THE INSTITUTE OF MATHEMATICAL SCIENCES

C.I.T. Campus, Taramani,

Chennai - 600 113.

ANNUAL REPORT

Apr 2016 - Mar 2017

Foreword

The Institute of Mathematical Sciences, Chennai has completed 55 years and I am pleased to present the annual report for 2016-2017 and note the strength of the institute and the distinctive achievements of its members.

During April 2016 - March 2017, there were 145 students pursuing their PhD and 54 scholars pursuing their post-doctoral programme at IMSc.

We are very pleased to note that an increasing number of students in the country are benefiting from our outreach programmes (for instance, 'Enriching Collegiate Education', 'Teachers' Enrichment Workshop', 'Enriching Mathematics Education', 'CSPathshala Teachers Workshop', 'Foldscope Workshop for TNSF', 'Mathematics and Craft Teachers Workshop', "International Day of 'Women and Girls in Science' for School girls", 'VIGYANshaala' and 'Science at the Sabha') and we are proud of the efforts of our faculty, both at an individual and at institutional level in this regard.

IMSc has started a monograph series during the year 2014, with a plan to publish at least one book every year. A book entitled "Problems in the Theory of Modular Forms" as 'IMSc Lecture Notes - 1' was published by last year. This is followed by two more books during the year 2016, such as, "Integral points on algebraic varieties-An introduction to Diophantine Geometry by Pietro Corvaja", and "Hilbert's Seventh Problem: Solutions and Extensions by Robert Tubbs", as IMSc Lecture Notes series 2 and 3 respectively.

Academic productivity of the members of the Institute has remained high. There were several significant publications reported in national and international journals and our faculty have authored a few books as well. Thirteen students were awarded Ph.D., and seven students have submitted their Ph.D. theses. Three students were awarded M.Sc. by Research, and two students have submitted their master's theses under the supervision of our faculty.

Several conferences and workshops were organized by IMSc during 2016-2017. These include, 'Network Theory: Conceptual Advances and Practical Applications', 'Automatic Presentations of Graphs and Numbers - A One day Workshop', 'Aspects of Gene and Cellular Regulation (AOGCR2016)', 'BioCS16: Mini-meeting on the Computer Science / Biology interface', '2nd IMSc School on Quantum Information', 'Plasticity and Failure in Disordered Materials' and 'Workshop on Arithmetic Complexity', to name but a few.

There were 55 lectures (lecture courses) conducted at the Institute during the reporting period. In addition, 3 lecture courses were given at Chennai Mathematical Institute for their National Undergraduate Programme.

The list of off-site conferences organized by IMSc faculty also continues to be impressive. This academic year nine conferences were organized outside including, 'Advanced Instructional School In Analytic Number Theory', 'A conference on Arithmetic Geometry and L-functions', 'Nurture 2016', 'Symposium on Algebraic Groups, TIMC-AMS Conference', 'Recent Advances in Operator Theory and Operator Algebras', 'Seshadri Constant', 'Academies' Lecture Workshop series', '9th Workshop on Methods for Modalities'.

We are proud to note the awards and honors bestowed on our faculty at the individual level. Vijay Kodiyalam was awarded "Fellow of the Indian Academy of Sciences", for

2017, by the Indian Academy of Sciences, Bangalore. Gautam I. Menon was awarded "Outstanding Reviewer" Award - Reports on Progress in Physics (2016), for 2017, by the Institute of Physics, UK. D.S. Nagaraj was awarded "Fellow", for 2017, by the "Indian National Science Academy". K.N. Raghavan was awarded "Fellow", for 2016, by the "National Academy of Sciences, Allahabad". Samal, Areejit was awarded "Max Planck Partner Group", for 2016, by the Max Planck Society (MPG).

This report was compiled through the efforts of the IMSc Annual Report Committee comprising of Drs. C. R. Subramanian, Shrihari Gopalakrishna, Pralay Chatterjee, Paul Pandian and Usha Devi. I owe my gratitude to all of them.

June, 2017 **V. Arvind**

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The Institute

1.1 Governing Board

Thiru. **K.P. Anbalagan**, Hon'ble Minister for Higher Education, Government of Tamil Nadu, Fort St. George, Chennai 600 009
(**Chairman**)

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(**Vice-Chairman**)

Prof. **S. K. Joshi**, Honorary Scientist Emeritus CSIR, Vikram Sarabhai Professor, National Physical Laboratory, Dr. K. S. Krishnan Road, New Delhi 110 012
(**Member**)

Prof. **Mustansir Barma**, Professor Emeritus TIFR Center for interdisciplinary Science, 21, Brindavan Colony, Osman Sagar Road, CBIT Post, Hyderabad.
(**Member**)

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(**Member**)

Prof. **Amitava Raychaudhuri**, Sir Tarak Nath Palit Professor of Physics, University of Calcutta, 92 Acharya Profulla Chandra Road, Kolkata - 700 009
(**Member**)

Vice Chancellor,
University of Madras, Chennai 600 005
(**Member**)

Prof. **Sudhanshu Jha**, 402 Vigyanshila, Juhu-Version Link Road, Seven Bungalow, Andheri(W), Mumbai 400 061
(**Member**)

Joint Secretary(R&D), Department of Atomic Energy, CSM Marg, Mumbai 400 001
(**Member**)

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(**Member**)

Shri **A. Karthik**, IAS, Secretary to Government, Secretariat, Higher Education Department, Govt of Tamil Nadu, Fort St. George, Chennai - 600 009
(**Member**)

Prof. **V. Arvind**, Director, The Institute of Mathematical Sciences, CIT Campus, Taramani, Chennai - 600 113
(**Member Secretary**)

1.2 Executive Council

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(**Chairman**)

Prof. **Mustansir Barma**, Professor Emeritus, TIFR Center for interdisciplinary Science, 21, Brindavan Colony, Osman Sagar Road, CBIT Post, Hyderabad.
(**Member**)

Prof. **C. S. Seshadri**, Director-Emeritus, Chennai Mathematical Institute, Plot Nos. D19 & D20, SIPCOT Information Technology Park, Padur Post, Siruseri - 603 103
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Prof. **Amitava Raychaudhuri**, Sir Tarak Nath Palit Professor of Physics, University of Calcutta, 92 Acharya Prafulla Chandra Road, Kolkata - 700 009
(**Member**)

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Shri **R. A. Rajeev**, IAS, Joint Secretary (Finance) to Government of India, Department of Atomic Energy, CSM Marg, Mumbai 400 001
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(**Member**)

Prof. **V. Arvind**, Director, The Institute of Mathematical Sciences, CIT Campus, Taramani, Chennai - 600 113
(**Member Secretary**)

1.3 Faculty

Name	Userid	Tel. Ext.

Computational Biology

Name	Userid	Tel. Ext.
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1.8.1 Administrative & Accounts Staff members

Vishnu Prasad S.
Registrar

Gayatri E.
Accounts Officer

Indra R.
Administrative Officer

Amulraj, D.	Archana Shukla
Ashfack Ahmed, G.	Babu, B.
Balakrishnan, J.	Baskaran, R.
Geetha, M.	Gopinath, S.
Janakiraman, J.	Jayanthi, S.
Johnson, P.	Moorthy, E.
Munuswamy, N.	Muthukrishnan, M.
Otheeswaran Usha	Padmanabhan, T.
Prafull Kumar	Parijatham, S.M.
Parthiban, V.	Prema, P.
Radhakrishnan, M. G.	Rajasekaran, N.
Rajendran, C.	Ramesh, M.
Ravichandran, N.	Ravindran, A.
Rizwan Shariff, H.	Shankaran, K.P.
Seenivasa Raghavan N.	Tamil Mani, M.
Varadaraj, M.	Vasudevan, T.V.
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Chapter 2

Research and Teaching

2.1 Computational Biology

2.1.1 Research Summary

Computational Biology

In collaboration with the experimental group of Sandhya Koushika at TIFR, Mumbai, the detailed model of axonal transport we have been developing over the past few years has been expanded and benchmarked to the experimental data. The simulations allow us to assess multiple aspects of the experiments that are not directly accessible to measurement. We find that transport in the crowded axonal environment is regulated by stationary clusters of stalled cargo, providing fresh insights into how cells deal with the inevitability of crowding. Further, such clusters of stationary vesicles might act as "depots" from which vesicles can be released or sequestered on demand. Constraints arising from crowding are especially important in the narrow confines of the axon and our work provides the first detailed picture of how cells may have evolved ways of ensuring that axonal transport of vesicle-encapsulated cargo can occur efficiently[Ku2]. A number of papers in this regard are being prepared for publication, including papers that separately discuss the role of actin and of microtubule ends in the regulation of axonal transport.

A related line of work, with the same group, concerns image analysis and modeling of mitochondrial positions along axons. That the distribution functions for mitochondrial positions is non-trivial has been known for awhile. We suggest that these distributions may reflect the length distribution of microtubule ends, leading to specific predictions for how such distributions might look like both in wild-type and in mutant *C. elegans* worms. A detailed analysis of mitochondrial positioning across different stages in the life-cycle of the worm is currently being completed.

A model for the positioning and other properties of chromosomes in human cells first proposed in Nucl. Acids Res (2014), which emphasizes the importance of active energy transduction into work arising from the hydrolysis of ATP molecules, has been extended in several ways[A]. The model now incorporates several cell-type specific features, such as activity distributions computed from RNA-seq experiments and looping as inferred from Hi-C exper-

iments. It predicts a variety of physical behaviour, including the distribution of individual chromosomes by gene density and by their centre of mass, the shapes and other statistical properties of individual chromosome territories as well as the nature of contacts between individual chromosomes. This work attempts to solve a number of outstanding problems in the understanding of nuclear architecture, the origins of chromosome territories, the separation of heterochromatin and euchromatin and the separation of distribution functions of active and inactive X chromosomes. It represents currently the only model which can reproduce these features.

A general agent-based model for the transmission of infectious diseases is currently being improved with further functionality. This model uses GIS-derived information as well as information from a large-scale population census from CMC, Vellore to model the movement and disease dynamics of a large number of individuals (agents). Currently, the extension of the model to include vectors such as mosquitoes, in addition to movies with visualisations is being carried out. A parallel effort is in the construction of synthetic populations, to avoid issues of confidentiality in the handling of data collected in the census.

A model for phototaxis in cyanobacteria, the motion of bacteria away from or towards a source of light, has been developed. We emphasize collective effects in our model, since these bacteria are known to interact and exert forces on each other through extensions called type-IV pili, and the initial migration towards the light source only happens after cells aggregate at the boundaries of the colony. Our agent-based model reproduces most features of what is experimentally seen and is general enough that we can assess the effects of various mutants as well as of "cheaters" i.e. members of the population of bacteria that are insensitive to light. The model is the first of its kind to investigate these phenomena.

2.1.2   List of Publications

The list of publications follows the following conventions: firstly, names of (co)authors who are not IMSc members are marked with a superscript *; secondly, the citation labels used for cross-referencing with the research summary are constructed from the last name of the first IMSc author and finally the list is ordered alphabetically according to the labels.

[**A**]
Ankit Agrawal, Nirmalendu Ganai*, Surajit Sengupta*, and Gautam I. Menon.
Chromatin as Active Matter.
J. Stat Mech, **2017**, 014001, 2017.

[**K**]
Gagan Deep Jhingan*, Sangita Kumari*, Shilpa V. Jamwal*, Haroon Kalam*, Divya Arora*, Neharika Jain*, Lakshmi Krishnakumaar, Areejit Samal, Kanury V. Rao*, Dhiraj Kumar*, and Vinay K. Nandicoori*.
Comparative proteomic analyses of virulent and clinical strains of Mycobacterium tuberculosis identifies strain-specific patterns.
Journal of Biological Chemistry, **291**, 14257–14273, 2016.

[Ku1]

Kausalya Murthy*, Parul Sood*, Aparna Ashok*, T. V. Kumar, Gautam I. Menon, and Sandhya Koushika*.
Stationary Cargo act as Local Regulators of Transport in Neurons.
2016.
(Submitted).

[Ku2]

Parul Sood*, Kausalya Murthy*, T. V. Kumar, Michael Nonet*, Gautam I. Menon, and Sandhya Koushika*.
Cargo crowding at actin-rich regions along axons causes local traffic jams in neurons.
2016.
(Submitted).

[S]

Areejit Samal, James P. Craig*, Samuel T. Coradetti*, J.P. Benz*, James A. Eddy*, Nathan D. Price*, and N. L. Glass*.
Network reconstruction and systems analysis of plant cell wall deconstruction by Neurospora crassa.
2016.
(Submitted).

[Sr1]

R.P. Sreejith, Jürgen Jost*, Emil Saucan*, and Areejit Samal.
Forman curvature for directed networks.
2016.
arXiv:1605.04662 (Submitted).

[Sr2]

R.P. Sreejith, Jürgen Jost*, Emil Saucan*, and Areejit Samal.
Systematic evaluation of a new combinatorial curvature for complex networks.
2016.
arXiv:1610.01507 (Submitted).

[Sr3]

R.P. Sreejith, Karthikeyan Mohanraj, Jürgen Jost*, Emil Saucan*, and Areejit Samal.
Forman curvature for complex networks.
J. Stat. Mech., page P063206, 2016.

[V]

R.P. Vivek-Ananth and Areejit Samal.
Advances in the integration of transcriptional regulatory information into genome-scale metabolic models.
Biosystems, **147**, 1–10, 2016.

2.2 Mathematics

2.2.1 Research Summary

Algebra

In [**D**], we produce an explicit embedding of the planar algebra of the Drinfeld double of a finite-dimensional, semisimple and cosemisimple Hopf algebra H into the two-cabling of the planar algebra of the dual Hopf algebra H^* and characterise the image.

Algebraic Geometry

On Hilbert Scheme of a Surface some results on Fourier-Mukai Transformed bundles are obtained [**Sn1**].

A degeneration of moduli of Hitchin pairs is obtained [**Sn4**].

A complete discription of automorphism group of a special type of toric varieties are obtained.

Algebraic Number Theory

A rational prime p is said to be a Wieferich prime with respect to the base a if

$$a^{p-1} \equiv 1 \pmod{p^2}, \tag{2.1}$$

and if the above congruence does not hold then we say that p is a non-Wieferich prime to the base a. Under the famous *abc* conjecture, J. H. Silverman proved that given any integer a, there are infinitely many non-Wieferich primes to the base a. In [**Ko3**], Silverman's proof is generalized to algebraic number fields with class number one.

Let K be a cyclic cubic field with discriminant f^2, where f is the conductor of K. In 1969, J. R. Smith proved that the cyclic cubic fields with conductors $7, 9, ..., 67$ are norm-Euclidean and the fields with conductors $73, 79, 97, 139, 151$ and $163 < f < 10^4$ are *not* norm-Euclidean. In this note [**Ko4**], it is established that all cyclic cubic fields with conductors $f \in [73, 11971]$ are in fact Euclidean provided they have class number one.

Analytic Number Theory

In [**Ko2**], it is proved that *Epstein's zeta-function $\zeta_Q(s)$, related to a positive definite integral binary quadratic form, has a zero $1/2 + i\gamma$ with $T \leq \gamma \leq T + T^{3/7+\varepsilon}$ for every sufficiently large positive numbers T.*

The study of arithmetic and analytic behavior of Multiple Lerch zeta functions has gained momentum due to the recent works of Brown, Deligne, Gonchrov, Hoffamann, Kaneko Nori, Teresoma, Zagier et al. In [**G5**], the authors extend an elegant idea of Ramanujan to establish the meromorphic continuation of these functions. Further, this method allows one to construct a "nice" set containing all possible singularities of these functions. In the

particular case of multiple Hurwitz zeta functions, the authors describe the exact set of singularities.

In [P] studied about Multiple Zeta Values and by considering what we have called Double Tails of Multiple Zeta Values, under the guidance of J. Oesterlé and obtained a fast algorithm to compute these zeta values. And now working on its generalizations in multiple polylogarithms jointly with J. Oesterlé and Henri Cohen. Also work in progress about establishing the relationship between Multiple Zeta Values and Multiple Apéry like Sums under the guidance of J. Oesterlé.

In [Ra] studied about Tail of a Moebius sum with coprimality conditions.

Cryptology

Digital water-marking concerns hiding digital images (water-mark image) inside another image (host image). A new method of water-marking has been proposed in the paper [Ko1] using Hilbert transform techniques. A detailed analysis of robustness of this scheme has been done.

Mathematical Physics

Multiplicity of spectrum is an important part of spectral theorem. In case of random Schrödinger operator, the multiplicity is still unknown. The work done in [M] is a step towards that direction. In it, a modified Anderson tight binding model is considered where the randomness affects a collection of sites at a time. In a large family of these operators, simplicity of singular spectrum is obtained. And in general, a bound on the multiplicity is obtained which only depends on the dimension of the lattice.

Modular forms

In [G2], the authors study the erratic behaviour of Fourier-coefficients of modular forms in short intervals. For simplicity, consider the classical Ramanujan τ-function and let k be a positive integer such that $\tau(n) \neq 0$ for $1 \leq n \leq k/2$. (This is known to be true for $k < 10^{23}$, and, conjecturally, for all k.) Further, let σ be a permutation of the set $\{1, ..., k\}$. In this work, the authors show that there exist infinitely many positive integers m such that $|\tau(m + \sigma(1))| < \tau(m + \sigma(2))| < ... < |\tau(m + \sigma(k))|$. This result is obtained as a special case of a general result involving Fourier-coefficients of any finite family of non-CM newforms.

Operator Algebras

In view of Sunder's impending retirement in April 2017, the focus was on ensuring that his two Ph.D. students, Keshab Chandra Bakshi and Sohan Lal Saini, completed the work necessary to be able to submit their Ph.D. theses titled 'On Intermediate subfactors' and 'On presentations of some planar algebras', respectively.

Finally, in collaboration with Vijay Kodiyalam, motivated by some existing literature on Quantum Information, generalisations of biunitry matrices to the general context of planar algebras were also studied. This is still work in progress, part of which is on a presentation

of the planar algebra of a set, which is jointly with Sohan Lal Saini and is expected to be part of his thesis.

Orthonormal bases have been first introduced by Mihai Pimsner and Sorin Popa in the context of finite index subfactors of type II_1 factors. Later Vaughan Jones and V. S. Sunder have shown the existence of more general bases which are not necessarily orthogonal and explored some beautiful properties of the same. These bases can be thought of as modular frames in the context of Hilbert C^*-module. Jones and Sunder also extended this notion of orthonormal bases for connected inclusion of finite dimensional C^*- algebras. In [**B1**] these more general bases have been characterized by three equivalent conditions in both the cases mentioned above. These bases behave nicely with respect to basic construction towers. As applications automorphisms of the hyperfinite II_1 factor R which are 'compatible with respect to the Jones' tower of finite dimensional C^*-algebras' have been studied. As a further application, in both cases a characterization, in terms of bases, of basic constructions has been obtained. Finally these bases are used to describe the phenomenon of multistep basic constructions (in both the cases)

The subfactor planar algebra $P^{(N \subset Q)}$ for an intermediate subfactor $N \subset Q \subset M$ of an irreducible subfactor $N \subset M$ of finite index has been explicitly worked out. This has been done in terms of the subfactor planar algebra $P^{(N \subset M)}$ by showing that if T is any planar tangle, the associated operator $Z_T^{(N \subset Q)}$ can be read off from $Z_T^{(N \subset M)}$ by a formula involving the so-called *biprojection* corresponding to the intermediate subfactor $N \subset Q \subset M$ and a scalar $\alpha(T)$ carefully chosen so as to ensure that the formula defining $Z_T^{(N \subset Q)}$ is multiplicative with respect to composition of tangles. Also, the planar algebra of $Q \subset M$ can be obtained by applying these results to $M \subset M_1$. As an application, one cute example of a semi-direct product subgroup-subfactor due to V. S. Sunder and Zeph Landau has been revisited. This is the subject of [**B2**].

From May 2 to August 26 Keshab Chandra Bakshi has visited Hausdorff Research Institute for Mathematics, University of Bonn, Germany to attend a trimester program on von Neumann algebras organized by Dietmar Bisch, Vaughan Jones, Sorin Popa and Dima Shlyakhtenko. There some research work on 'Angle between intermediate subfactors' has been done among other things jointly with Sayan Das, Zhengwei Liu and Yunxiang Ren. Between two intermediate subfactors of a subfactor of type II_1 factors a natural notion of angle has been introduced and relationship with 'so-called commuting squares and angle' has been examined. This has been done after expressing 'angle' in terms of Pimsner-Popa basis in the sense of [**B1**]. Surprisingly, for the minimal intermediate subfactors of an irreducible subfactor this angle has certain rigidity which was found to be very useful in investigating the lattice of intermediate subfactors. Moreover, the set of intermediate subfactors beyond the irreducible case also has been examined. This preprint, along with [**B1**] and [**B2**], will be a part of the thesis of Keshab Chandra Bakshi titled 'On intermediate subfactors' under the supervision of Professor V. S. Sunder.

Representation Theory

Suppose that G is a simple non-compact linear Lie group and that Γ a uniform lattice in G so that $\Gamma \backslash G$ compact. One has an associated G-invariant on $\Gamma \backslash G$ and a natural unitary representation of G on $L^2(\Gamma \backslash G)$ which decomposes as a Hilbert space direct sum of

certain irreducible unitary representations each occurring with finite multiplicity. When the symmetric space X associated to G is Hermitian, we show that certain unitary representation which is "cohomological" occurs with non-zero multiplicity in $L^2(\Gamma \backslash G)$, for a large family of arithmetic lattices, except when G is of exceptional type or has small complex rank or is locally isomorphic to $SU(p,p), SU(p,p-1)$. In the exceptional cases, a slightly weaker conclusion is obtained. The method involves construction of geometric cycles and exploiting the cohomological implications of the Kähler structure on the locally Hermitian symmetric space $\Gamma \backslash X$. ([**Mo**])

Let n be a positive integer with binary expansion $n = 2^{k_1} + \cdots + 2^{k_r}$, where $0 \le k_1 < \cdots < k_r$. For each partition λ of n, let V_λ denote the irreducible representation of S_n indexed by λ. Macdonald showed that the number of partitions of n such that the dimension of V_λ is odd, is $2^{k_1 + \cdots + k_r}$. Instead of looking at representations of S_n in isolation for each n, it is often revealing to look at relationships between them as n varies. Thus Alfred Young considered endowed the set of all partitions of all integers the structure of a graph. In [**Pra1**] it was found that in Young's graph, the partitions λ for which V_λ is odd form a binary tree with a simple recursive definition. This recursive definition is a structural interpretation of Macdonald's enumerative formula. These results were used by Isaacs, Navarro, Olsson and Tiep to construct a canonical bijective version of the McKay correspondence for odd dimensional representations of symmetric groups.

A related, but harder problem is that of counting the number of partitions of n for which the representing matrices of odd permutations of S_n in V_λ have non-trivial determinant. A closed formula for this enumerative problem has been discovered recently along with techniques to rapidly enumerate and randomly sample such partitions [**Pra2**].

Gelfand-Tsetlin theory was used by Vershik and Okounkov to give an new approach to the representation theory of symmetric groups. The classical orthogonal basis of Young is a Gelfand-Tsetlin basis for representations of symmetric groups. Algorithms for computing Gelfand-Tsetlin bases for the family of alternating groups in terms of Young's orthogonal basis were developed in [**Pra3**].

A study was undertaken of the bases introduced by Chari-Loktev for local Weyl modules of the current algebra associated to a special linear Lie algebra [**R**]. A new construct termed *partition overlaid patterns* (POPs for short) was introduced; they were shown to give convenient parametrizing sets of these bases and to thereby play a role analogous to that played by Gelfand-Tsetlin patterns in the representation theory of the special linear Lie algebra. Further, the natural notion of *area of a pattern* was studied and it was shown (from both combinatorial and representation theoretic points-of-view) that there is a unique pattern of maximal area among all those with a given bounding sequence and given weight.

2.2.2 List of Publications

The list of publications follows the following conventions: firstly, names of (co)authors who are not IMSc members are marked with a superscript [*]; secondly, the citation labels used for cross-referencing with the research summary are constructed from the last name of the first IMSc author and finally the list is ordered alphabetically according to the labels.

[B1]
Keshab Chandra Bakshi.
On Pimsner Popa bases.
Proc. Indian Acad. Sci. Math. Sci, **127(1)**, 117–132, 2017.

[B2]
Keshab Chandra Bakshi.
Intermediate planar algebra revisited.
2017.
https://arxiv.org/abs/1611.05811 (Submitted).

[Bi]
N. K. Bi, Amritanshu Prasad, and Giftson P. Santhosh∗.
Residues modulo powers of two in the young-fibonacci lattice.
2017.
arXiv:1702.06684 (Submitted).

[C]
Partha Sarathi Chakraborty and Arupkumar Pal∗.
An invariant for homogeneous spaces of compact quantum groups.
Advances in Mathematics, **301**, 258, 2016.

[D]
Sandipan De and Vijay Kodiyalam.
Planar algebras, cabling and the drinfeld double.
Quantum Topology, 2016.
(To be published).

[G1]
S. Gun and E. Saha∗.
A note on Generalized Euler-Briggs constants.
In K. Murty and R. Thangadurai, editors, *Highly Composite: Papers in Number Theory*,
  page 93. RMSLNS, Apr 2016.

[G2]
Y. Bilu∗, **J-M. Deshouillers**∗, **S. Gun, and F. Luca**∗.
Erratic behavior of Fourier-coefficients of modular forms in short intervals.
2017.
(Submitted).

[G3]
S. Gun, K. Murty∗, **and E. Saha**∗.
Linear and algebraic independence of Generalized Euler-Briggs constants.
J. Number Theory, **166**, 117, 2016.

[G4]
S. Gun and R. Murty∗.

Generalization of an identity of Ramanujan.
JRMS, **31(2)**, 125, 2016.

[**G5**]
S. Gun and B. Saha[*].
Multiple Lerch zeta functions and an idea of Ramanujan.
2016.
(Submitted).

[**G6**]
S. Gun, E. Saha[*], and S. Sinha[*].
A generalisation of an identity of Lehmer.
Acta Arithmetica, **173(2)**, 121, 2016.

[**G7**]
S. Gun and J. Sengupta[*].
Sign changes of Fourier coefficients of Siegel cusp forms of degree two on Hecke congruence
  subgroups.
Int. J. Number Theory, 2017.
(To be published).

[**I**]
Indranil Biswas[*], Pralay Chatterjee, and Chandan Maity.
The second cohomology groups of nilpotent orbits in classical lie algebras.
arXiv:1611.08369 (Submitted).

[**K**]
Vijay Kodiyalam and Srikanth Tupurani.
A note on generators for finite depth planar algebras.
Proceedings of the Indian Academy of Sciences (Mathematical Sciences), **126(2)**, 235, 2016.

[**Ko1**]
Rashmi Agarwal[*], Santhanam M. S.[*], and Srinivas Kotyada.
Digital watermarking : An approach based on hilbert transform.
In *IEEE International Conference on Computing, Communication and Automation (ICCCA-
  2016))*, page 2035, Apr 2016.

[**Ko2**]
Stephan Baier[*], Srinivas Kotyada, and Usha Keshav Sangale[*].
A note on the gaps between zeros of epstein's zeta-functions on the critical line.
Functiones et Approximatio, 2016.
FA1630 (To be published).

[**Ko3**]
Srinivas Kotyada and Subramani Muthukrishnan[*].
Non-wieferich primes in number fields and ABC conjecture.

Czechoslovak Mathematical Journal, 2017.
485/16 (6708) (To be published).

[Ko4]
Srinivas Kotyada and Subramani Muthukrishnan*.
A note on euclidean cyclic cubic fields.
Journal of Ramanujan Mathematical Society, 2017.
506 (To be published).

[Ks]
Ram Murty M* **and Srinivas K**.
Some remarks related to Maedas conjecture.
Proceedings of AMS, **144**, 4687, 2016.

[M]
Anish Mallick.
Multiplicity bound of singular spectrum for higher rank anderson models.
Journal of Functional Analysis, 2017.
10.1016/j.jfa.2017.02.018 (To be published).

[Mo]
Arghya Mondal and Parameswaran Sankaran.
Geometric cycles in compact locally hermitian symmetric spaces and automorphic representations.
2017.
Arxiv:1703.03206 (Submitted).

[P]
Akhilesh P.
Double tails of multiple zeta values.
Journal of Number Theory, **170(2017)**, 228, 2017.

[Pr]
Pralay Chatterjee and Chandan Maity.
On the second cohomology of nilpotent orbits in exceptional lie algebras.
Bull. Sci. Math., **141(1)**, 10–24, 2017.

[Pra1]
Arvind Ayyer***, Amritanshu Prasad, and Steven Spallone***.
Odd partitions in young's lattice.
Séminaire Lotharingien de combinatoire, **75**, B75g, 2016.

[Pra2]
Arvind Ayyer***, Amritanshu Prasad, and Steven Spallone***.
Representations of symmetric groups with nontrivial determinant.
Journal of Combinatorial Theory, Series A, **150**, 208, 2017.

[Pra3]
Amritanshu Prasad and T. Geetha[*].
Comparison of gelfand-tsetlin bases for alternating and symmetric groups.
2016.
arXiv:1606.04424 (Submitted).

[Pra4]
Amritanshu Prasad, Pooja Singla[*]**, and Steven Spallone**[*].
Similarity of matrices over local rings of length two.
Indiana University Mathematics Journal, **64(2)**, 471, 2016.

[R]
K. N. Raghavan, B. Ravinder, and Sankaran Viswanath.
On Chari-Loktev bases for local Weyl modules in type A.
2016.
arXiv:1606.01191 (Submitted).

[Ra]
Akhilesh P[*] **and Olivier Ramare**.
Tail of a moebius sum with coprimality conditions.
2017.
(Submitted).

[S]
P Sankaran.
Twisted conjugacy in certain pl-homeomorphism groups.
Mathematics Student, **85**, 1, 2016.

[Sa]
Daciberg L. Gonçalves[*]**, Parameswaran Sankaran, and Ralph Strebel**[*].
Groups of PL-homeomorphisms admitting non-trivial invariant characters.
Pacific Journal of Mathematics, **287(1)**, 101, 2017.

[Sh1]
Uday B. Sharma.
Simultaneous similarity classes of commuting matrices over a finite field.
Linear Algebra and its Applications, **501**, 48, 2016.

[Sh2]
Uday B. Sharma.
Asymptotic of number of similarity classes of commuting tuples.
Journal of the Ramanujan Mathematical Society, **31**, 385, 2016.

[Sn1]
Biswas Indranil[*] **and Nagaraj D. S**.
Fourier-mukai transform of vector bundles on surfaces.

Journal of Ramanujan Math. Soc., 2017.
(To be published).

[**Sn2**]
Biswas Inranil∗, Kannan Senthamarai∗, and Nagaraj D. S.
On a smooth compactification of PSL$(n, \mathbb{C})$/T..
Kyoto J. Math. 56 (2016), **56(1)**, 165, 2016.

[**Sn3**]
Abdelghani E. Mazouni∗, Fatima Laytimi∗, and Nagaraj D. S.
Special projections of veronese surfaces.
Proc. Indaian Acad. Sci. 127 (2017), **127(1)**, 59, 2017.

[**Sn4**]
Balaji Vikraman∗, Barik Pabitra∗, and Nagaraj D. S.
A degeneration of moduli of hitchin pairs.
Int. Math. Res. Not. IMRN 2016,, **21**, 6581, 2017.

[**Su1**]
V. S. Sunder.
On projections and non-existence of suprema.
In *Proceeding of 2016 Asian Mathematical Conference*. IEEE, Feb 2017.
(To be published).

[**Su2**]
V. S. Sunder.
Operator algebras in india in the past decade.
Ind. J. of Pure and Applied Math, (INSA journal), 2016.
(Submitted).

[**V**]
Sushmita Venugopalan.
Yangmills heat flow on gauged holomorphic maps.
Journal of Symplectic Geometry, **14(3)**, 903, 2016.

[**Vi1**]
J. Mehta∗ and G. K. Viswanadham.
Analytic continuation of multiple hurwitz zeta functions.
J. Math. Soc. Japan, 2016.
(To be published).

[**Vi2**]
G. K. Viswanadham.
On the q-exponents of generalized modular function.
The Ramanujan Journal, 2016.
(To be published).

2.3 Physics

2.3.1 Research Summary

Astrophysics

After their death through supernova explosions, moderate mass (10 to 25 times of the Sun) stars become neutron stars. Neutron stars are mostly composed of neutrons and a few protons, electrons and probably other baryons. Density at the centre of a neutron star can be as high as 10^{14} gm cm^{-3}. Neutron stars usually weigh around 1.4 times that of the Sun but have radii of only around 10 km. These stars take only 1 millisecond to 1 second to complete one full rotation around their own axis. The value of the magnetic field at the surface of neutron stars usually lies between $10^8 - 10^{15}$ Gauss. These stars emit electromagnetic beams along their magnetic axis which are generally misaligned with the spin axes. Thus the beam also rotates and might fall onto earth once in each rotation, i.e., the neutron star behaves like a light-house and called as a pulsar. Pulsars, especially when in binary systems, are excellent tools to test various theories of basic physics including general relativity and the physics of ultra-dense matter.

Binary pulsars are of particular interest. Population synthesis studies are going on to understand their overall properties. Orbital dynamics under general relativity is being explored. An effort is going on to build an "Indian Pulsar Timing Array" which will join the "International Pulsar Timing Array" to detect nano-Hertz gravitational waves.

Pulsar surveys to discover new pulsars are being undertaken. Observations using GMRT and ORT have been performed.

Classical and Quantum Gravity, Black Holes, Cosmology

The work on gravitational waves in de Sitter background is continued. It is being argued that the cosmological horizon may suffice for estimating energy-momentum radiated from spatially compact sources. This is done by showing that physical quantities such as energy-momentum are transported along out-going light cones even though the wave fields themselves do have a tail term [**D2**]. Numerical estimates of effects of cosmological constant on orbital parameters of binary systems are being computed.

Classical and Quantum Optics

We present [**G2**] a coherent state-vector method which can explain the results of a nested linear Mach-Zehnder Interferometric experiment. Such interferometers are used widely in Quantum Information and Quantum Optics experiments and also in designing quantum circuits. We have specifically considered the case of an experiment by Danan et al. (Phys. Rev. Lett. 111, 240402 (2013)) where the outcome of the experiment was spooky by our intuitive guesses. However we have been able to show by our method that the results of this experiment is indeed expected within the standard formalism of Quantum Mechanics using any classical state of a single-mode radiation field as the input into the nested interferometric set-up of the aforesaid experiment and thereby looking into the power spectrum of the output beam.

Condensed Matter Physics

Using extensive computations, we have studied how different dynamically arrested states (e.g. glasses, gels, etc.) respond to perturbations of various kinds.

When external shear is applied to a quiescent glass, in the form of an applied rate of deformation, we have demonstrated that the yielding of the glass is related to an underlying percolation of regions of higher mobility, with the transition predicted to belong to the directed percolation universality class [Ch7]. Beyond this first characterization of spatial heterogeneity, further localisation of mobility is observed in the form of shear-bands. Using extensive simulations over a range of applied shear-rates, age of the glass and ambient temperatures, we have also explored how the interplay of these conditions determine the extent of heterogeneity during formation of shear-bands, with the effect most prominent at low temperatures, longer ages and smaller shear-rates [Ch8].

We have also studied how aged glasses respond to isotropic expansion at different rates and demonstrated that onset of phase-separation occurs via cavitation [Ch3]. Further, we have compared the morphologies that one obtains in the dense part of the two-phase region, either via a thermal quench or a volume expansion [Ch4]. Our study shows that even in the case of slow dynamics, it is possible to obtain simple cavitated states via both paths if one uses slow rates of quenching or expansion. Otherwise, more complex morphologies develop.

In many biological systems, specially in cells and tissues, regimes of glassy dynamics have been observed in experiments. For such cases, quite often, a simple model corresponds to a dense collection of anisotropic particles which are self-propelled via an internal active force. We have charted out the glassy regime in the temperature-active state diagram of such an assembly of active dumb-bells and demonstrated that the activity-dominated regime exhibits complex dynamical patterns in the form of vortex-like structures, whose scale becomes larger in the vicinity of the arrested state, very different from the regime where thermal effects dominate [Ch6].

Thermal conductivity is an essential material property and we have studied how this depends on the history of preparation in the case of glassy systems. Our studies show that the conductivity decreases with increasing age or slower cooling rate. This is rationalized via connecting with the underlying potential energy landscape, showing that lowering of conductivity for lower-energy inherent structures is related to the localization of the corresponding high frequency harmonic modes [Ch1].

We have explored the non-equilibrium aging dynamics in a microscopic model for colloidal gels [Ch2]. We find that gelation resulting from a kinetically-arrested phase separation is accompanied by 'anomalous' particle dynamics revealed by superdiffusive particle motion and compressed exponential relaxation of time correlation functions. Spatio-temporal analysis of the dynamics reveals intermittent heterogeneities producing spatial correlations over extremely large length scales.

We study the rheology of a soft particulate system where the interparticle interactions are weakly attractive, scanning a wide range of packing fractions, imposed shear-rate and strength of attraction [Ch5]. We find that at small shear rates generically a fragile isostatic solid is formed, even if we go to smaller densities. With increasing shear-rates, for such fragile solids, nonmonotonic flow curves occur which lead to the formation of persistent shear bands in large enough systems. By tuning the damping parameter, we also show that

inertia plays an important role in this process. We have characterized the properties of the emergent shear bands, and also explored the history effects during ramping experiments.

Metal insulator transitions is studied in condensed matter theory

CP-Violation, Neutrinos, B-Physics and New Models

The leptonic CP (Dirac) phase is now the most crucial unknown parameter in neutrino oscillation physics. While there are hints for a preferred quadrant for this parameter, its determination is dependent on the equally unknown mass ordering of the neutrinos. In this paper it is shown through a simple analytical analysis that this CP phase may be determined using low energy atmospheric neutrino data almost unambigiously, independent of the ordering of masses and almost independent of the octant ambiguities. While sensitivity is maximum when the neutrino and antineutrino samples can be distinguished, it is also possible to demonstrate this sensitivity through a comparison with present Super-Kamiokande data [**I**].

Physics Beyond the Standard Model

One of the unappealing aspects in the standard model (SM) of particle physics is the instability in the Higgs sector. Various proposals for physics beyond the standard model (BSM) have been made to stabilize the Higgs sector. The large hadron collider (LHC) is probing these BSM extensions. A possible structure that stabilizes the weak scale is the "little-Higgs". In Ref. [**Sh3**] on the "Status and prospects of the two-Higgs-doublet SU(6)/Sp(6) little-Higgs model and the alignment limit" we study a particular little-Higgs model with a two Higgs doublet structure and ask how well it passes the LHC constraints and study the prospects for discovery at the LHC. The LHC had some tentative hints for a new resonance in the diphoton channel at 750 GeV. These hints seems to have gone away after more data taking at the LHC. In Ref. [**Sh1**] we showed the regions of parameter space that is compatible with the earlier excess. Another unanswered aspect of the SM is the lack of a good dark matter candidate. In Ref. [**Sh2**] we propose a singlet vector-like fermion dark matter candidate and study if it can be the observed dark matter.

Foundations of Quantum Mechanics

Nonlocality is one of the main characteristic features of quantum systems involving more than one spatially separated subsystem. It is manifested theoretically as well as experimentally through violation of some local realistic inequality. On the other hand, classical behavior of all physical phenomena in the macroscopic limit gives a general intuition that any physical theory for describing microscopic phenomena should resemble classical physics in the macroscopic regime, the so-called macrorealism. In the 2-2-2 scenario (two parties, with each performing two measurements and each measurement having two outcomes), contemplating all the no-signaling correlations, we characterise [**Ban2**] which of them would exhibit classical (local realistic) behavior in the macroscopic limit. Interestingly, we find correlations which at the single-copy level violate the Bell-Clauser-Horne-Shimony-Holt inequality by an amount less than the optimal quantum violation (i.e., Cirel'son bound $2\sqrt{2}$), but in the macroscopic limit gives rise to a value which is higher than $2\sqrt{2}$. Such correla-

tions are therefore not considered physical. Our study thus provides a sufficient criterion to identify some of unphysical correlations.

The connection between coarse-graining of measurement and emergence of classicality has been investigated for some time, if not well understood. Recently in (Phys. Rev. Lett. 112, 010402 (2014)) it was pointed out that coarse-graining measurements can lead to non-violation of Bell-type inequalities by a state which would violate it under sharp measurements. We study here [**V**] the effects of coarse-grained measurements on bipartite cat states. We show that while it is true that coarse-graining does indeed lead to non-violation of a Bell-type inequality, this is not reflected at the state level. Under such measurements the post-measurement states can be non-classical (in the quantum optical sense) and in certain cases coarse-graning can lead to an increase in this non-classicality with respect to the coarse-graining parameter. While there is no universal way to quantify non-classicality, we do so using well understood notions in quantum optics such as the negativity of the Wigner function and the singular nature of the Gluaber-Sudharshan P distribution.

Mathematical Physics

The number of ways in which a given integer n can be written as a sum of primes is discussed. In particular, an asymptotic form P(n) valid for n tending to infinity is obtained analytically using standard techniques of quantum statistical mechanics. First, the bosonic partition function of primes, or the generating function of unrestricted prime partitions in number theory, is constructed. Next, the density of states is obtained using the saddle-point method for Laplace inversion of the partition function in the limit of large n. This directly gives the asymptotic number of prime partitions P(n). The leading term in the asymptotic expression grows exponentially as sqrt[n/ln(n)] and agrees with previous estimates. The next-to-leading order term in the exponent, porportional to ln[ln(n)]/ln(n), is calculated and it is shown that an earlier result in the literature for its coefficient is incorrect. Furthermore, we also calculate the next higher order correction, proportional to 1/ln(n) which so far has not been available in the literature. Finally, the analytical results are compared with the exact numerical values of P(n) . Unlike for other types of partitions, the asymptotic limit for the prime partitions is reached rather slowly [**Mur**].

Nonlinear Dynamics, Solitons and Chaos

Recently, there have been many attempts to understand the collective dynamics of large, complex systems that occur in a variety of physical, biological and social contexts. Several of these studies suggest that detailed knowledge of the connection topology of a system is crucial for explaining the resulting dynamical behavior. Contrary to the expectation that complicated connection topologies are needed to generate the complex patterns observed in real-world systems, a recent study has shown that, in fact, even simple, homogeneous systems are capable of exhibiting non-trivial dynamical patterns through spontaneous symmetry breaking [**Me4**]. An important implication of this study is that certain features of the collective dynamics of complex systems can be explained even without complete knowledge of their wiring diagrams.

The study has looked at the specific example of a densely connected network of brain regions, whose collective dynamical activity correspond to large-scale patterns of neural excitation

can have important physiological implications. Each node of the network is modeled using the well-known Wilson-Cowan model that describes the local aggregate activity in a brain region. A rich variety of dynamical patterns has been observed that arise through spontaneous symmetry breaking, some of which qualitatively resemble those seen using a realistic connection topology of a primate brain (indicating their relative independence from the specific details of the underlying connectivity structure). Another important observation, of particular importance to physicists, is that while the attractors of the globally coupled system are preserved if the connectivity is decreased, even a marginal deviation from this mean-field situation can radically alter the robustness of certain patterns. The study also suggest an intriguing connection between seemingly contradictory findings from two recent experiments: while the disruption of communication between areas of the cerebral cortex has been linked to loss of consciousness in one set of experiments, another study has found that the development of fatigue is accompanied by an increase in the degree of synchronization between brain areas. Taken together these results imply that decreased strength of communication between brain regions can be accompanied by increased synchronization in their activity. Although this may appear counter-intuitive, the study results demonstrate that these observations need not in fact be incompatible.

The heart is a fascinating example of nonlinear dynamics at work in biology. Disruptions in the normal rhythmic functioning of the heart, termed as arrhythmia, often result from qualitative changes in the excitation dynamics of the organ. It has recently been observed that the occurrence of sudden cardiac death has a close statistical relationship with the time of day, viz., ventricular fibrillation is most likely to occur between 12 am-6 am, with 6 pm-12 am being the next most likely period. Consequently there has been significant interest in understanding how cardiac activity is influenced by the circadian clock, i.e., temporal oscillations in physiological activity with a period close to 24 hours and synchronized with the day-night cycle. Although studies have identified the genetic basis of circadian rhythm at the intracellular level, the mechanisms by which they influence cardiac pathologies are not yet fully understood. Evidence has suggested that diurnal variations in the conductance properties of ion channel proteins that govern the excitation dynamics of cardiac cells may provide the crucial link. Recent work [Me3] has investigated the relationship between the circadian rhythm as manifested in modulations of ion channel properties and the susceptibility to cardiac arrhythmias by using a mathematical model that describes the electrical activity in ventricular tissue. It shows that changes in the channel conductance that lead to extreme values for the duration of action potentials in cardiac cells can result either in abnormally high-frequency reentrant activity or spontaneous conduction block of excitation waves. Both phenomena increase the likelihood of wavebreaks that are known to initiate potentially life- threatening arrhythmias. Thus, disruptive cardiac excitation dynamics are most likely to occur in time-intervals of the day-night cycle during which the channel properties are closest to these extreme values, providing an intriguing relation between circadian rhythms and cardiac pathologies.

Strategies incorporating direct reciprocity, e.g., Tit-for-Tat and Pavlov, have been shown to be successful for playing the Iterated Prisoners Dilemma (IPD), a paradigmatic problem for studying the evolution of cooperation among non-kin individuals. However it is an open question whether such reciprocal strategies can emerge as the rational outcome of repeated interactions between selfish agents. It has been shown recently [S2] that adopting a co-action perspective, which takes into account the symmetry between agents - a relevant consideration in biological and social contexts - naturally leads to such a strategy. For a 2-player IPD, it

is shown that the co-action solution corresponds to the Pavlov strategy, thereby providing a rational basis for it. For an IPD involving many players, an instance of the Public Goods game where cooperation is generally considered to be harder to achieve, it is shown that the cooperators always outnumber defectors in the co-action equilibrium. This can be seen as a generalization of Pavlov to contests involving many players. In general, repeated interactions allow rational agents to become aware of the inherent symmetry of their situation, enabling them to achieve robust cooperation through co-action strategies - which, in the case of IPD, is a reciprocal Pavlovian one.

Quantum Computations

An interesting connection has been established between two apparently unrelated concepts, namely, quantum nonlocality and Bayesian game theory. It has been shown that nonlocal correlations in the form of advice can outperform classical equilibrium strategies in common-interest Bayesian games and also in conflicting-interest Bayesian games. Classical equilibrium strategies can be of two types, fair and unfair. Whereas in fair equilibrium payoffs of different players are equal, in the unfair case they differ. An advantage of nonlocal correlation has been demonstrated over fair strategies only. We show that quantum strategies can outperform even the unfair classical equilibrium strategies. For this purpose we consider [**G3**] a class of two-player Bayesian games. It becomes that such games can have only fair equilibria, both fair and unfair equilibria, or only unfair ones. We provide a simple analytic method to characterize the nonlocal correlations that are advantageous over the classical equilibrium strategies in these games. We also show that quantum advice provides a better social optimality solution (a relevant notion of equilibrium for the unfair case) over the classical one.

The principle of superposition is an intriguing feature of Quantum Mechanics, which is regularly exploited at various instances. A recent work [Phys. Rev. Lett. 116, 110403 (2016)] shows that the fundamentals of Quantum Mechanics restrict the superposition of two arbitrary pure states of a quantum system, even though it is possible to superpose two quantum states with partial prior knowledge. The prior knowledge imposes geometrical constraints on the choice of input pure states. We discuss [**Do**] an experimentally feasible protocol to superpose multiple pure states of a d dimensional quantum system and carry out an explicit experimental realization to superpose two single-qubit pure states on a two-qubit NMR quantum information processor.

Statistical Mechanics

While mainstream economic theory has been primarily concerned with the behavior of agents having complete information and perfect rationality, it is unlikely that either of these assumptions are valid in reality [**S**]. This has led to the development (among others, by statistical physicists) of theories that incorporate bounded rationality and also to the study of the role of information in economic interactions (information economics). In particular, information asymmetry, where all the agents do not have access to the same information has aroused much attention, as it has potential to significantly distort economic outcomes resulting in the failure of the market mechanism. It is often assumed that having more data than others gives agents a relative advantage in their interactions.Recent work [**S1**] has considered the situation where agents differ in terms of the granularity (as well as the quantity) of the

information that they can access. This has been investigated in the framework of a model system comprising agents with bounded rationality competing for limited resources, viz., the minority game. It has been shown that there is no simple relation between the amount of information available to an agent and its success as measured by payoffs received by it. In particular, an agent having access to a much coarser-grained information (that is also quantitatively less) than the rest of the population can have a relative advantage under certain conditions. The work shows that the success of individual agents can depend crucially on the relative fraction of the population that uses information of a specific type.

Individuals in free societies frequently exhibit striking coordination when making independent decisions en masse. Examples include the regular appearance of hit products or memes with substantially higher popularity compared to their otherwise equivalent competitors or extreme polarization in public opinion. Such segregation of events manifests as bimodality in the distribution of collective choices. Recent work [Si] has quantified how apparently independent choices made by individuals result in a significantly polarized but stable distribution of success in the context of the box-office performance of movies and show that it is an emergent feature of a system of non-interacting agents who respond to sequentially arriving signals. The aggregate response exhibits extreme variability amplifying much smaller differences in individual cost of adoption. Due to self-organization of the competitive landscape, most events elicit only a muted response but a few stimulate widespread adoption, emerging as "hits".

It has always been a difficult issue in Statistical Mechanics to provide a generic interaction Hamiltonian among the microscopic constituents of a macroscopic system which would give rise to equilibration of the system. One tries to evade this problem by incorporating the so-called H-theorem, according to which, the (macroscopic) system arrives at equilibrium when its entropy becomes maximum over all the accessible micro states. This approach has become quite useful for thermodynamic calculations using the (thermodynamic) equilibrium states of the system. Nevertheless, the original problem has still not been resolved. In the context of resolving this problem it is important to check the validity of thermodynamic concepts – known to be valid for macroscopic systems – in the microscopic world. Quantum thermodynamics is an effort in that direction. As a toy model towards this effort, we look here [C2] at the process of thermalization of a two-level quantum system under the action of a Markovian master equation corresponding to memory-less action of a heat bath, kept at certain temperature. A two-qubit interaction Hamiltonian (H_{th}, say) is then designed – with a single-qubit mixed state as the initial state of the bath – which gives rise to thermalization of the system qubit in the infinite time limit. We then look at the question of equilibration by taking the simplest case of a two-qubit system A+B, under some interaction Hamiltonian H_{int} (which is of the form of H_{th}) with the individual qubits being under the action of separate heat baths of temperatures T_A, and T_B. Different equilibrium phases of the two-qubit system are shown to appear – both the qubits or one of them get cooled down.

We study [T] coupled quantum systems as working media of thermodynamic machines. With suitable co-ordinate transformation, the coupled system appears to be uncoupled in the new frame of reference. In that case, the global efficiency of the total system is bounded (both from above and below) by the efficiencies of the independent subsystems, provided both the independent subsystems work in the engine mode. This is also true for the coefficient of performance when the coupled system behave as refrigerator. We make a comparative study between coupled spin-1/2 systems and coupled quantum oscillators considering analogous

interaction for both the systems. Interestingly, for particular kind of interactions, the efficiency of the coupled oscillators outperforms that of the coupled spin-1/2 systems when they work as heat engines. However, for same interaction, the coefficient of performance behaves in a reverse manner, while the system work as refrigerator. Therefore coupling can cause opposite effects in the figure of merits of heat engine and refrigerator.

In open system dynamics, a very important feature is the Markovianity or non-Markovianity of the environment i.e., whether there is any feedback of information into the system from the environment that has been previously transferred from the system. We have considered [**Ma1**] a toy model here, with a qubit acting as a system and an environment consisting of a collection of non-interacting qubits. Following the idea of Rivas et al. we device a non-Markovianity witness for the model. An ancilla qubit (which is not a part of the environment) is attached to the system and the the system-ancilla joint state is initially set to a maximally entangled state. Departure from monotonicity of the decay of this entanglement decay on interaction with the environment serves as a Witness of non-Markovianity. We examine the system-environment dynamics of our model for different types of coupling of the system qubit with the individual environment qubits. We find that for a time-independent coupling, any functional form of coupling will give rise to non-Markovianity. For space-independent coupling, our Witness detects that polynomial coupling will give rise to non-Markovianity. Also for space-independent exponential coupling, non-Markovianity can be witnessed in certain regions of parameter values. We further analyse space and time-dependent coupling for some special cases and find extremal values of the coupling parameter that will give rise to non-Markovianity. These extremal values can be seen as transition values from fully non-Markovian to possibly Markovian dynamics.

Hard squares interacting only through excluded volume interactions have been studied for a long time as the prototypical model showing columnar or striped order. Despite the long history, analytical estimates of the critical parameters are poor, off by a factor of five or more. A systematic calculation of the interfacial tension between two columnar phases is developed leading to an accurate estimate of the critical parameters for the hard square and hard rectangle gases [**Ma2**, **N1**].

The hard sphere system in two dimensionsional continuum is known to undergo two entropy driven transitions with increasing density: first from a liquid phase to a hexatic phase with quasi long range orientational order and second from the hexatic phase to a solid phase with quasi long range positional order and long range orientational order. The corresponding lattice problem, relevant for the study of adsorption of gas molecules onto surfaces, is not that well understood. The k-NN hard core lattice gas model in which the first k next nearest neighbour sites of a particle are excluded from occupation by other particles is studied on a two dimensional square lattice. This model is the lattice version of the hard disc system with increasing k corresponding to decreasing lattice spacing. It is shown that the lattice model will show multiple transitions only if the high density phase has columnar order. It is shown that there are only eighteen values of k, all less than k = 4134, that show columnar order, while the others show solid-like sub-lattice order [**N2**].

The nature of the velocity distribution of a driven granular gas, though well studied, is unknown as to whether it is universal or not, and if universal what it is. The tails of the steady state velocity distribution if determined for a driven inelastic Maxwell gas, which is a simple model of a granular gas where the rate of collision between particles is independent of

the relative velocity. It is shown that the steady state velocity distribution is non-universal and depends strongly on the nature of driving. The asymptotic behaviour of the velocity distribution are shown to be identical to that of a non-interacting model where the collisions between particles are ignored [**P**].

Cortical bone, found in the central part of long bones like femur, is primarily responsible for maintaining structural integrity. Cortical bone is of two types: Plexiform bone and Haversian bone. The specific role of the structure of the network of pores in plexiform bone on its fracture behaviour under compression is examined. CT scan images of the sample pre- and post- compressive failure show the existence of weak planes formed by aligned thin long pores extending through the length. It is shown that the physics of the fracture process is captured by a two dimensional random spring network model that reproduces well the macroscopic response and qualitative features of fracture paths obtained experimentally, as well as avalanche statistics seen in experiments on porcine bone [**Ra**].

Kolmogorov phenomenology for non-equilibrium cascade processes like turbulence assume locality of interaction. It is important to under to answer the important and generic question of what happens when interactions are non-local. An archetypal example of a turbulent system driven far from equilibrium by sources and sinks of a conserved quantity is irreversible aggregation. The source is a steady input of monomers and the evaporation of colliding particles with a small probability is the sink. Using exact and heuristic analyses, a universal regime and two distinct non-universal regimes distinguished by the relative importance of mergers between small and large particles are found. Logarithmic corrections are found at the boundary between the regimes as conjectured by Kraichnan for two dimensional turbulence [**Du**].

Most biopolymers in nature are charged polymers in a neutralizing solution. For understanding functions such as aggregation or collapsing into small sizes, it is vital to understand how attractive interactions arise in a system of like-charged polymers. Through extensive Monte Carlo simulations, it is shown that the existing theories of the interactions are unable to explain the observed dependence of the gyration radius on the charge density. By modifying suitably the counterion fluctuation theory, it is possible to explain the rich behaviour observed for a charged polymer in a good as well as poor solvent [**To2**, **To3**].

Extensive Molecular dynamics were performed on a single flexible polyelectrolyte (a charged polymer) in both good and poor solvent conditions to understand the fundamental nature of the attraction in a similarly charged system that leads to a collapsed conformation under certain conditions. The simulations stringly support counterion fluctuation model over other existing theoretical frameworks to explain the same. The simulations also revealed that the collapsed state has multiple regimes and certain system parameters have the ability to change the effective nature of the solvent conditions, which has not been seen previously. We have successfully explained the role of counterion size in altering the very nature of attractive interactions between monomers of the polyelectrolyte and explain how this leads to change of sign of second virial coefficient. Coarse grained MD simulations have also been used to understand the emergence of attractive interactions among rod-like charged polymers which lead to their aggregation. The aggregation dynamics have been found to be independent of system parameters such as charge density of the polymers, density, length of the polymer. These results strongly hint at effective short-ranged attractive interactions in a system which has inherently modelled long-range interactions. The attractive interactions arise from condensation of the counterions on the rod-like PEs, effectively renormalizing

the charges on the polymers. This renormalization of the charges makes the interactions effectively short-range in nature. To further confirm this, we model the aggregation dynamics using the Smoluchowski coagulation equation with kernels determined from the molecular dynamics simulations and compare the results of aggregation dynamics.

String Theory

The entanglement entropy of sine-Gordon theory for a single interval is computed using both field theoretic and holographic techniques. The results match for near-marginal perturbations up to leading order in the coupling.[Bh]

The exact renormalization group is used to study the RG flow of quantities in field theories. The basic idea is to write an evolution operator for the flow and evaluate it in perturbation theory. This is easier than directly solving the differential equation. This is illustrated by reproducing known results in four dimensional 966; 4 field theory and the two dimensional Sine-Gordon theory. It is shown that the calculation of beta function is somewhat simplified. The technique is also used to calculate the c-function in two dimensional Sine-Gordon th eory. This agrees with other prescriptions for calculating c-functions in the literature. If one extrapolates the connection between central charge of a CFT and entanglement entropy in two dimensions, to the c-function of the perturbed CFT, then one gets a value for the entanglement entropy in Sine-Gordon theory that is in exact agreement with earlier calculations (including one using holography) in [O]

The problem of locally describing tubular geometry around a submanifold embedded in a (pseudo)Riemannian manifold in its general form has been considered in [Mu]. Given the geometry of ambient space in an arbitrary coordinate system and equations determining the submanifold in the same system, the tubular expansion coefficients in terms of this *a priori data* have been computed. This is done by using an indirect method that crucially applies the tubular expansion theorem for vielbein previously derived. With an explicit construction involving the relevant coordinate and non-coordinate frames consistency of the whole method up to quadratic order in vielbein expansion has been verified. Furthermore, certain (long and tedious) higher order computation which verifies the first non-trivial spin connection term in the expansion has been performed. Earlier a similar method was used to compute tubular geometry in loop space. This work has been explained in the light of the present general construction.

Along with students Renjan R. John and Madhusudhan Raman, we continued our analysis of supersymmetric gauge theories using the methods of equivariant localization. One of our main focus was the understanding of modular and duality properties of interesting observables in the gauge theory such as the expectation values of the chiral ring elements [As2]. Another focus has been to extend the study of four dimensional gauge theories to include surface operators: these are half-BPS states and we end up with coupled 2d/4d systems. The low energy effective action is now determined by two holomorphic functions. Using a combination of localization and the constraints from S-duality, we calculated these in terms of elliptic and quasi-modular forms of the modular group [As1]. We also make provide evidence for a dual description of surface operators in terms of two dimensional sigma models coupled to the four dimensional gauge theory by showing that the effective superpotential that governs the IR dynamics matches the one obtained using localization.

2.3.2 List of Publications

The list of publications follows the following conventions: firstly, names of (co)authors who are not IMSc members are marked with a superscript *; secondly, the citation labels used for cross-referencing with the research summary are constructed from the last name of the first IMSc author and finally the list is ordered alphabetically according to the labels.

[A]
C. V. Ambarish, N. Lo Gullo*, Th. Busch*, L. Dell'Anna*, and C. M. Chandrashekar.
Dynamics and energy spectra of aperiodic discrete-time quantum walks.
Phys. Rev. E, 2016.
arXiv:1611.04427 (To be published).

[As1]
Sujay K. Ashok, Marco Billo*, Eleonora DellAquila*, Marialuisa Frau*, Renjan John, and Alberto Lerda*.
Modular and duality properties of surface operators in n=2* gauge theories.
Journal of High Energy Physics, 2017.
1702.02833 (Submitted).

[As2]
Sujay K. Ashok, Marco Billo*, Eleonora DellAquila, Marialuisa Frau*, Alberto Lerda*, Micha Moskovic*, and Madhusudhan Raman.
Chiral observables and s-duality in n = 2* u(n) gauge theories.
Journal of High Energy Physics, **11(2016)**, 020, 2016.

[As3]
Sujay K. Ashok, Dileep Jatkar*, Renjan John, Madhusudhan Raman, and Jan Troost*.
Exact wkb analysis of 57914;n = 2 gauge theories.
Journal of High Energy Physics, **07(2016)**, 115, 2016.

[B1]
Mihir Arjunwadkar*, Akanksha Kashikar*, and Manjari Bagchi.
Neutron stars in the light of square kilometre array: Data, statistics and science.
Journal of Astrophysics and Astronomy, **37(4)**, 28, 2016.

[B2]
Manjari Bagchi.
A unified model for repeating and non-repeating fast radio bursts.
The Astrophysical Journal Letter, **838**, L16, 2017.

[B3]
J. Deneva*, K. Stovall*, M. McLaughlin*, Manjari Bagchi, S. Bates*, P. Freire*, J. Martinez*, J. Jenet*, and N. Garver-Daniels*.

New discoveries from the arecibo 327 mhz drift pulsar survey radio transient search.
The Astrophysical Journal, **821(1)**, 10, 2016.

[B4]
Sushan Konar∗, Manjari Bagchi, Debadesh Bandyopadhyay∗, and et al.∗.
Neutron star physics in the square kilometre array era: An indian perspective.
Journal of Astrophysics and Astronomy, **37(4)**, 36, 2016.

[B5]
Yashwant Gupta Gupta∗ Yashwant Gupta, Poonam Chandra∗, Manjari Bagchi, Niruj M. Ramanujam∗, Yogesh Maan∗, Avinash A. Deshpande∗, and Siddhartha Bhattacharyya∗.
Fast transients with the ska and its pathfinders: An indian perspective.
Journal of Astrophysics and Astronomy, **37(4)**, 37, 2016.

[Ba1]
Pinaki Banerjee.
Holographic brownian motion at finite density.
Phys.Rev. D, **94(12)**, 126008, 2016.
(Preprint: arXiv:1512.05853 (IMSC-2015-12-08)).

[Ba2]
Pinaki Banerjee, Atanu Bhatta, and B. Sathiapalan.
Sine-gordon theory : Entanglement entropy and holography.
2016.
arXiv:1610.04233 [hep-th] (Submitted).

[Ba3]
Pinaki Banerjee, Shouvik Datta∗, and Ritam Sinha∗.
Higher-point conformal blocks and entanglement entropy in heavy states.
JHEP, **1605**, 127, 2016.

[Ba4]
Pinaki Banerjee and Balachandran Sathiapalan.
Zero temperature dissipation and holography.
JHEP, **1604**, 089, 2016.

[Ban1]
Somshubhro Bandyopadhyay∗, Manik Banik, Some Sankar Bhattacharya∗, Sibasish Ghosh, Guruprasad Kar∗, Amit Mukherjee∗, and Arup Roy∗.
Reciprocal ontological models show indeterminism comparable to quantum theory.
Foundations of Physics, **47(2)**, 265, 2016.

[Ban2]
Samir Kunkri∗, Manik Banik, and Sibasish Ghosh.
Nonlocal correlations in a macroscopic measurement scenario.
Phys. Rev. A, **95**, 022116–1, 2017.

[Bau]

Uppu D.S.S.M*, **Konai M.M***, **Upayan Baul, Singh P***, **Samaddar S***, **Satyavani Vemparala, Narayana C***, **and Haldar J***.
Isosteric substitution in cationic-amphiphilic polymers reveals an important role for hydrogen bonding in bacterial membrane interactions.
Chemical Science, **7**, 4613, 2016.

[Bh]

Atanu Bhatta, Pinaki Bannerjee, and Balachandran Sathiapalan.
Sine-gordon theory:entanglement entropy and holography.
2016.
1610.04233 (Submitted).

[Bi]

Minati Biswal, Sanatan Digal, and P.S. Saumia*.
Dynamical restoration of zn symmetry in su(n) + higgs theories.
Nuclear Physics B, **910**, 30, 2016.

[C1]

Sagnik Chakraborty, Arpan Das*, **Arindam Mallick, and C. M. Chandrashekar**.
Quantum ratchet in disordered quantum walk.
Annalen der Physik (AdP), 2016.
arXiv:1611.03323 (To be published).

[C2]

Sagnik Chakraborty, Prathik C. J., and Sibasish Ghosh.
On thermalization of two-level quantum systems.
2016.
(Preprint: arXiv:1604.04998 (quant-ph)).

[Ch1]

Pranab J. Bhuyan*, **Rituparno Mandal***, **Pinaki Chaudhuri, Abhishek Dhar***, **and Chandan Dasgupta***.
Thermal conductivity of glass-forming liquids.
2017.
arXiv:1703.04494 (Submitted).

[Ch2]

Pinaki Chaudhuri and Ludovic Berthier*.
Ultra-long-range dynamic correlations in a microscopic model for aging gels.
2016.
arXiv:1605.09770 (Submitted).

[Ch3]

Pinaki Chaudhuri and Juergen Horbach*.
Structural inhomogeneities in glasses via cavitation.
Physical Review B, **94**, 094203, 2016.

[Ch4]
Pinaki Chaudhuri and Juergen Horbach[*].
Phase separation in dense glassy liquids: effect of quenching protocols.
Journal of Statistical Mechanics: Theory and Experiment, **2016(8)**, 084005, 2016.

[Ch5]
Ehsan Irani[*]**, Pinaki Chaudhuri, and Claus Heussinger**[*].
Athermal rheology of weakly attractive soft particles.
Physical Review E, **94(5)**, 052608, 2016.

[Ch6]
Rituparno Mandal[*]**, Pranab J. Bhuyan**[*]**, Pinaki Chaudhuri, Madan Rao**[*]**, and Chandan Dasgupta**[*].
Glassy swirls of active dumbbells.
2017.
arXiv:1703.05484 (Submitted).

[Ch7]
Gaurav P. Shrivastav[*]**, Pinaki Chaudhuri, and Juergen Horbach**[*].
Yielding of glass under shear: A directed percolation transition precedes shear-band formation.
Physical Review E, **94**, 042605, 2016.

[Ch8]
Gaurav P. Shrivastav[*]**, Pinaki Chaudhuri, and Juergen Horbach**[*].
Heterogeneous dynamics during yielding of glasses: Effect of aging.
Journal of Rheology, **60(5)**, 835, 2016.

[D1]
Ghanashyam Date and Sk Jahanur Hoque.
Gravitational waves from compact sources in de sitter background.
Phys. Rev. D, **94**, 064039, 2016.

[D2]
Ghanashyam Date and Sk. Jahanur Hoque.
Cosmological horizon and the quadrupole formula in de sitter background.
2016.
IMSc/2016/12/07, arxiv:1612.09511 (Submitted).

[Do]
Shruti Dogra, George Thomas, Sibasish Ghosh, and Dieter Suter[*].
Superposing pure quantum states with partial prior information.
2017.
arXiv:1702.02418 (quant-ph) (Submitted).

[Du]
Colm Connaughton[*]**, Arghya Dutta, R. Rajesh, and Oleg Zaboronski**[*].

Universality properties of steady driven coagulation with collisional evaporation.
Europhysics Letters, **117**, 10002, 2017.

[**G1**]
Guruprasad Kar*, **Sibasish Ghosh**, **Sujit K. Choudhary***, **and Manik Banik**.
Role of measurement incompatibility and uncertainty in determining nonlocality.
Mathematics (special issue on Mathematics of Quantum Uncertainty), **4(3)**, 52, 2016.

[**G2**]
Anarta Roy* **and Sibasish Ghosh**.
Evolution of photon beams through a nested mach-zehnder interferometer using classical
  states of light.
2017.
(Preprint: arXiv:1701.03074 (quant-ph)).

[**G3**]
Arup Roy*, **Amit Mukherjee***, **Tamal Guha***, **Sibasish Ghosh**, **Some Sankar
  Bhattacharya***, **and Manik Banik**.
Nonlocal correlations: Fair and unfair strategies in bayesian game.
Phys. Rev. A, **94**, 032120–1, 2016.

[**H1**]
P. Haldar, M. S. Laad, and S. R. Hassan.
Quantum critical transport at a continuous metal-insulator transition.
Phys. Rev. B, **94(08)**, 081115(R), 2016.

[**H2**]
P. Haldar, M. S. Laad, and S. R. Hassan.
Quantum critical magneto-transport at a continuous metal-insulator transition.
Phys. Rev. Lett., 2016.
arXiv:1603.00779 (Submitted).

[**H3**]
P. Haldar, M. S. Laad, and S. R. Hassan.
Real-space cluster dynamical mean-field approach to the falicov-kimball model: An alloy-
  analogy approach.
Phys. Rev. B, **95(12)**, 125116, 2017.

[**H4**]
P. Haldar, M. S. Laad, and S. R. Hassan.
Thermal transport across a continuous metal-insulator transition.
Phys. Rev. B, 2017.
arXiv:1607.03879 (Submitted).

[**I**]
D. Indumathi, M.V.N. Murthy, and Lakshmi S. Mohan*.
Atmospheric neutrinos and cp violation.

Submitted to Phys. Rev. Lett., 2017.
arXiv:1701.08997v1 [hep-ph] (Submitted).

[**M1**]
Arindam Mallick and C. M. Chandrashekar.
Dirac quantum cellular automaton from split-step quantum wal.
Nature Scientific Reports, **6**, 25779, 2016.

[**M2**]
Arindam Mallick, Sanjoy Mandal, and C. M. Chandrashekar.
Neutrino oscillations in discrete-time quantum walk framework.
Eur. Phys. J. C (Particles and Fields), **77**, 85, 2017.

[**Ma1**]
Dipanjan Mandal, Sagnik Chakraborty, Arindam Mallick, and Sibasish Ghosh.
On non-markovianity of qubit evolution under action of spin environment.
2017.
(Preprint: arXiv:1703.02749 (quant-ph)).

[**Ma2**]
Dipanjan Mandal, Trisha Nath*, and R. Rajesh.
Estimating the critical parameters of the hard square lattice gas model.
Journal of Statistical Mechanics, 2017.
arXiv:1702.02332 (To be published).

[**Me1**]
Shakti N. Menon, Trilochan Bagarti, and Abhijit Chakraborty.
Jamming in a lattice model of stochastically interacting agents with a field of view.
Europhysics Letters, 2017.
arXiv:1612.04596 (Submitted).

[**Me2**]
Shakti N. Menon, Cameron L. Hall*, Scott W. McCue*, and Sean McElwain*.
A model for one-dimensional morphoelasticity and its application to fibroblast-populated
 collagen lattices.
Biomechanics and Modeling in Mechanobiology, 2016.
(Submitted).

[**Me3**]
Pavithra Seenivasan*, Shakti N. Menon, S. Sridhar*, and Sitabhra Sinha.
When the clock strikes: Modeling the relation between circadian rhythms and cardiac ar-
 rhythmias.
Journal of Physics: Conference Series, **759(1)**, 012021, 2016.

[**Me4**]
Varsha Sreenivasan*, Shakti N. Menon, and Sitabhra Sinha.
Emergence of coupling-induced oscillations and broken symmetries in heterogeneously driven

nonlinear reaction networks.
Scientific Reports, 2017.
(To be published).

[**Mu**]
Partha Mukhopadhyay.
General construction of tubular geometry.
2016.
(Preprint: arXiv:1608.07506).

[**Mur**]
Johann Bartel∗**, Rajat K. Bhaduri**∗**, Matthias Brack**∗**, and M.V.N. Murthy**.
On the asymptotic prime partitions of integers.
Submitted to Phys. ReV. E, 2016.
arXiv:1609.06497[math-phys] (Submitted).

[**N1**]
Trisha Nath, Deepak Dhar∗**, and R. Rajesh**.
Stability of columnar order in assemblies of hard rectangles or squares,.
Europhysics Letters, **114**, 10003, 2016.

[**N2**]
Trisha Nath and R. Rajesh.
The high density phase of the k-nn hard core lattice gas model.
Journal of Statistical Mechanics, **2016**, 073203, 2016.

[**O**]
Prafulla Oak and B. Sathiapalan.
Exact renormalization group and sine gordon theory.
Journal of High Energy Physics, 2017.
IMSC/2017/03/02(arXiv:1703.01591 (Submitted).

[**P**]
V. V. Prasad, Dibyendu Das∗**, Sanjib Sabhapandit**∗**, and R. Rajesh**.
Velocity distribution of driven inelastic one-component maxwell gas.
Physical Review E, 2017.
arXiv:1701.03600 (To be published).

[**R**]
G. Rajasekaran.
A crisis in fundamental physics (guest editorial).
Current Science, **111(5)**, 773, 2016.

[**Ra**]
Ashwij Mayya∗**, P. Praveen**∗**, Anuradha Banerjee**∗**, and R. Rajesh**.
Splitting fracture in bovine bone using a porosity based spring network model.
Journal of The Royal Society Interface, **13**, 20160809, 2016.

[**S1**]

Appilineni Kushal*, V. Sasidevan, and Sitabhra Sinha.
Information asymmetry and the performance of agents competing for limited resources.
In B. K. Chakrabarti et al F. Abergel, H. Aoyama, editor, *Econophysics and Sociophysics: Recent Progress and Future Directions*, page 113. Springer, 2017.

[**S2**]

V. Sasidevan and Sitabhra Sinha.
Co-action provides rational basis for the evolutionary success of pavlovian strategies.
Scientific Reports, **6**, 30831, 2016.

[**Sh1**]

S. Gopalakrishna and T. S. Mukherjee.
The 750 GeV diphoton excess in a two Higgs doublet model and a singlet scalar model, with vector-like fermions, unitarity constraints, and dark matter implications.
arXiv:1604.05774 [hep-ph].

[**Sh2**]

S. Gopalakrishna and T. S. Mukherjee.
Gauge Singlet Vector-like Fermion Dark Matter, LHC di-photon rate and Unitarity Constraints.
arXiv:1702.04000 [hep-ph].

[**Sh3**]

T. S. Mukherjee S. Gopalakrishna and S. Sadhukhan.
Status and prospects of the two-higgs-doublet SU(6)/Sp(6) little-higgs model and the alignment limit.
Physical Rev. D, **94(1)**, 015034, 2016.

[**Si**]

Anindya S. Chakrabarti* and Sitabhra Sinha.
Hits emerge through self-organized coordination in collective response of free agents.
Physical Review E, **94(4)**, 042302, 2016.

[**T**]

George Thomas, Manik Banik, and Sibasish Ghosh.
Performance of coupled systems as quantum thermodynamic machines.
2016.
(Preprint: arXiv:1607.00994 v2(quant-ph)).

[**To1**]

Anvy M. Tom, Rajesh R, and Satyavani Vemparala.
Aggregation dynamics of rigid polyelectrolytes.
The Journal of Chemical Physics, **144**, 034904, 2016.

[**To2**]

Anvy M. Tom, Satyavani Vemparala, Rajesh R, and Nikolai V. Brilliantov*.

Mechanism of chain collapse of strongly charged polyelectrolytes.
Physical Review Letters, **117**, 147801, 2016.

[**To3**]
Anvy M. Tom, Satyavani Vemparala, Rajesh R, and Nikolai V. Brilliantov*.
Regimes of strong electrostatic collapse of a highly charged polyelectrolyte in a poor solvent.
Soft Matter, **13**, 1862, 2017.

[**V**]
Madhav K. V., Tanmoy Biswas*, **and Sibasish Ghosh**.
Coarse-graining of measurement and quantum-to-classical transition in the bipartite scenario.
2017.
(Preprint: arXiv:1703.00502 (quant-ph)).

Books/Monographs Authored/Edited

The list below follows the same conventions as those followed for the list of publications.

[**S**]
Sitabhra Sinha, Anindya S. Chakrabarti*, and Manipushpak Mitra*, editors.
Can Economics be a Physical Science?, volume 225 of *Discussion and Debate*.
European Physical Journal Special Topics, 2016.

2.4   Theoretical Computer Science

2.4.1   Research Summary

Algorithms and Data Structures

In a previous conference submission, an efficient $4(\log n)^2$ approximation of MIS was established, without precisely estimating its time complexity. In [**Mu1**], a further analysis (based on a suggestion by a reviewer) establishes that the stated approximation of MIS can in fact be achieved within $O(n(\log n)^3)$ time.

In [**Mu2**], two approximation algorithms for the maximum independent set (MIS) problem, one for the class of B_1-VPG graphs and the other one for the class of B_2-VPG graphs were presented. For B_1-VPG graphs, the algorithm approximates MIS within a $2(\log n)$-multiplicative factor. This improves the approximation factor from the previously known $O((\log n)^2)$ (from a previous publication) to $O(\log n)$. For B_2-VPG graphs, the algorithm approximates MIS within a $16(\log n)^3$-multiplicative factor. No non-trivial approximation algorithm was known before for the MIS problem over B_2-VPG graphs.

In an ongoing research, work on determining the computational complexity of graph coloring and some of its variants is being carried out. The progress made so far (both on positive

and negative results) is being written up.

In [**Pr1**], we study a bound on the real roots of a polynomial by Lagrange. From known results in the literature, it follows that Lagrange's bound is also a bound on the absolute positiveness of a polynomial. A simple $O(n \log n)$ algorithm described in Mehlhorn-Ray (2010) can be used to compute the bound. Our main result is that this is optimal in the real RAM model. Our paper explores the tradeoff between improving the quality of bounds on absolute positiveness and their computational complexity.

A multivariate polynomial $F(x_1, x_2, \ldots, x_n)$ is said to be absolutely positive from a real number $\mathcal{B}$ if F and all its non-zero partial derivatives are positive for $x_1, x_2, \ldots, x_n \geq \mathcal{B}$. One of the well known bounds on absolute positiveness in the literature is due to Hong. His bound is dependent on the first maximum of a certain sequence of radicals defined using the absolute value of the coefficients of the polynomial. In the univariate setting, a bound due to Lagrange considers the first and the second maximum in the same radical sequence and is better than Hong's bound. Westerfield further improved on both these bounds in the univariate setting, by considering every value in the same radical sequence. In [**Pr2**], we provide a generalization of Westerfield's bound to the multivariate setting. As a specialization of this bound, we also derive a generalization of Lagrange's bound, which is a strict improvement upon Hong's bound. Finally, we give an algorithm to compute this improved bound. The running time of this algorithm matches the running time of the best known algorithm to compute Hong's bound.

In [Ma1], we have studied the kernelization complexity Vertex Disjoint Cycle Packing problem for undirected graphs for which the disjointness constraints have been relaxed in two different ways. For one of them, a vertex is allowed to appear in at most t cycles. And in the other case, two cycles can have at most t vertices in common. For the first case, we prove that when $t = O(k^{1-\epsilon})$, then this problem has no polynomial kernel. On the other hand, when $t = k$, this problem is already known to be polynomial time solvable. When $t = k/c$, then we give a polynomial kernel for this problem. For the second case, when $t = 1$, then we give a kernel with $O(k^4 . \log k)$ vertices. When $t \geq 2$, then we give a compression with $O(k^5 . \log k)$ bits. In addition, we also prove that it is NP-hard when $t = 1$.

In paper [**As**] we studied the parameterized complexity of Minimum Volume Packing and Strip Packing. In the two dimensional version the input consists of a set of rectangles S with integer side lengths. In the Minimum Volume Packing problem, given a set of rectangles S and a number k, the goal is to decide if the rectangles can be packed in a bounding box of volume at most k. In the Strip Packing problem we are given a set of rectangles S, numbers W and k; the objective is to find if all the rectangles can be packed in a box of dimensions $W \times k$. We prove that the 2-dimensional Volume Packing is in FPT by giving an algorithm that runs in $(2 \cdot \sqrt{2})^k \cdot k^{\mathcal{O}(1)}$ time. We also show that Strip Packing is W[1]-hard even in two dimensions and give an FPT algorithm for a special case of Strip Packing. Some of our results hold for the problems defined in higher dimensions as well.

For a target rank r, the *rigidity* of a matrix A over a field $\mathbb{F}$ is the minimum Hamming distance between A and a matrix of rank at most r. Rigidity is a classical concept in Computational Complexity Theory: constructions of rigid matrices are known to imply lower

bounds of significant importance relating to arithmetic circuits. Yet, from the viewpoint of Parameterized Complexity, the study of central properties of matrices in general, and of the rigidity of a matrix in particular, has been neglected. In paper [**Me3**], we conduct a comprehensive study of different aspects of the computation of the rigidity of *general matrices* in the framework of Parameterized Complexity. Naturally, given parameters r and k, the MATRIX RIGIDITY problem asks whether the rigidity of A for the target rank r is at most k. We show that in case $\mathbb{F} = \mathbb{R}$ or $\mathbb{F}$ is any finite field, this problem is fixed-parameter tractable with respect to $k + r$. To this end, we present a dimension reduction procedure, which may be a valuable primitive in future studies of problems of this nature. We also employ central tools in Real Algebraic Geometry, which are not well known in Parameterized Complexity, as a black box. In particular, we view the output of our dimension reduction procedure as an algebraic variety. Our main results are complemented by a $\mathsf{W}[1]$-hardness result and a subexponential-time parameterized algorithm for a special case of MATRIX RIGIDITY, highlighting the different flavors of this problem. Paper [**?**] is the full version of the paper.

In [Ma2], we study the parameterized and kernelization complexity of FEEDBACK VERTEX SET (FVS) problem when it is parameterized by some structures of the input. In this work, we prove that FVS is FPT when it is parameterized by the number of vertices that have degree more than 3. This answers a question asked in an earlier paper. We give an algorithm with running time $O(2^k.poly(n))$ for this. When FVS is parameterized by deletion distance to pseudo-forest, then it is already known to have a polynomial kernel and a conditional kernel lower bound. We narrow down this gap in this work. When FVS is parameterized by deletion distance to a mock-d-forest, we provide a polynomial kernel with a conditional lower bound for this problem.

In [Ma4], we study the kernelization complexity of VERTEX COVER problem under different structures of the input. We study the kernelization complexity of vertex cover when it is parameterized with respect to the following parameters. One of them is the size of a set whose deletion results in a graph of degree at most two. The other one is the size of a set whose deletion results in a graph every component of which is a clique with at most d vertices. For both the above cases, we provide polynomial kernels and conditional lower bound.

The question of the existence of a polynomial kernelization of the VERTEX COVER ABOVE LP problem has been a longstanding, notorious open problem in Parameterized Complexity. Five years ago, the breakthrough work by Kratsch and Wahlström on representative sets has finally answered this question in the affirmative [FOCS 2012]. In paper [**Me2**], we present an alternative, *algebraic compression* of the VERTEX COVER ABOVE LP problem into the RANK VERTEX COVER problem. Here, the input consists of a graph G, a parameter k, and a bijection between $V(G)$ and the set of columns of a representation of a matriod M, and the objective is to find a vertex cover whose rank is upper bounded by k.

In [Ma3], we study (k, i)-coloring of a graph where every vertex is assigned a set of k colors and every pair of adjacent vertices can share at most i colors. We study about the running time of exact and parameterized algorithms for this problem under different values of k and i with different parameterizations considered.

The problem of efficiently characterizing degree sequences of simple hypergraphs is a fun-

damental open problem in Graph Theory. Several results are known for restricted versions of this problem. The article [Me1] adds to the list of sufficient conditions for a degree sequence to be *hypergraphic*. We proved a combinatorial lemma about cyclically permuting the columns of a binary table with length n binary sequences as rows. We prove that for any set of cyclic permutations acting on its columns, the resulting table has all of its 2^n rows distinct. Using this property we propose a polynomial time algorithm which correctly identifies at least $2^{\frac{(n-1)(n-2)}{2}}$ *hypergraphic* sequences. In other words, for every $0 < \epsilon \le 1$, $\exists\, n \ge n_\epsilon$ such that if H_n is the set of all length n *hypergraphic* sequences, then the algorithm correctly identifies at least $|H_n|^{\frac{1}{2+\epsilon}}$ hypergraph degree sequences.

In paper [Me4] we continue our study of graph modification problems defined by reducing the rank of the adjacency matrix of the given graph, and extend our results from undirected graphs to modifying the rank of skew-adjacency matrix of oriented graphs. An instance of a graph modification problem takes as input a graph G and a positive integer k, and the objective is to either delete k vertices/edges or edit k edges so that the resulting graph belongs to a particular family $\mathcal{F}$ of graphs. Given a fixed positive integer r, we define $\mathcal{F}_r$ as the family of oriented graphs where for each $G \in \mathcal{F}_r$, the rank of the skew-adjacency matrix of G is at most r. Using the family $\mathcal{F}_r$ we do algorithmic study, both in classical and parameterized complexity, of the following graph modification problems: r-RANK VERTEX DELETION, r-RANK EDGE DELETION. We first show that both the problems are NP-Complete. Then we show that these problems are fixed parameter tractable (FPT) by designing an algorithm with running time $2^{\mathcal{O}(k \log r)} n^{\mathcal{O}(1)}$ for r-RANK VERTEX DELETION, and an algorithm for r-RANK EDGE DELETION running in time $2^{\mathcal{O}(f(r)\sqrt{k} \log k)} n^{\mathcal{O}(1)}$. In addition to our FPT results we design polynomial kernels for these problems. Our main structural result, which is the fulcrum of all our algorithmic results, is that for a fixed integer r the size of any "reduced graph" in $\mathcal{F}_r$ is upper bounded by 3^r. This result is of independent interest and generalizes a similar result of Kotlov and Lovasz regarding reduced oriented graphs of rank r.

In [Kr1], Tree Contraction, Star Contraction, Out-Tree Contraction and Cactus Contraction problems are studied in the recently introduced framework of *lossy kernelization*.

In [Kr4], two problems associated with the class domination coloring of a graph in the context of exact exponential-time algorithms and parameterized complexity are studied.

In [Kr3], the parameterized complexity of various classical graph-theoretic problems are studied in the dynamic framework.

In [C1] we show that the space bounds of some of the fundamental and classical graph algorithms can be improved without compromising their linear running time. Typical problems include DFS, BFS, testing biconnectivity, reporting cut vertices and bridges among others. Paper [S1] is the full version of the article.

In [C2] we shift our focus on linear bits while paying a slight penalty in the running times of the aforementioned classical graph problems and more. We mainly focus on various applications of DFS in the article. Paper [C3] is the full version.

In [S2] we improve further the space bounds of some classical applications of DFS presented in recent papers while retaining their running times.

In [S3] we focus on improving the space bounds of maximum cardinality search, and as a result, we also improve the space bounds of recognizing whether a given undirected graph is

chordal and other related problems.

Automata, Logic and Concurrency

In temporal logics, a central question is about the choice of modalities and their relative expressive power, in comparison to the complexity of decision problems such as satisfiability. Extending our earlier work, interval constraint modalities have been defined [**L2**]. These allow counting or simple algebraic operations on paths. The complexity of these extended logics is polynomial space, as of full temporal logic, and exponential space when using binary notation.

The survey [**L3**] treats formulas of two-variable logic and first order logic as providing specifications around which classes of finite automata and varieties of finite monoids revolve.

In the verification of web services, an important problem is *realizability*. Once initiated, these services proceed autonomously without monitoring, and hence it is important that specifications be checked for their implementability by finite state machines. Deciding whether a temporal logic specification is typically undecidable for message passing, and hence the design of sublogics is motivated where every formula is realizable by construction. [**R**] discusses such logics and constructs automata realizing specifications in them.

The study of modal logics over unboundedly many agents has been initiated in [**P1**]. Quantification can be used to force unboundedly many agents, but leads to undecidability. In this context, propositional term modal logics are investigated, but these need to be constrained as well. [**P2**] studies model checking over the monodic fragment when the set of agents is infinite, but regular.

Computational Complexity

In [**M6**], two hardness measures for resolution proofs, width and asymmetric width, were revisited. It is known that for every unsatisfiable CNF F,

$$\text{width}(F \vdash \Box) \leq \text{awidth}(F \vdash \Box) + \max\{\text{awidth}(F \vdash \Box), \text{width}(F)\}.$$

A simple direct proof of the upper bound was given, also shaving off a +1.

In [**M3**], a cutting planes proof system $\text{CP}+\forall\text{red}$ for quantified Boolean formulas (QBF) was defined, and the proof-theoretic strength of this new calculus was analysed. While in the propositional case, Cutting Planes is of intermediate strength between resolution and Frege, the findings here showed that the situation in QBF is slightly more complex: while $\text{CP}+\forall\text{red}$ is again weaker than QBF Frege and stronger than the CDCL-based QBF resolution systems Q-Res and QU-Res, it turns out to be incomparable to even the weakest expansion-based QBF resolution system $\forall\text{Exp}+\text{Res}$. Technically, these results established the effectiveness of two lower bound techniques for $\text{CP}+\forall\text{red}$: via strategy extraction and via monotone feasible interpolation.

In [**M8**] and [**M2**], reductions and completeness for the algebraic complexity classes VP and VNP were further explored. The contributions fall into three categories.

1. A list of new natural VNP-intermediate polynomial families, based on basic (combinatorial) NP-complete problems that are complete under *parsimonious* reductions. Over

finite fields, these families are in VNP, and under a plausible complexity-theoretic hypothesis, are neither VNP-hard (even under oracle-circuit reductions) nor in VP. Prior to this, only the Cut Enumerator polynomial was known to be VNP-intermediate, as shown by Bürgisser in 2000.

2. Over rationals and reals, it was shown that the clique polynomial cannot be obtained as a monotone p-projection of the permanent polynomial, thus ruling out the possibility of transferring monotone clique lower bounds to the permanent. Further, two of the intermediate polynomials, based on satisfiability and Hamiltonian cycle, were also shown to not be monotone affine polynomial-size projections of the permanent. These results augment recent results along this line due to Grochow.

3. Finally, a (somewhat natural) polynomial defined independent of a computation model was described, and shown to be VP-complete under polynomial-size projections. This complements a recent result of Durand et al. (2014) which established VP-completeness of a related polynomial but under constant-depth oracle circuit reductions. Both polynomials are based on graph homomorphisms. A simple restriction yields a family similarly complete for VBP.

An arithmetic read-once formula (ROF) is a formula (circuit of fan-out 1) over $+, \times$ where each variable labels at most one leaf. Every multilinear polynomial can be expressed as the sum of ROFs. In [M1], for certain multilinear polynomials, a tight lower bound on the number of summands in such an expression was proven.

In [A3] we explore lower bounds for set-multilinear arithmetic computations and prove lower bound results in some special cases.

In [A5] we study the structure noncommutative Valiant's classes. For instance, among various results, we show that the Chomsky-Schutzenberger theorem in classical formal language theory has an "arithmetic version" which yields a natural complete problem for VP.

In [A4], [A6], and [A2] we study parameterized complexity of algorithmic problems with some algebraic (particularly, permutation group-theoretic) structure. We obtain efficient algorithms by exploiting such structure.

2.4.2 List of Publications

The list of publications follows the following conventions: firstly, names of (co)authors who are not IMSc members are marked with a superscript *; secondly, the citation labels used for cross-referencing with the research summary are constructed from the last name of the first IMSc author and finally the list is ordered alphabetically according to the labels.

[A1]
V. Arvind, Frank Fuhlbruck*, Johannes Koebler*, Sebastian Kuhnert*, and Gaurav Rattan.
The parameterized complexity of fixing number and vertex individualization in graphs.
In Rolf Niedermeier Piotr Faliszewski, Anca Muscholl, editor, *Proceedings of the 41st International Symposium on Mathematical Foundations of Computer Science, MFCS 2016,*

pages 13:1 – 13:14. Schloss Dagstuhl Leibniz-Zentrum fuer Informatik 2016, ISBN 978-3-95977-016-3, Aug 2016.

[**A2**]
V. Arvind, Johannes Koebler[*]**, Sebastian Kuhnert**[*]**, and Jacobo Toran**[*].
Parameterized complexity of small weight automorphisms.
In Brigitte Valle Heribert Vollmer, editor, *34th Symposium on Theoretical Aspects of Computer Science, STACS 2017, March 8-11, 2017*, pages 7:1 – 7:13. Schloss Dagstuhl Leibniz-Zentrum fuer Informatik 2017, ISBN 978-3-95977-028-6, Mar 2017.

[**A3**]
V. Arvind, Pushkar Joglekar[*]**, and S. Raja**[*].
Noncommutative valiant's classes: Structure and complete problems.
ACM Transactions on Computation Theory, **9(1)**, 3:1, 2016.

[**A4**]
V. Arvind, Johannes Koebler[*]**, Sebastian Kuhnert**[*]**, and Jacobo Toran**[*].
Solving linear equations parameterized by hamming weight.
Algorithmica, **75(2)**, 322, 2016.

[**A5**]
V. Arvind and S. Raja[*].
Some lower bound results for set-multilinear arithmetic computations.
Chicago Journal of Theoretical Computer Science, **2016**, 6, 2016.

[**A6**]
V. Arvind and Gaurav Rattan[*].
The parameterized complexity of geometric graph isomorphism.
Algorithmica, **75(2)**, 258, 2016.

[**As**]
Pradeesha Ashok, Sudeshna Kolay, Syed M. Meesum, and Saket Saurabh.
Parameterized complexity of strip packing and minimum volume packing.
Theoretical Computer Science, **661**, 56, 2017.

[**B**]
Arindam Biswas, Varunkumar Jayapaul[*]**, and Venkatesh Raman**.
Improved bounds for poset sorting in the forbidden comparison regime.
In Gaur and Narayanaswamy, editors, *International Conference on Algorithms and Discrete Applied Mathematics (CALDAM)*, page 50. Springer, Feb 2017.

[**C1**]
Niranka Banerjee, Sankardeep Chakraborty, and Venkatesh Raman.
Improved space efficient algorithms for BFS, DFS and applications.
In *Computing and Combinatorics - 22nd International Conference, COCOON 2016, Ho Chi Minh City, Vietnam, August 2-4, 2016, Proceedings*, pages 119–130, 2016.

[C2]
Sankardeep Chakraborty, Venkatesh Raman, and Srinivasa Rao Satti[*].
Biconnectivity, chain decomposition and st-numbering using O(n) bits.
In *27th International Symposium on Algorithms and Computation, ISAAC 2016, December 12-14, 2016, Sydney, Australia*, pages 22:1–22:13, 2016.

[C3]
Sankardeep Chakraborty, Venkatesh Raman, and Srinivasa Rao Satti[*].
Biconnectivity, chain decomposition and st-numbering using $O(n)$ bits.
Submitted.

[D]
Kunal Dutta and C. R. Subramanian.
Improved bounds on induced acyclic subgraphs in random digraphs.
SIAM Journal on Discrete Mathematics, **30(3)**, 1848–1865, 2016.

[J]
Pallavi Jain, Jayakrishnan M., Fahad Panolan[*]**, and Abhishek Sahu**.
Mixed dominating set: A parameterized perspective.
In *International Workshop on Graph-Theoretic Concepts in Computer Science (WG 2017)*, Feb 2017.
(Submitted).

[K]
Sudeshna Kolay, Ragukumar Pandurangan, Fahad Panolan, Venkatesh Raman, and Prafullkumar Tale.
Harmonious coloring: Parameterized algorithms and upper bounds.
In *Graph-Theoretic Concepts in Computer Science - 42nd International Workshop, (WG 2016)*, Jun 2016.

[Kr1]
R. Krithika, Pranabendu Misra, Ashutosh Rai, and Prafullkumar Tale.
Lossy kernels for graph contraction problems.
In Akash Lal, S. Akshay, Saket Saurabh, and Sandeep Sen, editors, *36th IARCS Annual Conference on Foundations of Software Technology and Theoretical Computer Science (FSTTCS 2016)*, page 23:1. Schloss Dagstuhl–Leibniz-Zentrum fuer Informatik, Dec 2016.

[Kr2]
R. Krithika, Pranabendu Mishra, Ashutosh Rai, and Prafullkumar Tale.
Lossy kernels for graph contraction problems.
In *36th IARCS Annual Conference on Foundations of Software Technology and Theoretical Computer Science, FSTTCS 2016*, Dec 2016.

[Kr3]
R. Krithika, Abhishek Sahu, and Prafullkumar Tale.
Dynamic parameterized problems.
In Jiong Guo and Danny Hermelin, editors, *11th International Symposium on Parameterized*

and Exact Computation (IPEC 2016), page 19:1. Schloss Dagstuhl–Leibniz-Zentrum fuer Informatik, Feb 2017.

[**Kr4**]
R. Krithika, Ashutosh Rai, Saket Saurabh, and Prafullkumar Tale.
Parameterized and exact algorithms for class domination coloring.
In *SOFSEM 2017: Theory and Practice of Computer Science: 43rd International Conference on Current Trends in Theory and Practice of Computer Science*, page 336. Springer International Publishing, Jan 2017.

[**L1**]
Andreas Krebs*, Kamal Lodaya, Paritosh Pandya*, and Howard Straubing*.
Two-variable logic with a between predicate.
In *31st ACM/IEEE Symp. Logic in Computer Science, New York City, USA*, pages 106–115. ACM/IEEE, Jul 2016.

[**L2**]
Kamal Lodaya and Paritosh Pandya*.
Deterministic temporal logics and interval constraints.
In *Proc. 9th Workshop on Methods for Modalities, Kanpur*, pages 23–40. EPTCS, Mar 2017.

[**L3**]
Kamal Lodaya.
Logic as regular behaviour.
In D.G. Thomas, editor, *Proc. Automata, graphs and logic*. Narosa, 2017.
(Submitted).

[**M1**]
Meena Mahajan and Anuj Tawari.
Sums of read-once formulas: How many summands suffice?
In A. S. Kulikov and G.. J. Woeginger, editors, *Proceedings: 11th International Computer Science Symposium in Russia (CSR 2016), LNCS 9691*, pages 266–279. Springer, Jun 2016.

[**M2**]
Meena Mahajan and Nitin Saurabh.
Some complete and intermediate polynomials in algebraic complexity theory.
In A. S. Kulikov and G. J. Woeginger, editors, *11th International Computer Science Symposium in Russia (CSR 2016), LNCS 9691*, pages 251–265. Springer, Jun 2016.

[**M3**]
Olaf Beyersdorff*, Leroy Chew*, Meena Mahajan, and Anil Shukla.
Understanding cutting planes for QBFs.
In *FSTTCS, LIPIcs Vol. 65*, pages 40:1–40:15. LIPIcs, Dec 2016.

[**M4**]
Anna Gál*, Jing-Tang Jang*, Nutan Limaye*, Meena Mahajan, and Karteek Sreenivasaiah*.

Space-efficient approximations for subset sum.
ACM Transactions on Computation Theory, **8(4)**, 16:1–28, 2016.

[**M5**]
Andreas Krebs*, Nutan Limaye*, Meena Mahajan, and Karteek Sreenivasaiah*.
Small depth proof systems.
ACM Transactions on Computation Theory, **9(1)**, 2:1–2:26, 2016.

[**M6**]
Andreas Krebs*, Meena Mahajan, and Anil Shukla*.
Relating two width measures for resolution proofs.
In *Electronic Colloquium on Computational Complexity*. 2016.
(Preprint: ECCC TR16-164).

[**M7**]
Meena Mahajan, Raghavendra B. Rao*, and Karteek Sreenivasaiah*.
Building above read-once polynomials: identity testing and hardness of representation.
Algorithmica (special issue for COCOON 2014), **76(4)**, 890–909, 2016.

[**M8**]
Meena Mahajan and Nitin Saurabh.
Some complete and intermediate polynomials in algebraic complexity theory.
Theory of Computing Systems, pages dx.doi/10.1007/s00224–016–9740–y, 2016.
(To be published).

[**Ma1**]
Akanksha Agrawal*, Daniel Lokshtanov*, Diptapriyo Majumdar, Amer Mouawad*, and Saket Saurabh.
Kernelization of cycle packing with relaxed disjointness constraints.
In Yuval Rabani Ioannis Chatzigiannakis, Michael Mitzenmacher and Davide Sangiorgi, editors, *43rd International Colloquium on Automata, Languages, and Programming (ICALP 2016)*, page 26:1. Leibniz International Proceedings in Informatics, Jul 2016.

[**Ma2**]
Diptapriyo Majumdar.
Structural parameterizations of feedback vertex set.
In Jiong Guo and Danny Hermelin, editors, *11th International Symposium of Parameterized and Exact Computation (IPEC 2016)*, page 21:1. Leibniz International Proceedings in Informatics, Aug 2016.

[**Ma3**]
Diptapriyo Majumdar, Rian Neogi*, Venkatesh Raman, and Prafullkumar Tale.
Exact and parameterized algorithms for (k,i)-coloring.
In Daya Gaur and N. S. Narayanaswamy, editors, *Algorithms and Discrete Applied Mathematics (CALDAM 2017)*, page 281. Springer LNCS, Feb 2017.

[Ma4]
Diptapriyo Majumdar, Venkatesh Raman, and Saket Saurabh.
Polynomial kernels for vertex cover parameterized by small degree modulators.
Algorithmica, 2016.
(Submitted).

[Me1]
Syed M. Meesum.
Cyclic hypergraph degree sequences.
(Submitted).

[Me2]
Syed M. Meesum, Fahad Panolan[*]**, Saket Saurabh, and Meirav Zehavi**[*].
Rank vertex cover as a natural problem for algebraic compression.
(Submitted).

[Me3]
Fedor V. Fomin[*]**, Daniel Lokshtanov**[*]**, Syed M. Meesum, Saket Saurabh, and Meirav Zehavi**[*].
Matrix rigidity from the viewpoint of parameterized complexity.
In Heribert Vollmer and Brigitte Vallée, editors, *34th Symposium on Theoretical Aspects of Computer Science, STACS 2017*, page 32:1. Schloss Dagstuhl–Leibniz-Zentrum fuer Informatik, Mar 2017.

[Me4]
Syed M. Meesum and Saket Saurabh.
Rank reduction of oriented graphs by vertex and edge deletions.
(Submitted).

[Mu1]
Abhiruk Lahiri[*]**, Joydeep Mukherjee, and C. R. Subramanian**.
On approximating mis over b_1-vpg graphs.
2016.
(Submitted).

[Mu2]
Joydeep Mukherjee and C. R. Subramanian.
On approximating mis over b_1, b_2-vpg graphs.
2016.
(Submitted).

[P1]
Anantha M. Padmanabha and R. Ramanujam.
Propositional term-modal logic: Decidability.
In van der Hoek Bonanno and Perea, editors, *12th Conference on Logic and the Foundations of Game and Decision Theory*. Maastricht University, Jul 2016.

[P2]
Anantha M. Padmanabha and R. Ramanujam.
Model checking a logic over systems with regular sets of processes.
In Swarup Mohalik, editor, *Developmental aspects of Intelligent Adaptive Systems*, page 114.
 Springer Lecture Notes in Computer Science, Feb 2017.

[Pr1]
Swaroop N. Prabhakar and Vikram Sharma.
A lower bound for computing lagrange's real root bound.
In Vladimir P. Gerdt, Wolfram Koepf, Werner M. Seiler, and Evgenii V. Vorozhtsov, editors,
 *Computer Algebra in Scientific Computing - 18th International Workshop, CASC 2016,
 Bucharest, Romania, September 19-23, 2016, Proceedings*, page 444. Springer, Aug 2016.

[Pr2]
Swaroop N. Prabhakar and Vikram Sharma.
Improved bounds on absolute positiveness of multivariate polynomials.
In *International Symposium on Symbolic and Algebraic Computation, ISSAC 2017*, Jan 2017.
(Submitted).

[R]
R. Ramanujam and S. Sheerazuddin*.
Realizable temporal logics for web service choreography.
Journal of Logic and Algebraic Methods in Programming, **85(5)**, 759, 2016.

[Ra1]
Dishant Goyal***, Varunkumar Jayapaul*****, and Venkatesh Raman**.
Elusiveness of finding degrees.
In Gaur and Narayanaswamy, editors, *Proceedings of the International Conference on Algo-
 rithms and Discrete Applied Mathematics (CALDAM)*, page 242. Springer, Feb 2017.

[Ra2]
Amer E. Mouawad***, Naomi Nishimura*****, Venkatesh Raman, Narges Simjour*****,
 and Akira Suzuki***.
On the parameterized complexity of reconfiguration problems.
Algorithmica, **78(1)**, 274, 2017.

[S1]
**Niranka Banerjee, Sankardeep Chakraborty, Venkatesh Raman, and Srini-
 vasa Rao Satti***.
Improved space efficient linear time algorithms for BFS, DFS and applications.
Submitted.

[S2]
Sankardeep Chakraborty, Seungbum Jo***, and Srinivasa Rao Satti***.
Improved space-efficient linear time algorithms for some classical graph problems.
In *15th Cologne Twente Workshop on Graphs and Combinatorial Optimization (CTW)*, 2017.

[S3]
Sankardeep Chakraborty and Srinivasa Rao Satti[*].
Space-Efficient Algorithms for Maximum Cardinality Search, Stack BFS, Queue BFS and
  Applications.
Submitted.

[Sh1]
Ruben Becker[*]**, Michael Sagraloff**[*]**, Vikram Sharma, Juan Xu**[*]**, and Chee Yap**[*].
Complexity analysis of root clustering for a complex polynomial.
In Eugene V. Zima Sergei A. Abramov and Xiao-Shan Gao, editors, *Proceedings of the
  ACM on International Symposium on Symbolic and Algebraic Computation, ISSAC 2016,
  Waterloo, ON, Canada, July 19-22, 2016*, page 71. ACM, Jul 2016.

[Sh2]
Prashant Batra[*] **and Vikram Sharma**.
Near optimal subdivision algorithms for real root isolation.
Journal of Symbolic Computation, 2016.
(To be published).

[Sh3]
Vikram Sharma and Chee K. Yap[*].
Robust geometric computation.
In Ming-Yang Kao, editor, *Encyclopedia of Algorithms*, page 1860. Springer, 2016.

[Sh4]
Vikram Sharma and Chee K. Yap[*].
Robust geometric computation.
In Joseph O'Rourke Jacob E. Goodman and Csaba D. Tth, editors, *Handbook of Discrete
  and Computational Geometry*. CRC Press LLC, 2017.
(Submitted).

Books/Monographs Authored/Edited

The list below follows the same conventions as those followed for the list of publications.

[R]
Can Baskent[*], Larry Moss[*], and R. Ramanujam, editors.
Rohit Parikh on Logic, Language and Society, volume 11 of *Outstanding Contributions to
  Logic.*
Springer International Publishing, Heidelberg, Germany, 2017.

2.5 Student Programmes

2.5.1 Degrees Awarded

Doctoral Degrees Awarded during 2016 – 2017

Mathematics

Name: **Mallick, Anish**
Thesis Title: Spectral multiplicity for random operators with projection valued randomness
Thesis Advisor: Maddaly, Krishna
University: HBNI

Name: **Ravinder, B.**
Thesis Title: On bases for local Weyl modules in type A
Thesis Advisor: Raghavan, K. N.
University: HBNI

Name: **Saha, Biswajyoti**
Thesis Title: On the analytic continuation of multiple Dirichlet series and their singularities
Thesis Advisor: Gun, S.
University: HBNI

Name: **Saha, Ekata**
Thesis Title: Arithmetic properties of generalised Euler-Briggs constants
Thesis Advisor: Gun, S.
University: HBNI

Name: **Biswal, Rekha**
Thesis Title: Demazure flags, Chebyshev polynomials and mock theta functions.
Thesis Advisor: Viswanath, Sankaran
University: HBNI

Physics

Name: **Kunjwal, Ravi**
Thesis Title: Contextuality beyond the Kochen-Specker theorem
Thesis Advisor: Ghosh, Sibasish
University: HBNI

Name: **Singal, Tanmay**
Thesis Title: Some Problems in Quantum State Discrimination
Thesis Advisor: Ghosh, Sibasish
University: HBNI

Name: **Nath, Trisha**
Thesis Title: Phase behaviour and ordering in hard core lattice gas models
Thesis Advisor: Rajesh, R.
University: HBNI

Theoretical Computer Science

Name: **Kolay, Sudheshna**
Thesis Title: Parameterized Complexity of Graph Partitioning and Geometric Covering
Thesis Advisor: Saurabh, Saket
University: HBNI

Name: **Rattan, Gaurav**
Thesis Title: Some Geometrical and Vertex Partitioning Techniques for Graph Isomorphism
Thesis Advisor: Arvind, V.
University: HBNI

Name: **Roy, Ashutosh**
Thesis Title: Parameterized Algorithms for graph modification problems
Thesis Advisor: Saurabh, Saket
University: HBNI

Name: **Shukla, Anil**
Thesis Title: On Proof Complexity for Quantified Boolean Formulas
Thesis Advisor: Mahajan, Meena
University: HBNI

Name: **Saurabh, Nitin**
Thesis Title: Analysis of Algebraic Complexity Classes and Boolean Functions
Thesis Advisor: Mahajan, Meena
University: HBNI

Doctoral Theses Submitted during 2016 – 2017

Mathematics

Name: **Mondal, Arghya**
Thesis Title: Cohomology of locally symmetric spaces
Thesis Advisor: Sankaran, Parameswaran
University: HBNI

Name: **De, Sandipan**
Thesis Title: Infinite iterated crossed products of Hopf algebras, Drinfeld doubles and planar algebras
Thesis Advisor: Kodiyalam, Vijay
University: HBNI

Physics

Name: **Bhattacharya, Soumyadeep**
Thesis Title: Role of topological defects in breaking and enhancing discrete symmetries
Thesis Advisor: Ray, Purusattam
University: HBNI

Name: **Roy, Subhadeep**
Thesis Title: Interplay of stress release range and disorder in fracture
Thesis Advisor: Ray, Purusattam
University: HBNI

Name: **Baul, Upayan**
Thesis Title: Influence of the presence of solutes on the structural and dynamical properties of lipid membranes and water
Thesis Advisor: Vemparala, Satyavani
University: HBNI

Theoretical Computer Science

Name: **Mukherjee, Joydeep**
Thesis Title: Approximation algorithms for stochastic matchings and independent sets
Thesis Advisor: Subramanian, C. R.
University: HBNI

Name: **Raja, S.**
Thesis Title: On structure and lower bounds in restricted models of arithmetic computation
Thesis Advisor: Arvind, V.
University: HBNI

Masters Degrees Awarded during 2016 − 2017

Physics

Name: **Sen, Indrajit**
Thesis Title: Violating the assumption of Measurement Independence in Quantum Foundations
Thesis Advisor: Ghosh, Sibasish
University: IIT-Madras (jointly supervised with Dr. Prabha Mandayam of IIT-M)

Theoretical Computer Science

Name: **M, Jayakrishnan**
Thesis Title: Data Structure Lower Bounds Using Communication Complexity

Thesis Advisor: Sharma, Vikram
University: HBNI

Name: **Datta, Rajit**
Thesis Title: Lines Determined by n points in the Euclidean Plane
Thesis Advisor: Sharma, Vikram
University: CMI

Masters Theses Submitted during 2016 − 2017

Mathematics

Name: **Sivaraman, Jyothsnaa**
Thesis Title: Aspects of Diophantine approximation
Thesis Advisor: Gun, S.
University: HBNI

Theoretical Computer Science

Name: **Divyarthi, M.**
Thesis Title: An Improved Dynamic Algorithm for Maximum b-Matching
Thesis Advisor: Bhattacharya, Sayan & Sharma, Vikram
University: HBNI

2.5.2   Lecture Courses During 2016 − 2017

The following **lecture courses** were offered during 2016 − 2017.

Course Title	Period	Lecturer
Mathematics		
Algebra II	Jan-Apr 2016	Viswanath, Sankaran
Functional Analysis	Jan-Apr 2016	Sunder, V. S.
Topology-II	Jan-Mar 2016	Sankaran, Parameswaran
Topology-I	Aug-Dec 2016	Chatterjee, Pralay
Algebra I	Aug-Dec 2016	Nagaraj, D. S.
Analysis I	Aug-Dec 2016	Chakraborty, Partha S.
Complex Analysis	Aug-Dec 2016	Srinivas, K.
Lie algebras and their representations	Aug-Nov 2016	Raghavan, K. N.
Symplectic Geomtry	Jan-Apr 2017	Venugopalan, Sushmita

Physics

Advanced Particle Physics (in part- along with others)	Jan-Apr 2016	Murthy, M.V.N.
Classical Field Theory	Jan-Apr 2016	Date, G.
Quantum Information and Quantum Computation (elective)	Jan-Apr 2016	Chandrashekar, C. M.
Statitistical Field Theory	Jan-Apr 2016	Sathiapalan, Balachandran
Statistical Mechanics I	Feb-May 2016	Chaudhuri, Pinaki P.
A Minicourse on Neutrinos	Apr-Apr 2016	Rajasekaran, G.
Classical Mechanics	Aug-Dec 2016	Bagchi, Manjari
Electrodynamics	Aug-Dec 2016	Ashok, Sujay K.
Protein Structure	Aug-Dec 2016	Vemparala, Satyavani
Quantum Field Theory	Aug-Nov 2016	Digal, Sanatan D.
Quantum Mechanics 1	Aug-Dec 2016	Chandrashekar, C. M.
Statistical Mechanics II	Aug-Dec 2016	Rajesh, R.
Quantum Mechanics-I	Sep-Oct 2016	Ghosh, Sibasish
Condensed Matter Physics	Jan-Apr 2017	Vemparala, Satyavani
Nonlinear Dynamics	Jan-May 2017	Sinha, Sitabhra
Quantum Field Theory II	Jan-Apr 2017	Mukhopadhyay, Partha
Quantum Information and Quantum Computation	Jan-Apr 2017	Chandrashekar, C. M.
Renormalisation Group	Jan-Mar 2017	Sathiapalan, Balachandran
Statistical Field Theory	Jan-Apr 2017	Ray, Purusattam
Statistical Mechanics 1	Jan-May 2017	Chaudhuri, Pinaki P.
Systems Biology	Jan-May 2017	Sinha, Sitabhra
Advanced Particle Physics (Along with some other faculty)	Feb-Feb 2017	Murthy, M.V.N.

Theoretical Computer Science

Computational Complexity	Jan-May 2016	Mahajan, Meena
Graph Classes: Classical and Parameterized	Jan-May 2016	Saurabh, Saket
Infinite Discrete Structures	Jan-Apr 2016	Ramanujam, R.
Mathematical Foundation of Computer Science	Jan-May 2016	Saurabh, Saket
Parameterized Complexity	Jan-May 2016	Saurabh, Saket
Algebra and Computation	Aug-Nov 2016	Arvind, V.
Algorithms and Data Structures	Aug-Dec 2016	Raman, Venkatesh
Concrete Lower Bounds	Aug-Nov 2016	Mahajan, Meena
Discrete Mathematics	Aug-Dec 2016	Subramanian, C. R.
Discrete Mathematics (jointly with CR Subramanian)	Aug-Dec 2016	Sharma, Vikram
Logic	Aug-Dec 2016	Lodaya, Kamal
Theory of computation	Aug-Dec 2016	Ramanujam, R.
Advanced Data Structures	Jan-Apr 2017	Raman, Venkatesh
Computational Complexity	Jan-May 2017	Mahajan, Meena

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Finite model theory	Jan-Apr 2017	Ramanujam, R.
Parameterized Complexity	Jan-Apr 2017	Raman, Venkatesh
Theory of Computation II	Jan-May 2017	Lodaya, Kamal

Computational Biology

Advanced Condensed Matter	Jan-May 2016	Menon, Gautam I.
Biology-2	Jan-Apr 2016	Samal, Areejit
Modeling Infectious Diseases	Jan-May 2016	Menon, Gautam I.
Biology-1	Aug-Nov 2016	Samal, Areejit
Physical Biology	Aug-Dec 2016	Menon, Gautam I.
Biology-2	Jan-Apr 2017	Samal, Areejit
Classical Field Theory	Jan-Apr 2017	Menon, Gautam I.

In addition, the following **lecture courses** were offered during 2016 – 2017 by IMSC faculty in the National Undergraduate programme of the Chennai Mathematical Institute.

Course Title	Period	Lecturer

Physics

Quantum Mechanics II	Jan-Apr 2016	Rajasekaran, G.
Advanced Quantum Mechanics	Aug-Dec 2016	Rajasekaran, G.
Quantum Field Theory	Jan-Apr 2017	Rajasekaran, G.

2.5.3   Summer Students

Every summer, a small number of students from various institutes/universities come to our institute and work on some learning/research projects with some faculty member for a period of four to six weeks. The following students visited the institute during Apr, 2016 - Mar, 2017.

Student	Faculty

Mathematics

Student	Faculty
Philip, Aleena, Central university of Kerala	Gun, S.
Kumar, Vinay, NIT Warangal	Gun, S.
Srivastava, Vaibhava, Acharya Narendra Dev College	Gun, S.
Santhosh, Giftson P., RIASM, Univ. of Madras	Prasad, Amritanshu
Maliakal, Shruti, IISER, Mohali	Raghavan, K. N.
Mukhija, Dikhsa, IISER, Mohali	Raghavan, K. N.

Kundu, Arnab, CMI	Raghavan, K. N.
Deb, Bishal, CMI	Raghavan, K. N.
Kazi, Ananyo, CMI	Raghavan, K. N.
P. Subbulakshmi, Stella Maris College, Chennai	Srinivas, K.

Physics

Rustagi, Varun, Delhi Technological University	Bagchi, Manjari
Manohar, Aswin, Madras Christian College	Bagchi, Manjari
Neogi, Arkalekha, IISER-Kolkata	Ghosh, Sibasish
Mubarak, Ahmad, Loyola College, Chennai	Ray, Purusattam
Venkataramanan, Koushik, Loyola College, Chennai	Ray, Purusattam
Sundaresan, Hari Krishnan, Loyola College, Chennai	Ray, Purusattam
Barua, Arnab, IIT Bombay	Sinha, Sitabhra
Goyal, Srashti, IISER, Kolkata	Sinha, Sitabhra
Gupta, Anubhav, IISER, Kolkata	Sinha, Sitabhra
Krishnan, Divya, Pondicherry Central University	Sinha, Sitabhra
Datta, Arya, IIT Guwahati	Sinha, Sitabhra

Theoretical Computer Science

Kush, Deepanshu, IIT Bombay	Mahajan, Meena
Chakraborty, Atlanta , IISc	Mahajan, Meena
Sahayaraj, Sanjana, SSN College of Engineering	Ramanujam, R.

Computational Biology

Mona, Kenitha, PSGR Krishnammal College for Women	Menon, Gautam I.
Jayaram, Ashreya, Stella Maris College	Samal, Areejit

2.5.4   Other Students

Students also do their projects under the supervision of our faculty during the academic year.The following students visited the institute during Apr, 2016 - Mar, 2017.

Student	Faculty

Mathematics

Sangale, Usha K, SRTM University, Nanded	Srinivas, K.

Physics

Biswas, Tanmoy, IISER-Kolkata   Ghosh, Sibasish
Ramnath, Samyukta, BITS-Pilani Goa Campus   Sinha, Sitabhra

Theoretical Computer Science

Murali, Adithya, BITS Pilani, Hyderabad   Lodaya, Kamal
Singh, Deeptanshu , IIT Roorkee   Mahajan, Meena

Computational Biology

Narasimhan, Roshani, Dhirubhai Ambani Inst. of   Samal, Areejit
  Information and Communication Tech.
Karthikeyan, M., Bharathidasan University   Samal, Areejit

2.6   Honours and Awards

Kodiyalam, Vijay was awarded Fellow of the Indian Academy of Sciences, for 2017, by the Indian Academy of Sciences, Bangalore.

Menon, Gautam I. was awarded Outstanding Reviewer Award - Reports on Progress in Physics (2016), for 2017, by the Institute of Physics, UK for This award recognizes the high quality and timeliness of the awardees reviews for Reports on Progress in Physics. This award is new for 2016, and is given to a very small number of reviewers judged by the editorial teams to have provided exception service.

Nagaraj, D. S. was awarded Fellow, for 2017, by the INSA.

Raghavan, K. N. was awarded Fellow, for 2016, by the National Academy of Sciences, Allahabad.

Samal, Areejit was awarded Max Planck Partner Group, for 2016, by the Max Planck Society (MPG).

Chapter 3

Other Professional Activities

This chapter lists the activities carried out by the individual members of the institute in their professional capacity.

Arvind, V.

Member of Programme Committee of the 12th Conference on Computability and Randomness during Nov 2015 – Apr 2016.

Editor of Computational Complexity Column of the Bulletin of the European Assoc. of Theoretical Computer Science.

Bagchi, Manjari

Skype chat at The Netherlands Institute for Radio Astronomy – ASTRON (participated remotely from IMSc). on Apr 10, 2016. Participated in the "chat with an astronomer" session on the occasion of the "Girls' Day" organized by the Netherlands Institute for Radio Astronomy. This is an annual public outreach activity organised by ASTRON.

Reviewer of Europhysics Letters, Journal of Astrophysics and Astronomy, Journal of Science Education (Indian Academy of Sciences); Physics News (Indian Physics Association), during May 2016 – Jan 2017.

Panel member at Shri Ram School, Moulsari Avenue, Gurgaon on May 6, 2016. Participated by invitation in the Physics Conclave (a panel discussion on Gravitational Waves and Higgs Boson) organised by Life Lab (NGO).

Reviewer of GMRT observation proposals during Aug 2016 – Jan 2017.

Reviewer of NASA Post-doctoral Program during Aug – Nov, 2016.

Lecture at IMSc, Chennai on Oct 21, 2016. "Gravity: Distortion and ripples in the space-time." - A talk as a part of One percent, the public outreach (school-students) programme

organised by the Mathematics group of IMSc.

Lecture and co-organiser at IMSc, Chennai on Feb 11, 2017. "Twinkle, twinkle little stars; Yes, we know what they are!" - A talk as a part of a programme for school students (class VIII- XII) on the occasion of the International Day of Women and Girls in Science.

Bakshi, Keshab Chandra

Speaker in IMSc Mathematics Student Seminar at IMSc on Mar 23, 2017. Briefly introduced what a von Nemann algebra is and also lectured some basics on subfactors of type II_1 factors. Commuting squares and angle between intermediate subfactors have also been introduced.

Chakraborty, Partha S.

Member of Advisory Committee for Recent Advances in Operator Theory and Operator Algebras held at Indian Statistical Institute, Bangalore Centre during Dec 13 – Dec 22, 2016.

Chaudhuri, Pinaki P.

Convener of Local Organising Committee for Plasticity and failure in disordered materials held at IMSc during Jan 4 – Jan 7, 2017.

Date, G.

Ex-officio member of the Council of Indian Association for General Relativity and Gravitation

Lecture during IMSc Open Day at IMSc on Apr 9, 2016. Gave a talk *A Hundred Years Later* on the detection of the Gravitational Waves.

Ganguli, Saibal

Reviewer for Mathscinet of AMS during Apr 2014 – Dec 2016.

Ghosh, Sibasish

External Expert of Doctoral Committee in the physics department of IIITDM, Kancheepuram during May 2013 – Apr 2016.

Member of Doctoral Committee, Physics Department, IIT-Madras during Apr – Dec, 2016.

Convener of Local Organising Committee for 2nd IMSc School on Quantum Information held at IMSc during Dec 5 – Dec 17, 2016.

Gun, S.

Reviewer of Mathematical Reviews during Jul 2008 – Mar 2017.

Reviewer of Zentralblatt Reviews during Apr 2011 – Mar 2017.

Managing Editor of IMSc monograph series during Apr 2015 – Mar 2017.

Member of International Organising Committee for A conference on Arithmetic Geometry and L-functions held at KSOM during Aug 17 – Aug 21, 2016.

Kodiyalam, Vijay

Lecture on "What does a mathematician do?" at Chettinad Vidyashram on Feb 15, 2017.

Mahajan, Meena

Member of Programme Committee of the 12th International Computer Science Symposium in Russia during Jul 2016 – Mar 2017.

Convener of National Organising Committee for Workshop on Arithmetic Complexity held at IMSc during Feb 27 – Mar 3, 2017.

Menon, Gautam I.

Member of Academic Committee, Raman Research Institute, Bengaluru during Aug 2014 – Aug 2016.

Member of DBT Star College Scheme Committee, Department of Biotechnology, New Delhi during Mar 2016 – Mar 2017.

Member of Grant Review Committee, Human Frontier Science Program, Strasbourg during Mar 2016 – Mar 2017.

Member of Editorial Board, Scientific Reports during Mar 2016 – Mar 2017.

Member of Editorial Board, Texts and Readings in the Physical Sciences during Mar 2016 – Mar 2017.

Convener of Local Organising Committee for Science at the Sabha held at The Music Academy on Feb 26, 2017.

Murthy, M.V.N.

Lecture to school students at Vana Vani School, IIT Madras on Jan 24, 2017. Popular lecture

on "Environment, Pollution and Climate Change".

Nagaraj, D. S.

Convener of National Organising Committee for Narture2016 "Winter School in Mathematics to the memory of Dr. Subramiah Minakshi Sundaram (SMS)" held at Central University of Tamilnadu, Thiruvarur during Dec 4 – Dec 24, 2016.

Convener of Local Organising Committee for Seshadri constant held at C.M.I. Chennai during Jan 30 – Feb 10, 2017.

Prabhakar, Varuni

Understanding mathematics through crafts for schools at Craft Education and Research Center (CERC), Kalakshetra Foundation [every 2 weeks, 07/2015-03/2016] on Apr 1, 2016. In collaboration with CERC and Sunita Vatuk (City University of New York), developing a course for students of the Besant Arundale Senior Secondary School to explore abstract Mathematical Concepts through block printing and weaving.

Convener of Local Organising Committee for CSPathshala teachers workshop held at IMSc on Nov 18, 2016.

Convener of Local Organising Committee for Foldscope workshop for TNSF held at IMSc on Nov 19, 2016.

Convener of Local Organising Committee for Teachers Enrichment Workshop held at IMSc during Nov 21 – Nov 26, 2016.

Convener of Local Organising Committee for VIGYANshaala held in schools in Chennai, Puducherry and Chengalpet district during Jan 9 – Jan 12, 2017.

Convener of Local Organising Committee for Mathematics and Craft teachers workshop held at IMSc during Jan 20 – Feb 20, 2017.

Convener of Local Organising Committee for International Day of Women and Girls in Science for school girls held at IMSc on Feb 11, 2017.

Convener of Local Organising Committee for Science at the Sabha held at The Music Academy on Feb 26, 2017.

Prasad, Amritanshu

Member of Board of studies, undergraduate studies, Homi Bhabha National Institute during Apr 2015 – Mar 2017.

Raghavan, K. N.

Secretary of Forum D'analystes

Convener of Local Organising Committee for Teachers' Enrichment Workshop: Algebra and Analysis held at IMSc during May 23 – May 28, 2016.

Lecture to college students in a summer workshop at Pie Mathematicians Club, Nungambakkam on May 12, 2016. Lectured to college students (mostly moving from MSc first year to second year) on applications of linear algebra.

Mentor in DST INSPIRE progamme at Madras University, Guindy Campus on Aug 26, 2016. Lectured to and interacted with school students

Lecture at a school programme at Vidyodaya School, T. Nagar, Chennai on Aug 20, 2016. Talk on "Scope of Mathematics" in the school's "Career Guidance Programme"

Member of Board of Studies (Mathematical Sciences), HBNI during Aug 2016 – Mar 2017.

Lecture to school students at Srinivsa Ramanujan Centre, SASTRA University, Kumbakonam on Sep 24, 2016. Gave a maths lecture to school students in the University's "Science Arattai" lecture series

Panelist at a science program for school children at Central Leather Research Institute, Chennai on Sep 22, 2016. Was the mathematician in a panel of scientists at a science program for school children.

Mentor in DST INSPIRE camp for school children at Sree Sashta Institute of Engineering and Technology, Chennai on Oct 22, 2016. Lectured to and interacted with students

Mentor in DST INSPIRE camp for school children at Madras Univeristy, Guindy Campus on Oct 21, 2016. Lectured to and interacted with school children

Convener of NBHM Southern Region Library Committee during Nov 2016 – Mar 2017.

Convener of International Organising Committee for Symposium on Algebraic Groups, TIMC–AMS Conference held at Benares Hindu University, Varanasi during Dec 14 – Dec 17, 2016.

Mentor in DST INSPIRE camp for school children at SASTRA University, Thanjavur on Dec 29, 2016. Lectured to and interacted with school children

Mentor in DST INSPIRE program for school children at Madras University, Gunidy Campus on Dec 27, 2016. Lectured to and interacted with school students

Convener of National Organising Committee for Academies' Lecture Workshop Series held at Karpagam University, Coimbatore during Jan 4 – Jan 5, 2017.

Mentor in DST INSPIRE camp for school children at SRM University, Chennai on Jan 9, 2017. Lectured to and interacted with school children

Convener of Local Organising Committee for Science at the Sabha held at The Music Academy, Chennai on Feb 26, 2017.

Mathematics Club activity at Padma Seshadri Bal Bhavan School on Feb 27, 2017. Lectured to and interacted with students

Rajasekaran, G.

Member of Academic Council of CMI

Popular Science article at Madurai on Jun 1, 2016. Published a popular science article in Tamil: "Faraday, Maxwell and the Electromagnetic Field" in the Journal Mulumai Ariviyal Udayam, Vol 9,No 6

Popular Science article at Madurai on Sep 1, 2016. Published a popular science article "Who is the loser if INO does not come up in Tamil Nadu?" in the Journal Mulumai Ariviyal Udayam Vol 9, No 9.

Popular Science Book at Madurai on Jan 1, 2017. Wrote a Tamil book on popular science "Science and Beyond Science", published by Rajarajan Institute for Science and BI-NOWS,Madurai.

Popular Science Talk at Young Men's Indian Association, Mylapore on Jan 17, 2017. Gave a talk on Neutrinos and INO

Popular Science article at Madurai on Feb 1, 2017. Published a popular science article in Tamil "Imagination in Science" in the Journal Mulumai ariviyal udayam Vol 10, No 2.

Popular Science article at Madurai on Mar 1, 2017. Published a popular science article in Tamil "In praise of Astronomy" in the Journal Mulumai ariviyal udayam Vol 10, No 3.

Raman, Venkatesh

Member of Board of Studies of Mathematics at PSG College of Technology, Coimbatore

Member of Program Committee of Conference on Algorithms and Discrete Applied Mathematics (CALDAM) during Jul 2016 – Feb 2017.

Ramanujam, R.

Member of East Asia committee of the Association for Symbolic Logic during Jan 2011 – Dec 2016.

Chairperson of Board of Studies, Mathematical Sciences, of the Homi Bhabha National Institute during Aug 2013 – Jul 2016.

Member of Governing Board of Vigyan Prasar, DST during Aug 2013 – Mar 2017.

Chairperson of Board of Studies of Mathematical Sciences, HBNI during Aug 2013 – Aug 2016.

Member of Program Committee, Highlights of Logic Games and Automata, Brussels, 6-9 Sept 2016 during Aug 2015 – Sep 2016.

Member of Program Committee, 9th Workshop on Logical Aspects of Multi-Agent Systems, May 2016, Singapore during Aug 2015 – May 2016.

Member of Program Committee, 23rd International Symposium on Temporal Representation and Reasoning, October 17-19, 2016, Technical University of Denmark during Nov 2015 – Oct 2016.

Member of Program Committee, Indian Conference on Logic and Applications, Jan 5 to 7, IIT, Kanpur during May 2016 – Jan 2017.

Lectures on mathematics education and popularisation at Jakarta, Bandung and Bali, Indonesia on May 16, 2016. Conducted 10 sessions on mathematics education from May 16 to 26 in schools and universities in Indonesia.

Convener of International Organising Committee for 9th Workshop on Methods for Modalities held at Indian Institute of Technology, Kanpur during Jan 8 – Jan 9, 2017.

Keynote speaker at Lady Shriram College, New Delhi on Mar 3, 2017. Gave the keynote lecture in the National conference on innovation in mathematics education.

Ray, Purusattam

Convener of National Organising Committee for Plasticity and failure in disordered materials held at IMSc during Jan 4 – Feb 7, 2017.

Samal, Areejit

Convener of Local Organising Committee for Network theory: conceptual advances and practical applications held at IMSc on Apr 26, 2016.

Grant reviewer of Science and Engineering Research Board (SERB), Department of Science and Technology, India during Jul – Aug, 2016.

Grant reviewer of Netherlands Organisation for Scientific Research (NWO, the Dutch Research Council) during Feb – Feb, 2017.

Sankaran, Parameswaran

Member of Mathematics Section Committee, Indian Academy of Sciences, Bengaluru.

Member of Joint Science Education Panel, Indian Academy of Sciences, Bengaluru.

Sharma, Vikram

Convener of Local Organising Committee for Automatic Presentations of Graphs and Numbers A One Day Workshop held at IMSc on Oct 11, 2016.

Sinha, Sitabhra

Member of Editorial Board of Frontiers in Fractal Physiology

Lecturer at RSIC Summer Program, IIT Madras at Indian Institute of Technology, Madras on Jun 3, 2016. Gave popular lecture titled "The Wave of Life" to high-school students

Srinivas, K.

EC member of Ramanujan Mathematical Society

Vidyalaya Management Committee of KV, CLRI

AIR Talk Show in Hindia at AIR studio on Apr 27, 2016. Gave an interview in All India Radio in **Hindi** on the topic: *Aankhon ke yugpurush- Srinivas Ramanujan.* It was aired on the National Hook-up on 27-4-2016 at 10 pm. This recording is a part of the National Science Magazine VIGYAN BHARATI.

Convener of Local Organising Committee for Enriching Collegiate Education -II (TEW 2016) held at IMSc during May 23 – May 28, 2016.

Convener of Local Organising Committee for Advanced Instructional School in Analytic Number Theory held at KIIT, Bhubaneswar during Jun 13 – Jul 2, 2016.

Convener of Local Organising Committee for Enriching Collegiate Education (TEW2016) held at IMSc during Nov 21 – Nov 26, 2016.

All India Radio Interview at AIR Chennai Hub on Dec 27, 2016. Gave an interview programme on *All India Radio* titled "The Wizard of Mathematics, SRINIVASA RAMANUJAN broadcast in the national programme of english talks on 27.12.16 (Tue) at 9.30 pm and on 29.12.16 (Thu) on FM (Gold) at 6 pm.

Subramanian, C. R.

Member of Programme Committee of CALDAM-2017 during Apr 2016 – Feb 2017.

Sunder, V. S.

Invited to give R P Ranga Endowment Lecture at Loyola College on Feb 21, 2017. Gave a lecture titled 'When is a knot not the unknot'.

Venugopalan, Sushmita

Speaker at IMSc on Jul 4, 2016. FACETS, an outreach programme for high school students

Speaker at IMSc on Feb 27, 2017. International Day of Women and Girls in Science

Viswanath, Sankaran

Convener of Local Organising Committee for Enriching Mathematics education 2016 held at IMSc during Sep 26 – Sep 27, 2016.

Lectured at PSBB School KK Nagar Chennai on Nov 10, 2016. Lectured to 12th standard students on a mathematics topic related to calculus.

Chapter 4

Colloquia

4.1 Conferences/Workshops Held at IMSc

the Indus Valley Phenomenon

4.1.1 Network Theory: Conceptual Advances and Practical Applications

Complex networks permeate our daily life. These span across biological networks, social networks and technological networks. A major goal of network theory is to elucidate the relationships between structure, dynamics and function of complex networks. The focus of this meeting was conceptual advances in network theory and their practical applications.

A report with related links is available at http://www.imsc.res.in/ knr/past/tewmay16/

4.1.2 Automatic Presentations of Graphs and Numbers A One Day Workshop

To present an infinite graph, one can use grammars or finite state automata. For example, the infinite transition system of configurations of a pushdown automaton can be represented by the pushdown automaton itself, or by a graph grammar. This can be generalized to transition systems of higher-order pushdown automata, which use stacks of stacks of ...stacks, rather than just ordinary stacks.

To present a real number, say between 0 and 1, one can again use grammars or automata of different kinds. For example, an automaton can accept a word which represents a number /N/ (in some predetermined base) to say that the /N/th bit of that number is 1, and can reject the word representing /N/ to say that the /N/th bit of that number is 0.

Can one have interesting algorithms which work with these representations? What kinds of graphs or numbers are representable? Can one directly work with logics which express properties of graphs, or of relationships between graphs?

List of Speakers * Didier Caucal, University of Paris-Est Marne-la-Valle, France * Christian Delhomme University of La Reunion, France * Marion Le Gonidec, University of La Reunion, France * Alexandre Mansard, University of La Reunion, France * Antoine Meyer, University of Paris-Est Marne-la-Valle, France * T.S. Ramanathan, IMSc Chennai * Purusottam Rath, Chennai Mathematical Institute * Vikram Sharma, IMSc Chennai

Co-convener along with Prof. Kamal Lodaya

4.1.3 Aspects of Gene and Cellular Regulation (AOGCR2016)

This informal meeting consisted of 14 research talks by speakers from leading institutions in India and abroad on various aspects of regulation at the genetic and cellular level. Other than the speakers, there were about 25 participants. (August 25-26, 2016)

4.1.4 BioCS16: Mini-meeting on the computer science/biology interface

This meeting explored the interface between theoretical computer science and modern biology, with speakers from India and abroad describing applications of CS techniques such as string algorithms, machine learning, visualization to problems in modern biology. (December 10-11, 2016)

4.1.5 2nd IMSc School on Quantum Information

This School is the second one, the first one was held in Jan., 2014. This time, we had six speakers for the School. Most of the speakers gave a series of 5-6 lectures together with some tutorials. The topics were chosen to be of current interests in the field of Quantum Information Science with special emphasis on Continuous Variable Quantum Information. There were about 80 participants all over India and a few from abroad.

4.1.6 Plasticity and Failure in Disordered Materials

Material behaviour under stress is a fascinating non-linear dynamic phenomena that occurs over various length and time scales. In ductile materials, the onset of plasticity is marked by the avalanche dynamics and hysteresis. In brittle and quasi- brittle materials, small scale perturbations at the micro scale leads to catastrophic failures. Understanding material response under stress at different length scales is of vital importance to physicists and for many engineering, biological and geophysical applications. This meeting aims at a collective understanding of the material behaviour at various length scales

4.1.7 Workshop on Arithmetic Complexity

This workshop was organised as part of the activities in the Thematic Year Complexity Theory and Cryptography of the National Mathematics Intitiative of the Government of India. It took place at IMSc during the period 27 Feb – 3 March 2017.

The goal of this workshop was two-fold: to provide a forum for active researchers in the area to interact and collaborate, and to help young researchers (including beginning graduate students and post-doctoral fellows) get launched off in this area. The workshop included fourteen talks covering various themes within the broad area of arithmetic complexity, including counting complexity, depth-reduction and structural properties of algebraic circuits, non-commutative computation, polynomial identity testing, and more. There were 46 participants at the workshop.

4.2　Other Conferences/Workshops Organized by IMSc

4.2.1　Advanced Instructional School in Analytic Number Theory

NCM/IMSc sponsored AIS in Analytic Number Theory was held at KIIT, Bhubaneswar during 13 June to 2 July, 2016, about 35 research scholars and few faculty members from universities participated in this programme. The resource people were Kumar Murty, Ritabrata Munshi, Kaneenika Sinha, R. Thangadurai, Stephan Baier and K. Srinivas. The tutors were Kashi Viswanadham, Subramani Muthukrishnan, Usha Sangale, Sudhir Pujahari. The academic programme is available at https://www.atmschools.org/2016/ais/atan .

4.2.2　A Conference on Arithmetic Geometry and L-functions

The conference have around 30 distinguished speakers from various parts of India and abroad. A conference proceeding will be published by Springer.

4.2.3　Nurture 2016 : Winter School in Mathematics to the memory of Dr. Subramiah Minakshi Sundaram (SMS)

The aim of this workshop is to show the natural flavor of doing mathematics and to encourage independent learning.

Gave 5 lectures on Algebra.

4.2.4　Symposium on Algebraic Groups, TIMC–AMS Conference

The symposium was jointly organized by Professor K.N. Raghavan and Professor V. Lakshmibai, as part of the TIMC-AMS conference in BHU during 14-18 December 2016.

4.2.5　Recent Advances in Operator Theory and Operator Algebras

OTOA is a platform to explore and discuss developments, issues and challenges in the fields of Functional analysis, Operator Algebras, Operator theory and related fields.

OTOA-2016 aims bringing experts and researches from around the world, including postdocs and advanced doctoral students,to share their recent findings related to the various fields of Functional Analysis, Operator Theory, Operator Algebras and related fields. The meeting will start with a workshop during December 13-17, 2016 followed by a conference during December 19-22, 2016. The purpose of the workshop is to bring experts and students as well as researchers together to discuss the most recent developments in certain topics in those areas.

4.2.6   Workshop on Seshadri Constant

Seshadri constants is very important numerical invariant of an algebraic variety and is a very active area of research.

4.2.7   Science Academies' Lecture Workshop Series: Algebra & Analysis

Professor K.N.Raghavan arranged the academic program and also acted as a resource person.

4.2.8   9th Workshop on Methods for Modalities

The Association for Logic in India (ALI) sponsored the 9th Methods for Modalities Workshop, held at the Indian Institute of Technology (IIT) Kanpur, from January 8 to 9, 2017. It was co-located with the Indian Conference on Logic and its Applications (ICLA) held from January 5 to 7, 2017.

M4M is an important avenue for discussions of research in modal logics, especially on proof methods and decision procedures, and linkages of modal formalisms to computer science. In M4M9 a substantial part of the meeting was devoted to tutorial lectures to increase the instructional content of the event. It had invited talks by Lydia Tendera (Warsaw) and Joel Gregory Lucero-Bryan (Abu Dhabi), as well as tutorials by Thomas Bolander (Copenhagen) and jointly by Kamal Lodaya (IMSc) and Paritosh Pandya (TIFR).

The electronic proceedings of M4M9 have been published in the EPTCS series as volume 243, March 2017.

4.3 IMSc Outreach Activities

4.3.1 Enriching Collegiate Education -II (TEW 2016)

A one week lecture programme for mathematics teachers of arts and science colleges was held at IMSc during 23–28 May, 2016. This event was funded by NCM and cosponsored by IMSc. About 60 teachers participated in this programme.

4.3.2 Teachers' Enrichment Workshop: Algebra and Analysis

This was one of the NCM sponsored workshops for teachers. A report with related links is available at http://www.imsc.res.in/ knr/past/tewmay16/

4.3.3 Teachers Enrichment Workshop

A workshop for Mathematics teachers from Engineering Colleges co-funded by National Centre for Mathematics (NCM). Topics covered in this years TEW were: Complex Analysis, Sushmita Venugopalan; Laplace transform, Indrava Roy and Vector Calculus, P. Sankaran. (IMSc Organizers: P Sankaran and K. Srinivas)

4.3.4 Enriching Collegiate Education (TEW2016)

A one week lecture programme for teachers of engineering colleges in and around Chennai was held at IMSc during November 21–26, 2016. About 60 teachers participated in this programme. This programme was financially supported by NCM and co-sponsored by IMSc. A link to the programme is available at https://www.atmschools.org/2016/tew/wmtec

4.3.5 Enriching Mathematics Education 2016

Workshop for school teachers. The aim was to bring research mathematicians and school teachers together in an effort to enrich mathematics education in schools. Activities included lectures on school level mathematics from alternate perspectives, talks on pedagogy, and discussions related to the teaching and learning of mathematics.

4.3.6 CSPathshala Teachers Workshop

The Association for Computing Machinery (ACM) India has started an education initiative, CSpathshala, to promote the teaching of computing as a science in schools. CSpathshala brings a modern computing curriculum to Indian schools. CSpathshala, will be rolling out a pilot project to teach computing as a science in Chennai schools for grades 1-8, for the academic year 2017-18. The initiative will train teachers on a new Computer Science curriculum, provide teaching aids - detailed lesson plans, notes and activity sheets. A pilot project

for 15 schools using the new curriculum is already underway in Pune. (IMsc Organizer: Venkatesh Raman)

4.3.7 Foldscope workshop for TNSF

A Foldscope is simple microscope that can be assembled from a sheet of paper and a lens. It was developed by Manu Prakash and Jim Cybulski at Stanford University. They are now involved in a world wide program to distribute Foldscopes to school children and create a community of young miscroscpers. IMSc along with Tamil Nadu Science Forum is organized a Foldscope workshop for school teachers from in and around the city. (Organizers: Krishnaswamy S and Varuni P)

4.3.8 Mathematics and Craft Teachers Workshop

A teachers workshop on how craft can be used to understand different concepts in Mathematics for various age groups. The workshop included hands-on Craft sessions as well as ways to understand some Mathematical concepts through these Crafts. (IMSc Organizers: Amritanshu Prasad and Varuni P)

4.3.9 International Day of Women and Girls in Science for school girls

International Day of Women and Girls in Science is observed on 11th February by the United Nations. IMSc is hosted a one day event for girl students on Mathematics and Science. The program will had talks by women scientists, focused on achievements of Indian women scientists and have discussions with the graduate students on research as career. About 100 girls from classes VIII to XII standard to attended. (IMSc Organizers: Manjari Bagchi and Varuni P)

4.3.10 VIGYANshaala

VIGYANshaala is a team of researchers who have been involved in science communication and popularization in schools. They have been traveling across the country conducting workshops called "It's a Materials World" targeting high school students through innovative demonstrations that communicate complex scientific phenomena from polymer self-assembly and entropy to interference and diffraction. IMsc hosted them in Chennai and arranged for sessions in schools in the surrounding areas. (IMSc Organizer: R. Ramanujam)

4.3.11 Science at the Sabha

Series of lectures on Science for the general public. (IMSc Organizers: Gautam Menon, K. N. Raghavan and Varuni P)

Science at the Sabha is the largest outreach event organized by IMSc Chennai and has traditionally been held at the Music Academy, an iconic venue in Chennai. It was organized by K.N. Raghavan, Gautam Menon and Varuni Prabhakar. This year, four speakers from a variety of scientific disciplines were invited to speak there. They were: Uma Ramakrishnan (NCBS, Bangalore), Amritanshu Prasad (IMSc, Chennai), Yashwant Gupta (NCRA, Pune) and S. Krishnaswamy (IMSc, Chennai). The program was held on Sunday, February 26, between 4:00 pm and 7:30 pm.and the talks were aimed at anyone with an interest in science, irrespective of age or background. Around 900 members of the public attended and there was a lively question-and-answer session.

"For the second year, the Institute of Mathematical Sciences, Chennai, hosts a series of talks that play an integral part in their Triveni Outreach Series. The lectures covered a vast section of fundamental research taking place in the mathematical and physical sciences. Yashwant Guptas Reaching out to the Stars has explored star-gazing, touring the universe through an astronomical medium. Meanwhile, S Krishnaswamy and Uma Ramakrishnan took the crowd back to the basics of molecular particles and the implications of DNA in animal extinction. Amritanshu Prasad attempts to decode the mystery of cryptography in a world that seems to be filled with coded threats. The talks were meant to reach out to the people of Chennai, drawing attention to scientific phenomena that are changing the world. Though the Academy is used to seeing its share of music lovers, during this programme it was singing quite a different tune." From The Hindu article: http://www.thehindu.com/todays-paper/tp-features/tp-metroplus/science-at-the-sabha/article17345021.ece

Details of the event are available at http://www.imsc.res.in/triveni/

4.3.12   One Percent 2016

"One percent 2016", a day of Mathematics for students of class XI and XII, was held at the Institute on 21st October, 2016. The school children from different schools in different places of Chennai have participated in this program. The participants were given an opportunity to learn about Cryptography and Gravitational Waves. About 200 students from various schools have registered for this program.

4.4 Seminars

Date	Speaker Affiliation	Title
1-4-2016	Aprameyan Parthasarathy Univ. of Paderborn	Casselman-Wallach globalisation and its applications
5-4-2016	Arpita Choudhary	Star and planet formation: The story unfolds
6-4-2016	Govind Krishnaswami CMI, Chennai	Conservative regularization of compressible 3D Eulerian flows
6-4-2016	Mahendra Prajapat IIT Bombay	Computational Analysis of Regulatory Structure and Its Impact on Control of Gene Expression Dynamics
7-4-2016	Arun Kumar Kandukuri TB Alert India, Hyderabad	Axshya India Project
7-4-2016	Tali Pinsky TIFR	A topological approach to the Lorenz equations
15-4-2016	Ayalvadi Ganesh School of Mathematics, Univ. of Bristol, UK	Epidemics on networks: Thresholds and control strategies
19-4-2016	M Muthukumar Polymer Science and Eng., Univ. of Massachusetts, Amherst, USA	The Ordinary-Extraordinary Transition in Dynamics of Solutions of Charged Molecules
19-4-2016	Ashwin Ganesan Vidyalankar Inst. of Technology, Mumbai	Automorphism group of Cayley graphs generated by transpositions
22-4-2016	Sabastien Palcoux & Mamta Balodi IMSc	On boolean interval of finite groups
27-4-2016	Pinaki Banerjee IMSc	Zero temperature dissipation and holography

27-4-2016	Manimala Mitra IISER Mohali	On the Origin of Neutrino Mass: Neutrinoless Double Beta Decay
28-4-2016	Manimala Mitra IISER Mohali	Seesaw and Massive Neutrinos: From Collider to Cosmology
29-4-2016	B Ravinder TIFR Mumbai	Thesis Defense: On bases for local Weyl modules in type A
10-5-2016	Shruti Dogra IISER Mohali	Exploring contextuality and determining the parity of a permutation using an NMR qutrit
11-5-2016	N D Hari Dass TIFR-TCIS, Hyderabad	Hydrogen's Challenge to Quantum Mechanics
11-5-2016	Krishanu Roy IMSc	An overview of the proof of the Kadison-Singer Conjecture
12-5-2016	E V Sampathkumaran TIFR, Mumbai	Geometrically frustrated magnetism: Competition among cooperative phases and order by disorder
13-5-2016	Jyoti Sharma CIE, Delhi University	Mentor Support Network for Math and Science Students
17-5-2016	Sandipan Sengupta IIT Gandhinagar	Degenerate spacetimes in first order gravity
18-5-2016	Bimla Danu IMSc	Extended degeneracy and order by disorder in the square lattice antiferromagnet
19-5-2016	Upendra Kulkarni CMI, Chennai	Relating tensor structures on representations of general linear and symmetric groups
1-6-2016	Thanu Padmanabhan IUCAA	Action Principle in General Relativity
2-6-2016	C Navin Gupta Imag. Genetics & Informatics Lab, Georgia State Univ., USA	Multivariate methods for fusion of multimodal imaging and genetic data in schizophrenia

7-6-2016	Amritanshu Prasad IMSc	Comparison of Gelfand-Tsetlin bases for alternating and symmetric groups
8-6-2016	Sumana Dutta IIT, G	Understanding "Far From Equilibrium Phenomenon": Dynamics and control of spiral and scroll waves
8-6-2016	Shreejit Bandyopadhyay CMI, Chennai	Deuring Heilbronn Phenomena
10-6-2016	A P Balachandran IMSc	Equations of Motion as Quantum Constraints: Super Selection Rules, Ward Identities
14-6-2016	Karimilla Nayeem IMSc	Odd dimensional representations of hyperoctahedral groups
15-6-2016	R Rajaraman JNU, Delhi	India's Nuclear Energy Program: Prospects and Problems
15-6-2016	Tushar Kanti Bose Indian Assoc. for the Cultivation of Science, Kolkata	Ferroelectric order in liquid crystal phases of dipolar disk-like ellipsoids
16-6-2016	Balaji Rajagopalan Univ. of Colorado, USA	A 10,000 year Story of Equatorial Pacific Sea Surface Temperatures and Indian Summer Monsoon
21-6-2016	S Viswanath IMSc	Gelfand-Tsetlin Patterns
22-6-2016	Albin James USC, LA	String Backgrounds with Local Conformal Symmetry
23-6-2016	Tathagata Banerjee Goettingen	Coarse geometry for noncommutative spaces
24-6-2016	M Sivakumar Univ. of Hyderabad	Physics Training and Talent Search Program (PTTS)
27-6-2016	Kamal Lodaya IMSc	Counting, addition and other logical delights

28-6-2016	Ananyo Kazi & Arnab Kundu	Vershik-Okounkov approach to the representation theory of symmetric groups
29-6-2016	N Shankaraiah School of Physical Sciences, JNU, Delhi	Phase-ordering kinetics in martensites
29-6-2016	Tathagata Banerjee Goettingen	Rieffel Deformation
1-7-2016	Madhuparna Karmakar IMSc	Imbalanced Fermi Superfluids
4-7-2016	Sachin Jain Cornell University	Causality constraint on conformal field theory
4-7-2016	Tathagata Banerjee	Rieffel Deformation
7-7-2016	Arul Shankar Harvard University	Heuristics for the distribution of the ranks and Selmer-ranks of elliptic curves
7-7-2016	Sourabh Lahiri ESPCI, Paris	Fluctuation relations for entropy and work in small systems
7-7-2016	Gautam Menon IMSc	Active Topics and related matter
7-7-2016	Tathagata Banerjee	Rieffel Deformations
8-7-2016	B Subash Bharathidasan University, Tiruchirapalli	Nonlinear Magnetization Dynamics of Spin Transfer Nano-Oscillators (STNO)
8-7-2016	E Jayaprasath Pondicherry University, Pondicherry	Chaos synchronization in Semiconductor diode lasers
11-7-2016	A Shankar Harvard University	Ranks of elliptic curves
11-7-2016	M Divyarthi IMSc	Fully dynamic maximum b-matching in constant update time

12-7-2016	S Viswanath IMSc	Gelfand-Tsetlin patterns
12-7-2016	Krishna Maddaly IMSc	A quantum theory of Dark Matter
12-7-2016	Rajesh Singh	Active topics and related matter
12-7-2016	Varun Rustagi IMSc	Procedure to estimate masses of binary pulsars from timing parameters
12-7-2016	M Jayakrishnan	Data structure lower bounds using communication complexity
13-7-2016	Ronak M Soni TIFR, Mumbai	Entanglement in Gauge Theories
13-7-2016	Sreerup Raychaudhuri TIFR, Mumbai	The Early Days of Particle Physics in India
15-7-2016	Rekha Biswal IMSc	Demazure flags, Chebyshev polynomials, Mock theta functions. (PhD Thesis Defence)
19-7-2016	S Viswanath IMSc	Gelfand-Tsetlin patterns
19-7-2016	Swarnava Mukhopadhyay Univ. of Maryland	Rank-level duality of Conformal Blocks
21-7-2016	Sandeep K. Goyal IISER Mohali	An almost convincing scheme for discriminating the preparation basis of quantum ensemble and why it will not work
21-7-2016	Gopal Pandurangan Univ. of Houston, USA	Distributed Computation of Large Scale Graph Problems
22-7-2016	Venkatesh Raman IMSc	Set membership with two bit probes
26-7-2016	Ashutosh Rai Univ. of Latvia	Parity Oblivious d-Level Random Access Codes and Class of Noncontextuality Inequalities

26-7-2016	Aravind Srinivasan Univ. of Maryland	A brief survey of dependent rounding
26-7-2016	Trilochan Bagarti	Active Topics and Related Matter: The TASEP model
26-7-2016	Amritanshu Prasad IMSc	An involutiove model for the symmetric group
28-7-2016	Rohit Verma TIFR	Hitchin morphism for parahoric torsors
28-7-2016	Shrobona Bagchi HRI, Allahabad	A study on measures of total and quantum correlations
29-7-2016	Narasimha Kumar IIT Hyderabad	On the gaps between non-zero Fourier coefficinets of cusp forms of higher weight and level
2-8-2016	T V H Prathamesh IMSc	Quandles: Introduction and the Word Problem
4-8-2016	Peter Wong Bates College, Lewiston, USA	Twisted conjugacy in lamplighter groups
4-8-2016	Anirban Polley Univ. of Chicago, Illinois, USA	How does the closed state of V 3 Integrin destabilized by mutations? -Multiscale Molecular Dynamics Study
5-8-2016	Bhaskar Sen Gupta Yale University	Cross Magneto-Mechanical Effects in Amorphous Solids with Magnetic Degrees of Freedom
5-8-2016	Varunkumar Jayapaul CMI, Chennai	Sorting with Forbidden Comparisons
8-8-2016	K P N Murthy Univ. of Hyderabad	Non-Boltzmann Monte Carlo Methods
9-8-2016	Vijay Ravikumar CMI, Chennai	An Introduction to Schubert Polynomials

10-8-2016	M Lakshmanan Centre for Nonlinear Dynamics, Bharathidasan University, Tiruchirapalli	Nonlinear Dynamics of Heisenberg Ferromagnetic Spin Chain
12-8-2016	Peter Wong Bates College, Lewiston, USA	Torus homotopy groups
12-8-2016	K. B. Sinha	On Two-dimensional Helton-Howe formula Symmetrised Bi-disk
12-8-2016	Diptapriyo Majumdar IMSc	Structural Parameterizations of FVS
16-8-2016	Takeshi Ikeda Okayama Univ. of Science, Japan	K-theory analogues of Schurs P-and Q-functions
19-8-2016	Niranka Banerjee IMSc	Lower bounds for set membership using two bitprobes
24-8-2016	Srinivasan Ramakrishnan TIFR, Mumbai	Superconductivity at extremely low carrier density: Bismuth
26-8-2016	Rajeev Kumar Jain Univ. of Southern Denmark, Denmark	Cosmological Inflation and Primordial Magnetic Fields
29-8-2016	David Hutchinson Univ. of Otago, New Zealand	Quantum Technology Research in New Zealand
30-8-2016	Steven Spallone IISER Pune	An Odd McKay Correspondence for Symmetric Groups
31-8-2016	V.V. Prasad IMSc	Velocity statistics of Driven Granular gases
31-8-2016	Ghanashyam Date IMSc	Gravitational Waves from Compact Sources in de Sitter Background
31-8-2016	A. Zuk Univ. of Paris VII	Analysis and geometry on groups
2-9-2016	A. Zuk Univ. of Paris VII	Analysis and geometry on groups

2-9-2016	S. P. Suresh	An introduction to bitcoin
6-9-2016	Vishnu Jejjala Univ. of the Witwatersrand, South Africa	Consistency and derangements
6-9-2016	A. Zuk Univ. of Paris VII	Analysis and Geometry on Groups
7-9-2016	Bhaskaran Muralidharan IIT Bombay	Quantum-dot heat engines, quantum clocks and a Landauer principle for time-keeping
7-9-2016	Surajit Sengupta TCIS-TIFR, Hyderabad	Concerning pleats and slip: Do we have a new perspective on plastic deformation?
7-9-2016	A. Zuk Univ. of Paris VII	Analysis and Geometry on groups
8-9-2016	Swarnali Majumder SINP, Kolkata	Application of topological methods in non-linear time series analysis
8-9-2016	Lobsang Dhargyal IMSc	Phenomenological studies of the observed anomalies in the tau sector.
9-9-2016	Dheeraj Kulkarni ISI, Kolkata	Contact Structures and Heegaard Floer Homology
12-9-2016	Mohan Ravichandran Minar-Sinan Fine Arts University	The Kadison-Singer problem (1959-2013)
12-9-2016	Anupama Sharma IMSc	Coupling the dynamics of infectious diseases and behavioral responses on complex networks
13-9-2016	Mainak Poddar METU-NCC	Group actions and non-Kaehler complex manifolds
14-9-2016	Sourav Ghosh Univ. of Heidelberg, Germany	Margulis spacetimes and Anosov representations

15-9-2016	Prasanna Venkatraman ACTREC, Navi Mumbai	Network approach to gaining biological insights, its promise and challenges using proteasomal chaperones as a case study
16-9-2016	C S Rajan TIFR	Strong multiplicity one in the context of l-adic Galois representations
16-9-2016	Manik Banik IMSc	Nonlocal and Noncausal correlations: fundamental perspective and applications
19-9-2016	Arnab Saha Univ. of Pune	Collective motion of self-propelled particles: A density functional approach
19-9-2016	Jahnavi Phalkey King's College London	A documentary film on the World's oldest functioning particle accelerator
20-9-2016	Mabin Joseph IGCAR, Kalpakkam	Distinguishing Attacks on (Ultra-)lightweight WG Ciphers
21-9-2016	Arnab Saha Univ. of Pune	Active gel and physics of cortex
22-9-2016	Subodh R Shenoy TCIS, TIFR Hyderabad	Domain-wall evolution in structural phase transitions: Anisotropic interactions, entropy barriers and final geometric strain-patterns
23-9-2016	Subodh R Shenoy TCIS, TIFR Hyderabad	Dynamical scaling after a quench: Coarsening exponents from a coarseniing-length kinetics
23-9-2016	Venkatesh Raman IMSc	String matching with wild-cards
24-9-2016	T R Govindarajan	Course for CMI students by Prof.T.R. Govindarajan
26-9-2016	Neha Prabhu IISER Pune	Statistics of Hecke Eigenvalues: Beyond Equidistribution.
27-9-2016	Shraddha Srivastava CMI, Chennai	On monoidal structure of the Schur algebra via strict polynomial functors

27-9-2016	T Geetha Univ. of Stuttgart	Jones basic construction
28-9-2016	Dileep Jatkar HRI, Allahabad	BMS algebra with extended supersymmetry and free field realization
29-9-2016	T Geetha Univ. of Stuttgart	Cellularity of G-colored partition algebras
3-10-2016	Subhadeep Roy IMSC	Interplay of Stress Release Range and Disorder in Fracture
3-10-2016	Amit Dutta IIT, Kanpur	Slow quenches, dynamical phase transitions and emergent topology
3-10-2016	Jean-Marc Deshouillers Institut mathématique de Bordeaux, Bordeaux INP	Integral points on a convex curve
4-10-2016	R Venkatesh IIT Madras	Bases for root spaces of Borcherds-Kac-Moody algebras
5-10-2016	Anvy Moly Tom IMSc	Mechanism of chain collapse in good and poor solvents
6-10-2016	Aprameyan Parthasarathy Univ. of Paderborn	Resolvent and scattering kernels for symmetric spaces of rank one.
6-10-2016	Madhuparna Karmakar HRI, Allahabad	Population imbalanced Fermi superfluid
7-10-2016	Aditi Dudeja IMSc	Verifying minimum spanning trees in linear time
12-10-2016	S Santhosh Kumar IISER TVM	Free, higher derivative scalar field drives quantum phase transition
12-10-2016	Sarbeswar Pal IISER TVM	Non-emptiness of Brill-Noether loci over certain surfaces.
13-10-2016	Antoine Meyer Univ. Paris Est-Marne la Vallee	Order 2 tree-automatic graphs

14-10-2016	S Janakarajan MIDS, Adyar	Water and Environment: the Chennai situation
14-10-2016	Arindam Biswas IMSc	Randomized linear time algorithm for finding minimum spanning tree
17-10-2016	Chethan Krishnan IISc, Bangalore	A New Path Integral for Quantum Gravity
17-10-2016	Didier Caucal Univ. Paris Est-Marne la Vallee	Graphs and sequences
18-10-2016	Sayan Biswas Centre for Astroparticle Phys. & Space Science, Bose Institute	A production scenario of the galactic strangelets and an estimation of their possible flux in the solar neighborhood
19-10-2016	Prosenjit Singha Deo S.N. Bose National Centre	Charge and spin density waves: quasi one dimension to two dimensions
19-10-2016	Abhishek T Bharadwaj CMI, Chennai	On a density theoretic approach to Erdos Conjecture involving Dirichlet Series.
19-10-2016	Ronald Benjamin Soft Matter Institute, Heinrich-Heine Univ., Germany	Investigating Statistical Mechanics problems via Molecular Simulations: Two Case Studies. (i)Solids and liquids at interfaces (ii)Thermodynamics of Buettiker-Landauer Brownian Motor.
19-10-2016	Sunil Simon IIT, Kanpur	Polymatrix coordination games
21-10-2016	Usha Vijayraghavan IISc, Bangalore	Genetic Codes for the making of a rice flowering stem
21-10-2016	S Uma Shankar IIT Bombay	D* polarization as a probe to discriminate new physics in B $\rightarrow D * \tau\bar{\nu}$
21-10-2016	Rahul Siddharthan IMSc	Genome assembly using de Bruijn graphs

25-10-2016	M. Manickam KSOM, Calicut	On the Taylor's coefficients of half-integral weight Jacobi forms and an interesting identity.
25-10-2016	Sachin Sharma IIT Kanpur	Weyl modules associated to Kac-Moody algebras
26-10-2016	ShyamChand Singh Centre for Interdisciplinary Research in Basic Sciences, Jamia Millia Islamia, New Delhi	Understanding Complex Brain Networks
28-10-2016	Sayan Bhattacharya	A general technique for cell-probe lower bound for static data structures
1-11-2016	R Venkatesh IIT Madras	Hilbert series of partially commutative Lie algebras
2-11-2016	Abhiram Soori ICTS, Bangalore	Electron transport in systems of normal metals and superconductors
3-11-2016	B Ramakrishnan HRI, Allahabad	On formulas for the number of representations of certain quadratic forms
3-11-2016	Pinaki Banerjee IMSc	Conformal Blocks, Entanglement Entropy Heavy States
4-11-2016	S Leoni Cardiff Univ., UK	Ab-initio Studies of Carbon-Based Novel Materials
8-11-2016	Pranendu Darbar IMSc	A new proof of Halasz theorem and pretentiousness in analytic number theory.
8-11-2016	K N Raghavan IMSc	Matrix Schubert Varieties
8-11-2016	Francois Le Maitre Univ. of Paris VII	Topological rank and cost
9-11-2016	Arnab Priya Saha IMSc	Double Soft Theorem for Perturbative Gravity

15-11-2016	Usha Sangale SRTM University, Nanded	A simple proof of Hardy's Theorem
17-11-2016	Arghya Mondal IMSc	Decorated staircases and applications
22-11-2016	K N Raghavan IMSc	A Groebner basis theorem for matrix Schubert varieties
23-11-2016	Aninda Sinha IISc, Bangalore	Analytic bootstrap
24-11-2016	Shabia Khan University of Kashmir	Intelligent System Design for Knowledge Extraction
25-11-2016	Martin Jung TUM-IAS, Tech. Univ. Munchen	New Physics in $b \to c\tau\nu$ transitions and signatures of a nonstandard Higgs Boson from flavour physics
26-11-2016	Haben Girma Disability Rights Advocates, Berkeley	Equal Access for an Inclusive and Progressive Society
28-11-2016	Vishwas Vasisht Georgetown University, USA	Rheology of dense emulsions - a shear start-up and steady state study
29-11-2016	N.D. Hari Dass TIFR-TCIS, Hyderabad.	Time in classical and quantum physics.
29-11-2016	A P Balachandran CMI, Chennai	The Turbulent Vacuum
29-11-2016	Anirban Mukhopadhyay IMSc	Class numbers with many prime factors
29-11-2016	K N Raghavan IMSc	Subword Complexes in Coxeter Groups
30-11-2016	Jerome Martin Institut d'Astrophysique de Paris, France	Cosmic Inflation and Quantum Mechanics
2-12-2016	Parimala Raman Emory University	Zero cycles of degree one on homogeneous spaces

2-12-2016	Rupali L. Sonone Univ. of Pune	Nonlinear Lattices: Dynamics and Quantization
5-12-2016	Rajat Mittal IIT Kanpur	Finding quadratic non-residue over finite fields
5-12-2016	Philippon Patrice Univ. Paris VI	Introduction to Toric Varieties and Diophantine geometry.
6-12-2016	Arnab Bandyopadhyay Univ. of Kansas	Bacterial growth regulation on the interface of ordered and chaotic regimes
6-12-2016	K N Raghavan IMSc	Subword complexes in Coxeter Groups - III
7-12-2016	Abhishek Iyer TIFR	Portal to non-MSSM models using kinematic edges
7-12-2016	Sachin Gautam Perimeter Institute	Yangians and R-matrices
8-12-2016	B S Karthikeyan Bharathidasan University, Tiruchirappalli	Systems biology and network biology applications in Toxicology: Examples from Cytochrome P450 enzyme system and Obesogens
9-12-2016	Philippon Patrice Univ. Paris VI	Introduction to Toric Varieties and Diophantine geometry.
9-12-2016	Parimala Raman Emory University	Zero cycles of degree one on homogeneous spaces-II
12-12-2016	Ananth Shankar Harvard University	Abelian varieties isogenous to Jacobians
12-12-2016	Patrice Philippon Univ. Paris VI	Introduction to Toric Varieties and Diophantine geometry.
13-12-2016	Niranjan Balachandran IIT Bombay	Distinguishing Random Cayley graphs and List distinguishing Kneser graphs randomly

13-12-2016	Ananth Shankar Harvard University	Abelian varieties isogenous to Jacobians
15-12-2016	Sazzad Ali Biswas CMI, Chennai	p-adic Zeta function
16-12-2016	G. Krishnamoorthy Anna University, Chennai	Chemical Dynamics in Biology
16-12-2016	Parimala Raman Emory University	Zero cycles of degree one on homogeneous spaces
19-12-2016	Sayantan Sharma Brookhaven National Laboratory, NY, USA	The topological properties of QCD in and out-of equilibrium
19-12-2016	Indu Satija George Mason University, Fairfax VA, USA	Pure and Poetic: Butterfly in the Quantum World
20-12-2016	Ignacio Ojea Quintana Columbia University, USA	Probabilistic Opinion Pooling with Imprecise Probabilities
21-12-2016	Higson et al Penn State Univ.	A day with Higson and Younger operator algebraists
22-12-2016	Ritabrata Munshi ISI Kolkata	Circle method and the subconvexity problem
22-12-2016	R Balasubramanian IMSc	Partition Function
23-12-2016	Preeti Raman IIT-Mumbai	Classification of hermitian forms over cohomological dimension 3 fields
23-12-2016	Dinakar Ramakrishnan Caltech	Rational points
23-12-2016	Vasudevan Lakshminarayanan Univ. of Waterloo	Early Arab Contributions to Vision Science and the Central Role of Ibn al Haytham
26-12-2016	Hans van Ditmarsch LORIA, CNRS, Nancy, France	Gossip and knowledge

26-12-2016	Anirban Chakraborti JNU, Delhi	Correlations and co-movements in financial networks: A mesoscopic analysis
27-12-2016	Raghav Rajan IISER Pune	How does the brain initiate learned motor sequences: lessons from a songbird
28-12-2016	P. Akilesh IMSc	Double tails of multiple zeta values
28-12-2016	Nitin Saurabh IMSc	Analysis of Algebraic Complexity Classes and Boolean Functions HBNI PhD Viva Voce
29-12-2016	Sourav Chatterjee North Western University	Star Cluster Dynamics and Merging Black Hole Binaries
29-12-2016	Jayashree Ramadas Homi Bhabha Centre for Science Education, Mumbai	'Small Science' in the classroom: Some observations on curriculum change
29-12-2016	P. Poulose IIT Guwahati	Additional Higgs: possibilities with Left Right Symmetric Model.
30-12-2016	Venkat Guruswami CMU	(2+eps)-SAT is NP-hard, and further results on promise constraint satisfaction
30-12-2016	Arindam Banerjee Purdue University	Homological Algebra of Ideals Related to Finite Simple Graphs
3-1-2017	Rahul Roy ISI, Delhi	Drainage networks and the Brownian web
3-1-2017	T N Shorey NIAS, Bengaluru	Product of odd parts of factorials being an odd part of factorial
3-1-2017	Rajesh Chitnis Weizmann Institute of Science , Rehovot, Israel	A fine-grained approach for designing (time and space) efficient algorithms
3-1-2017	Mrigendra Singh Kushwaha IMSc	Freudenthal's formula

4-1-2017	Karthick Babu IMSc	The method of exponent pairs and its application
6-1-2017	Shaon Chakrabarti Harvard University & Dana-Farber Cancer Institute	Inferring drug effects on cancer evolution and heterogeneity: from bulk to single cells
9-1-2017	Naveen Prabhakar	Spiked Instantons from Intersecting D-branes
10-1-2017	Arghya Sadhukhan IMSc	Chevalley groups: construction and simplicity
10-1-2017	Rajesh Gupta King's College London	Supersymmetric Localization on $\text{AdS}_2 x S^1$
11-1-2017	Satyajit Seth Univ. of Mainz	Combine and Conquer
11-1-2017	D P Roy Homi Bhabha Centre for Science Education, TIFR, Mumbai	Why LHC?
11-1-2017	Suruchi Mittal ICGEB Trieste	Basic concepts of tumor heterogeneity
11-1-2017	Rahul Siddharthan	Computer programming and biology
12-1-2017	D P Roy Homi Bhabha Centre for Science Education, TIFR, Mumbai	SUSY Dark Matter in Universal and Nonuniversal Gaugino Mass Models
12-1-2017	Bithika Jain KIAS, S. Korea	Hierarchy Stabilization at Zero and Finite Temperature
13-1-2017	Rahul Siddharthan	Computer programming and biology
16-1-2017	Rudra Sekhar Manna Augsburg University	Low-dimensional frustrated quantum magnets in honeycomb and triangular lattices
16-1-2017	D P Roy Homi Bhabha Centre for Science Education, TIFR, Mumbai	Neutrino Mass, Mixing & Oscillation

16-1-2017	Dietmar Berwanger LSV, CNRS, Paris-Saclay, France	Public value of private signals
17-1-2017	Bhargav Vaidya Univ. of Torino	Multi-wavelength Emission from Astrophysical Jets: Insights using Numerical Simulations
17-1-2017	J-M. Deshouillers Univ. of Bordeaux	Automatic aspects distribution mod one of $\theta^n in F_q[[X]]$
17-1-2017	Amritanshu Prasad IMSc	The Real Robinson-Schensted-Knuth Algorithm
18-1-2017	Sk Jahanur Hoque IMSc	Cosmological Horizon and energy flux in de Sitter background
18-1-2017	J-M. Deshouillers Univ. of Bordeaux	Distribution mod one of $\theta^n in F_q[X]$
18-1-2017	Rahul Siddharthan	NNMCB series - computers and biology part 3
19-1-2017	J-M. Deshouillers Univ. of Bordeaux	Automatic aspects of distribution mod one of $\theta^n in F_q[[X]]$
19-1-2017	Yu. Bilu Univ. of Bordeaux	CM-points on straight line and hyperbolas
19-1-2017	Anindya S. Chakrabarti IIM, Ahmedabad	Inflationary effects of monetary policies in newly industrialized economies
19-1-2017	Venkat Guruswami CMU	Subspace designs
20-1-2017	Yu. Bilu Univ. of Bordeaux	Diversity in parametric families of number fields
20-1-2017	Jyothsnaa S IMSc	Euclidean rings of algebraic integers
23-1-2017	Aradhana Singh IMSc	Cluster synchronization in networks

24-1-2017	Ferit Oztruk	Contact structures on AR-Singularity
27-1-2017	Rukmini Dey ICTS	Some aspects of Minimal surfaces, maximal surfaces and solitions.
27-1-2017	Rahul Siddharthan IMSc	NNMCB course: Computers and Biology part 4
30-1-2017	R Loganayagam ICTS	Issues in Open EFT
30-1-2017	Areejit Samal IMSc	Constraint-based modeling and Flux Balance Analysis (FBA)
31-1-2017	K Ragavendran IMSc	Electrical field-assisted melting: Quantum and classical phenomena at oxide layers on metals
31-1-2017	Areejit Samal IMSc	Introduction to Constraint-based Metabolic Modelling and Flux Balance Analysis
1-2-2017	Areejit Samal IMSc	Introduction to Constraint-based Metabolic Modelling and Flux Balance Analysis
2-2-2017	Manas Kulkarni ICTS, Bengaluru	Entanglement inlight-matter systems
2-2-2017	Kannan Moudgalya IIT Bombay	Spoken Tutorials
3-2-2017	P Akhilesh IMSc	A Computational Approach to Multiple Zeta Values
3-2-2017	R Loganayagam ICTS	Counting Out of Time Order
6-2-2017	Swagato Sanyal TIFR / NUS	Linear sketching and one-way communication
7-2-2017	Anil Shukla IMSc	On Proof Complexity for Quantified Boolean Formulas

9-2-2017	Ashutosh Rai IMSc	Parameterized Algorithms for Graph Modification Problems
9-2-2017	Venkata Hanumanta Prathamesh IMSc	Ax-Grothendieck Theorem - A Model Theoretic Proof
9-2-2017	Bethan Cropp IISER TVM	Hints of quantum gravity from the horizon fluid
10-2-2017	Harikrishnan Ramani SUNY Stony Brook, USA	Thermal resummation and phase transitions
10-2-2017	Nandita Jayaraj *thelifofscience.com*	The 'invisible' women of Indian science
13-2-2017	Bhaswar Ghosh Max Planck Institute for Terrestrial Microbiology, Marburg, Germany	Cellular Noise suppression and optimized information transmission through a signaling cascade in yeast
14-2-2017	Arvind Ayyer IISc, Bangalore	Alternating Sign Triangles: A new class of objects equinumerous with ASMs
15-2-2017	T V H Prathamesh IMSc	Of Legendrian Knots and First Order Theorem Provers
17-2-2017	G Kasi Viswanadham IMSc	Hoheisel phenomenon and sign changes
17-2-2017	A M M Pruisken Univ. of Amsterdam	The quantum Hall effect and SU(N) spin chains
20-2-2017	Trisha Nath IMSc & Gottingen Univ.	Phase behaviour and ordering in hard core lattice gas models (Thesis Defence)
20-2-2017	Rakesh Venkat TIFR	Multiplayer Parallel Repetition for Expanding Games
20-2-2017	Himadri Barman IMSC	Two relaxation rates in the Falicov Kimball Hubbard model
21-2-2017	George Thomas IMSc	Coupled systems as quantum thermodynamic machines

22-2-2017	Gaurav Narain KITPC, Beijing	Exorcising ghosts in Induced Gravity
22-2-2017	Chandan Dasgupta IISC, Bangalore	Glass transition in dense systems of self-propelled particles
22-2-2017	G Arun Kumar IMSc	An exposition to Chromatic Polynomials
23-2-2017	Juergen Horbach Univ. of Duesseldorf	From soft matter to 2D electron gases: Anomalous transport phenomena in heterogeneous media
23-2-2017	Upayan Baul Univ. of Texas, Austin, USA	Influence of the presence of solutes on the structural and dynamical properties of lipid membranes and water (Thesis Defence)
23-2-2017	Anthony Selvan IMSc	Sampling Theory in Shift-invariant Spaces
23-2-2017	Balaji Raman VIT,Vellore	Stochastic Models for System-Level Performance Analysis of Multimedia Embedded Systems
27-2-2017	Yashwant Gupta NCRA-TIFR	Probing the Universe at Radio Wavelengths: from the GMRT to the SKA
28-2-2017	Vikas Krishnamurthy Imperial College, London	Theoretical models for compressible vortex streets
28-2-2017	Samrith Ram HRI, Allahabad	Splitting Subspaces of Linear Transformations over Finite Fields
6-3-2017	Samrith Ram HRI, Allahabad	A trick of Diaconis and primitive polynomials over finite fields
6-3-2017	Suman Ganguli IMSc	Extendability of Spacetime and Causal Structure of Dynamical Charged Black Holes
6-3-2017	Suresh Dara IMSc	Erdos-Faber-Lovasz Conjecture

7-3-2017	Satyanarayan Mukhopadhyay Univ. of Pittsburgh	Expeditions : The Energy and Cosmic Frontiers in Particle Physics
9-3-2017	Sudeshna Kolay IMSc	Parameterized Complexity for Graph Partitioning and Geometric Covering (Thesis Defense)
9-3-2017	Satyanarayan Mukhopadhyay Univ. of Pittsburgh	Search for Physics Beyond the Standard Model : Challenges and Prospects
10-3-2017	Bidya Binay Karak High Altitude Observatory, Boulder, USA	Solar Magnetic Fields and Cycles
10-3-2017	Mrigendra Singh Kushwaha IMSc	Polynomial invariants of finite reflection groups
13-3-2017	Sibasish Banerjee IPhT, CEA, Saclay	Type II strings on Calabi-Yau: Lecture 1
13-3-2017	Bidya Binay Karak High Altitude Observatory, Boulder, USA	Why do stars rotate differentially?
14-3-2017	Sibasish Banerjee IPhT, CEA, Saclay	Type II strings on Calabi-Yau: Lecture 2
14-3-2017	Bishal Deb CMI, Chennai	Chromatic polynomials and heaps of pieces
16-3-2017	Sibasish Banerjee IPhT, CEA, Saclay	Type II strings on Calabi-Yau: Lecture 3
16-3-2017	Rishi Vyas Ben Gurion Univ., Israel	Dualizing Complexes in the Noncommutative Arithmetic Context
17-3-2017	Sibasish Banerjee IPhT, CEA, Saclay	D-instantons and mock modular forms
17-3-2017	Rishi Vyas Ben Gurion Univ., Israel	Local Cohomology and Completion

17-3-2017	Pranay Goel IISER Pune	NNMCB video course
20-3-2017	Anirban Basu HRI, Allahabad	String loop amplitudes and U-duality: Lecture 1
21-3-2017	Jugal Verma IIT Bombay	Counting Zeros of Multivariate Laurent Polynomials and Mixed Volumes of Polytopes
21-3-2017	Madhavan Mukund CMI, Chennai	The work of Edsger Dijkstra
22-3-2017	Anirban Basu HRI, Allahabad	String loop amplitudes and U-duality: Lecture 2
22-3-2017	N Ramakrishnan Univ. of Pennsylvania	Curvature remodelling of cell membranes and its implications in cellular biophysics
22-3-2017	Areejit Samal IMSc	NNMCB Course
23-3-2017	Sourendu Gupta TIFR	An effective field theory for thermal matter
23-3-2017	Nagaiah Chamakuri Mahindra-Ecole-Centrale, Hyderabad	Large scale PDE constrained optimization of cardiac defibrillation
23-3-2017	Keshab Bakshi IMSc	Commuting squares and angle between intermediate subfactors.
24-3-2017	Anirban Basu HRI, Allahabad	String loop amplitudes and U-duality: Lecture 3
27-3-2017	Anirban Basu HRI, Allahabad	String loop amplitudes and U-duality: Lecture 4
27-3-2017	Jyotirmoy Ganguly IISER Pune	Spinorial Representations of symmetric groups
28-3-2017	Anirban Basu HRI, Allahabad	String loop amplitudes and U-duality: Lecture 5

28-3-2017	Steven Spallone IISER Pune	Spinoriality of Representations of Lie Groups
28-3-2017	Soumybrata Chatterjee IOP Bhubaneshwar	AdS Cosmology and Gauge Theory Correlator
29-3-2017	Subhasish Mandal Yale University	First principles investigation on Quantum Materials
30-3-2017	Vijay Ravikumar CMI, Chennai	Multiplying Schubert Polynomials
31-3-2017	Sridhar P. Narayanan IMSc	On 2-Sylow subgroups of S_n
31-3-2017	Nivedita Chatterjee	Biology-2

Chapter 5

External Interactions

5.1 Collaborative Projects with Other Institutions

5.1.1 Arecibo 327 MHz Drift Pulsar Survey (AO327)

AO327 has been running using the Arecibo radio telescope (USA) since 2010. To date, the survey has discovered 72 pulsars and transients (http://www.naic.edu/ deneva/drift-search). The new discoveries include 8 millisecond pulsars (MSPs), 8 binary pulsars, and 11 rotating radio transients. 4 of the 8 MSPs were found in 2016, along with 1 RRAT and 7 slow pulsars, one of which was found in data taken during the observatory shut-down for hurricane Isaac in 2012. So far two AO327 discoveries have proven to be exceptionally stable rotators and have been added to the The North American Nanohertz Observatory for Gravitational Waves (NANOGrav) data set. The papers have been published reporting results of this survey.

This collaboration has total nine members, from different institutes across the world, e.g., Naval Research Laboratory USA, University of New Mexico USA, West Virginia University USA, IMSc India (Manjari Bagchi), Max-Planck-Institut fur Radioastronomie Bonn Germany.

5.1.2 Automatic Presentation of Numbers (PANO - Présentation automatique des nombres)

This is a project of the Région Réunion on algorithms and properties of numbers which can be represented using finite automata. Kamal Lodaya and Vikram Sharma attended the first academic meeting of the project, gave talks and had discussions, at the Université de La Réunion, 7-9 January 2016. Automatic numbers are roughly represented as numbers whose nth bit position is accepted by a DFA. A breakthrough result shows that such numbers are either rational or irrational. We are interested in studying similar properties of numbers accepted by other automatic models, such as PDAs.

The other group members are: Prof. Didier Caucal and Dr. Antoine Meyer from Universit Paris-Est et CNRS, Marne-La-Valle, France and Prof. Christian Delhomme, Prof. Marion

Le-Gonidec, from University of Reunion, France

Didier Caucal, Antoine Meyer (UPEM) and Christian Delhomme, M. Le Gonidec, A. Mansard (U. de La Réunion) visited IMSc during 8-19 October 2016. They also participated in a one-day workshop on Automatic Presentations of Graphs and Numbers, organized by Vikram Sharma on 11 October 2016.

5.1.3 CEFIPRA Project Proposal No 5401-A Sums of integers : Fourier Combinatorics computation

Colloborative project with R.Balasubramanian as the principal investigator from the Indian side and professor jean Marc Deshouillers from the French side This is a three year project .

5.1.4 Correctness by Construction (CORCON)

This project is funded by the Marie Curie Actions – International Research Staff Exchange Scheme (IRSES) of the European Union FP7. It involves multiple nations and researchers, and runs for four years beginning January 2014. IMSc is involved in the sub-project on proof verification and proof complexity, jointly with the University of Leeds, UK. The principal investigators for this sub-project are Meena Mahajan from IMSc and Olaf Beyersdorff from the University of Leeds.

5.1.5 Correlation between hWW and tth coupling at the LHC

We intend to work on correlation between Higgs couplings with weak gauge bosons and the top quark. LHC measurement shows good agreement with the SM expectation. But there are room for new physics and it is our intention to dig out from the Higgs' coupling, if any hint of new physics may turn up.

5.1.6 Indian Pulsar Timing Array (InPTA) experiment

Pulsar Timing Array (PTA) uses an ensemble of pulsar clocks in an attempt to detect Gravitational Waves (GW) from a stochastic background resulting from a superposition of an ensemble of super-massive black hole binary systems (BSMBH). We are performing an Indian PTA experiment using the Giant Metrewave Radio Telescope (GMRT) and the Ooty Radio Telescope (ORT). Observations and data analysis is going on. The preliminary results were presented in the 2016 Meeting of International Pulsar Timing Array in South Africa. Presently 10 people are involved in this project, members are affiliated to NCRA-TIFR Pune, TIFR Mumbai, RAC TIFR Ooty, ASTRON (The Netherlands), IMSC Chennai (Manjari Bagchi, Dhruv Pathak).

5.1.7 Indo-German research grant funded by the Humboldt Foundation.

This was the final year, on extension, of a research project starting 2011 on Graph Isomorphism and related questions supported by the von Humboldt foundation between IMSc (with V. Arvind as project leader and some PhD students of IMSc) and Humboldt University, Berlin (with Johannes Koebler and students).

5.1.8 ITRA-Media Lab Asia Project on De-congesting India's transportation networks using mobile devices

The project envisages the use of mobile phones to estimate congestion and traffic patterns on urban roads. Based on the congestion metrics thus obtained, the project aims to develop algorithms and tools for traffic planning and management, using the mobile phone as a service platform. The proposed solution strategy consists of two distinct focus areas. The first focus area deals with the problem of estimating mobile phone densities to measure prevailing congestion and traffic patterns. The second focus area involves developing algorithms for traffic routing, control and prediction, based on the estimated congestion. The proposed work has enormous potential for applications, such as dynamic route planning, peak hour rush control, routing of emergency vehicles to and from disaster affected areas, evacuation planning, and traffic prediction. In addition, this work is expected to shed new conceptual insights into the general problem of control of complex networks with strategic agents, by bringing together ideas from several technical disciplines.

5.1.9 Modeling Soft Glass flow from micro to macro scale (CEFIPRA Project No 5604-1)

The project, funded via CEFIPRA, is a collaboration between Dr. Pinaki Chaudhuri, IMSc, and Dr. Kirsten Martens, Laboratoire interdisciplinaire de Physique, Universit Grenoble Alpes, Grenoble, starting from December 2016, for a period of three years. The aim of this project is to understand the complex dynamical features during the yielding and subsequent flow of dense soft disordered materials, via a multi-scale approach, using computational and analytic techniques. Such an approach is necessary in linking macroscopic experimental observations to material's properties at micro-scale, thereby leading to designing new materials. To develop valid descriptions across the scales involved, we start from the scale of individual particles, grains or bubbles, which are modeled using molecular dynamics simulations. Based on these microscopic studies, we aim at coarse-graining the dynamics to stochastic lattice models on the scale of plastic rearrangements. These simpler models are the ideal starting point for a statistical approach to derive stochastic evolution equations for the probability distributions of local observables, relevant for the yielding process. The originality in this bottom up approach, bridging different scales, is the combination of consistent simultaneous studies on the micro and the meso-scale to ensure the validity of the assumptions made for the simplified scenarios, which can thereafter be used to predict effects on larger length-scales.

5.1.10 Survey for Pulsars and Fast Transients with the upgraded GMRT : A Pilot Study

A survey for pulsars and transients using GMRT (uGMRT) is ongoing. Using population synthesis studies and the available system parameters for the uGMRT, we identified a suitable area of the sky of around 450 sq.deg where we expect discoveries of new pulsars. We have performed total 100 hours of observations divided into 14 epochs (during September-2016 to March-2017). Data analysis is under process.

There are total 20 members in this collaboration presently. There is scope of more people joining in the future. Members of this project are affiliated to various Indian and foreign Institutes, like NCRA-TIFR Pune, IMSc Chennai (Manjari Bagchi) SINP Kolkata, IUCAA Pune, RRI Bangalore, NISER Bhubaneswar, University of California Berkeley (USA), TIFR Mumbai, ASTRON (The Netherlands), CEA Saclay (France), IIT,-Kharagpur, PRL Ahmedabad, and IIT-Roorkie.

GMRT is operated by NCRA-TIFR, Pune.

5.1.11 Towards precision pulsar timing with the uGMRT

To test the capacity of upgraded GMRT (uGMRT) to study millisecond pulsars (MSPs), 19 MSPs are being monitored and timed. This is a eight member team from NCRA-TIFR Pune, TIFR Mumbai, IMSc Chennai, and ASTRON (The Netherlands).

5.1.12 Exact Geometry Computation

The focus of this project was to devise exact algorithms for nonlinear problems in computational geometry, such as finding roots of polynomials and analytic functions, isotopic approximation of curves. The project is funded by the Indo Max Planck Centre for Computer Sciences (IMPECS). The principal investigator from the Indian side is Vikram Sharma, and from the German side Michael Sagraloff.

5.2 Institute Associateships

The Institute has established short-term associateships in Mathematics, Theoretical Physics, Theoretical Computer Science and Computational Biology to enable teachers from colleges and universities to work at the institute. The programme is envisaged to develop interaction between the members of the faculty of the institute and scientists in the university system. Under this programme, an associate can visit the institute once or twice a year, up to a total of 90 days per year, each visit lasting a minimum of three weeks. The tenure of an associate will be for a period of three years and (s)he is expected to visit the institute at least twice during this period.

The institute will bear the expenses of round-trip travel (by rail) from the Associate's normal place of work to Chennai and will also pay a daily allowance to cover local expenses at Chennai. During their stay at Chennai, Associates will be accommodated in the institute Guest House.

Associates who visited the institute during the period 01.04.16 to 31.03.17 are :

Aritra Banik
Assistant Professor, IIT Jodhpur
9.12.2016 - 18.12.2016

Bikash Chandra Paul
Professor, North Bengal University, Siliguri
13.6.16 - 10.12.16

Gopal Chandra Shit
Jadavpur University, Kolkata
22.5.16 - 7.1.17

Md. Mehedi Kalam
Professor of Physics, Aliah University, Kolkata
2.10.16 - 17.10.16

K. Reji Kumar
Assistant Professor, N.S.S.College, Kerala
11.4.16 - 26.5.16

Saibal Ray
Associate Professor, government College of Engineering Ceramic Technology, Kolkata
3.5.16 - 6.11.16

Sk.Monowar Hossein
Associate Professor,Aliah University, Kolkata
23.5.16 - 17.10.16

5.3 Conference Participation and Visits to Other Institutions

Ahmed, Taushif

Visited Mainz University, Germany during Jun 28, 2015 – Jul 1, 2016. Presented seminar on "Threshold Corrections to DY and Higgs at N3LO QCD"

Arvind, V.

Visited Humboldt University, Berlin during Jul 25 – Aug 6, 2016. Research. Visit supported by a joint project funded by the Humboldt Foundation.

Participated in *Dagstuhl Seminar: Algebraic Methods in Computational Complexity* held at Schloss Dagstuhl, Wadern, Germany during Oct 9 – Oct 14, 2016.

Participated in *The Interface of Biology and Theoretical Computer Science* held at NCBS, Bangalore during Dec 19 – Dec 21, 2016.

Participated in *Workshop on Arithmetic Complexity* held at Institute of Mathematical Sciences, Chennai during Feb 27 – Mar 3, 2017.

Ashok, Sujay K.

Visited TIFR, Mumbai during Apr 2 – Apr 16, 2016. Invited to give lectures and a seminar.

Visited Department of Physics, INFN, Torino during May 1 – Jun 30, 2016. Invited to visit for collaborative purposes.

Visited ICTS-TIFR during Jul 18 – Jul 25, 2016. Invited to give lectures and a seminar

Participated in the conference *String theory: past and present* held at ICTS, Bengaluru during Jan 11 – Jan 13, 2017.

Participated in *School and Workshop on Modular Forms and Black Holes* held at NISER, Bhubaneshwar during Jan 13 – Jan 14, 2017. Invited speaker at the workshop.

Bagchi, Manjari

Participated in *Workshop on Science with the uGMRT* held at The National Centre for Radio Astronomy Tata Institute of Fundamental Research, Pune, India during Jun 15 – Jun 17, 2016. Oral presentation: "Pulsar Timing: basics, present day efforts, and future potentials using uGMRT"

Participated in *2016 Meeting of International Pulsar Timing Array* held at Stellenbosch Institute for Advance Studies, Stellenbosch, South Africa during Jun 27 – Jul 1, 2016. Oral presentation: "Status of Indian Pulsar Timing Array, a new initiative"

Participated in *First ASIONS (Asia SKA Initiative on Neutron Stars)* held at Goa, India during Nov 4 – Nov 5, 2016. Oral presentation: "Pulsars in the dense (Galactic) environment". Also a member of the SOC.

Visited Inter-University Centre for Astronomy and Astrophysics, Pune, India, during Jan 2 – Jan 13, 2017. Collaborative discussions.

Visited Indian Institute of Technology - Gandhinagar during Mar 12 – Mar 16, 2017. Gave a seminar on "Use of radio pulsar data to understand basic physics" during Mar 15, 2017.

Visited The National Centre for Radio Astronomy Tata Institute of Fundamental Research, Pune, India during Mar 16 – Mar 27, 2017. Collaborative activities.

Bakshi, Keshab Chandra

Visited Hausdorff Research Institute for Mathematics, University of Bonn, Bonn, Germany during May 2 – Aug 26, 2016. Participated in a trimester program in von Neumann algebras. This program aimed at bringing together researchers in various subareas of von Neumann algebras, exploring connections among them and investigating new directions.

Participated in *Von Neumann Algebras, Hausdorff Trimester Program* held at Hausdorff Research Institute for Mathematics, Bonn, Germany during May 2 – Aug 26, 2016. Presented a seminar talk titled, " On Pimsner Popa bases"

Participated in *NCGOA Spring Institute 2016* held at University of Bonn, Bonn, Germany during May 17 – May 25, 2016.

Participated in *Young Mathematicians in C^*-Algebras (YMC*A)* held at University of Munster, Germany during Jul 25 – Jul 29, 2016.

Participated in *One day meet on Operator algebras, Chennai* held at IMSc on Dec 21, 2016. Invited Talk on, "Pimsner Popa bases and Intermediate subfactor"

Participated in *Non-Commutative Analysis* held at IMSc during Feb 6 – Feb 16, 2017. Attended both conference and workshop

Banerjee, Niranka

Participated in *Cocoon 2016* held at Ho Chi Minh City during Aug 2 – Aug 5, 2016.

Participated in *FSTTCS 2016* held at Chennai during Dec 13 – Dec 15, 2016.

Banerjee, Pinaki

Visited Universidad de Oviedo, Spain during Mar 31 – Apr 2, 2016. Presented my work on "Conformal Blocks, Heavy States and Entanglement Entropy".

Visited University of Barcelona during Apr 3 – Apr 6, 2016. Board talk on "Dissipation and holography"

Visited Perimeter Institute for Theoretical Physics, Waterloo, Canada during Oct 13 – Oct 27, 2016. Talk given on "Conformal blocks, entanglement entropy heavy states"

Chakraborty, Partha S.

Visited Institute Hautes Etudes Scienifique during Mar 26 – Apr 26, 2016.

Participated in *Advances in Noncommutative Mathematics* held at Indian Statistical Institute, Bangalore during Jan 11 – Jan 13, 2017. Invited to give a series of lectures

Chaudhuri, Pinaki P.

Visited JNCASR, Bangalore during Apr 29 – Apr 30, 2016.

Visited Laboratoire Interdisciplinaire de Physique, Universit Joseph Fourier in Grenoble, France during May 15 – Jul 13, 2016.

Participated in *The flow of amorphous solids: from atomistic simulations to Earth Science applications* held at Centre Blaise Pascal, Lyon during Jun 15 – Jun 17, 2016. Talk on "Transient heterogeneities during onset of flow in glassy systems"

Visited Institute for Theoretical Physics, University of Duesseldorf during Jul 13 – Aug 12, 2016.

Participated in *Complex Fluids 2016* held at IIIT Hyderabad during Dec 12 – Dec 14, 2016. Talk on "Rheology of suspension of attractive particles"

Participated in *4th Indian Statistical Physics Community Meeting* held at ICTS Bangalore during Feb 17 – Feb 19, 2017. Talk on "Heterogeneous dynamics during onset of flow in glasses"

Ghosh, Ria

Participated in *Computational Approaches to Memory and Plasticity* held at National Centre for Biological Sciences, Bangalore during Jul 1 – Jul 16, 2016.

Participated in *Santa Barbara Advanced School of Quantitative Biology* held at KITP, University of California, Santa Barbara, USA during Jul 25 – Aug 26, 2016.

Ghosh, Sibasish

Participated in *2nd International Conference on Quantum Foundation, 2016* held at NIT-Patna during Oct 17 – Oct 21, 2016. Gave an invited talk.

Visited Physics Department at IIT-Jodhpur during Nov 21 – Nov 26, 2016, for a collaborative work with Dr. Subhashish Banerjee

Participated in *2nd IMSc School on Quantum Information* held at IMSc during Dec 5 – Dec 17, 2016.

Visited the Physics Department of NIT-Patna, gave a series of lectures on Quantum Informations, and started collaborative work with Dr. Alok Kumar Pan at NIT-Patna.

Visited Physics and Applied Mathematics Unit, Indian Statistical Institute, Kolkata during Jan 30 – Feb 3, 2017. Visited PAMU to give a talk as well as to continue our ongoing collaborative work with the members in the group of Prof. Guruprasad Kar.

Participated in *Workshop on Quantum Information Science* held at Physics Department, Pondicherry University during Feb 17 – Feb 18, 2017. Gave an invited talk.

Visited BITS-Pilani, Hyderabad Campus during Feb 22 – Feb 25, 2017. Visited the Physics Department to give a talk as well as to complete an ongoing collaborative work with Dr. K. V. S. Shiv Chaitanya there at the Physics Department.

Visited Department of Applied Mathematics, University of Calcutta during Mar 2 – Mar 11, 2017. Visited the Applied Mathematics Department to have informal discussions towards collaborative works with the members in the group of Prof. Debasis Sarkar as well as to give lectures on our research works.

Participated in *National Symposium ON Recent Trends in Quantum Theory 2017* held at Department of Applied Mathematics, Calcutta University during Mar 9 – Mar 10, 2017. Gave an invited talk.

Visited Physical Research Laboratory, Ahmedabad during Mar 21 – Mar 25, 2017. Visited the group of Prof. R. P. Singh to discuss about optical implementation of one of my theoretical scheme on universal entanglement witness in a measurement device independent way.

Gopalakrishna, Shrihari

Coordinator (one of three) of standard model and beyond working group, "XXII DAE-BRNS

High Energy Physics Symposium 2016", held at University of Delhi, New Delhi, India, during Dec. 12 - 16, 2016.

Delivered Twelve lectures on "Particle Physics and the standard model", SERC Preparatory school in THEP, IIT-Gandhinagar, during Sep 19 - 30, 2016.

Gun, S.

Visited ICTP during May 3 – Jun 30, 2016. Associate visit

Participated in *A conference on Modular forms* held at IISER Bhopal on Sep 4, 2016. Invited speaker

Visited TIFR during Oct 11 – Oct 18, 2016. Research collaboration

Visited Pavanatma College, Idukki during Nov 28 – Dec 2, 2016. Outreach program

Participated in *A symposium in number theory* held at BHU during Dec 14 – Dec 17, 2016. Invited Speaker

Visited NISER during Dec 25 – Dec 27, 2016. Discussion meeting

Participated in *International conference on number theory* held at KSOM during Jan 9 – Jan 13, 2017. Invited Speaker

Visited KSOM during Feb 9 – Feb 12, 2017. Resource person for a Refresher Course for College Teachers

Participated in *Combinatorics and Number Theory Meet* held at HRI during Feb 19 – Feb 23, 2017. Invited Speaker

Haldar, Prosenjit

Visited Saha Institute of Nuclear Physics, Kolkata during Dec 16, 2016 – Mar 15, 2017. Worked on Anderson localizations

Participated in *International Meeting on Highly Correlated Systems 2017* held at Mahatma Gandhi University, Kottayam, Kerala during Mar 24 – Mar 26, 2017. Gave a presentation talk on "Real-space cluster dynamical mean field theory on Falicov-Kimball Model" and also gave poster presentation

Kodiyalam, Vijay

Participated in *Refresher course for college teachers* held at KSOM, Kerala during Jan 19 – Jan 22, 2017. Gave a series of 8 lectures on semisimple and simple algebras and modules

Visited Periyar University, Salem on Jan 25, 2017. Gave a talk on "Semisimple algebras and the Wedderburn-Artin theorem"

Krishna, M.

Visited Indian Statistical Institute during Jul 16, 2015 – Jul 31, 2016. To interact with Prof Rajaram Bhat and his students on questions of common interest

Krithika, R.

Participated in *11th International Symposium on Parameterized and Exact Computation (IPEC 2016)* held at Aarhus University, Aarhus, Denmark during Aug 24 – Aug 26, 2016. Presented the paper titled "Dynamic Parameterized Problems"

Participated in *RoA: Rangoli of Algorithms* held at Chennai Mathematical Institute, Chennai, India during Dec 11 – Dec 12, 2016.

Participated in *Foundations of Software Technology and Theoretical Computer Science (FSTTCS 2016)* held at Chennai Mathematical Institute, Chennai, India during Dec 13 – Dec 15, 2016.

Lodaya, Kamal

Visited IIT Madras on Apr 11, 2016. Gave a talk on "Courcelle's theorem".

Participated in *31st LICS* held at New York, USA during Jul 5 – Jul 9, 2016.

Visited Computer Science Department, Boston College during Jul 11 – Jul 22, 2016.

Participated in *36th FSTTCS* held at CMI, Chennai during Dec 13 – Dec 16, 2016.

Participated in *7th Indian Conference on Logic and Applications* held at IIT Kanpur during Jan 5 – Jan 7, 2017.

Participated in *9th Workshop on Methods for Modalities* held at IIT Kanpur during Jan 8 – Jan 9, 2017.

Mahajan, Meena

Participated in *Highlights of Logic, Games, Automata* held at Brussels, Belgium during Sep 6 – Sep 9, 2016. Gave a keynote talk titled "Arithmetic Circuits: Classes, Structure, Completeness ..."

Participated in *Dagstuhl Seminar on SAT and interactions* held at Leibniz Centre for Infor-

matics, Dagstuhl, Germany during Sep 18 – Sep 23, 2016. Gave a talk titled QBF Proof Complexity

Visited School of Computing, University of Leeds, UK during Sep 25 – Oct 9, 2016. This visit was for research collaboration under the ongoing IRSES project CORCON.

Gave a talk titled "Enumerator polynomials: Completeness and Intermediate Complexity"

Participated in *Dagstuhl Seminar on Algebraic Methods in Computational Complexity* held at Leibniz Centre for Informatics, Dagstuhl, Germany during Oct 10 – Oct 14, 2016. Gave a talk titled "Enumerator Polynomials: Completeness and Intermediate Complexity"

Visited Ashoka University on Nov 10, 2016. Gave a talk titled "The power of negations in Boolean circuits"

Participated in *FSTTCS* held at CMI, Chennai during Dec 13 – Dec 15, 2016.

Participated in *DIMACS Workshop on E+M=C². Eric Allender and Mike Saks are 60* held at Rutgers University, USA during Jan 26 – Jan 27, 2017. Gave a talk titled "Enumerator polynomials: Completeness and Intermediate Complexity".

Participated in *Dagstuhl Seminar on Computational Complexity of Discrete Problems* held at Leibniz Centre for Informatics, Dagstuhl, Germany during Mar 19 – Mar 24, 2017. Gave a talk titled Understanding Cutting Planes for QBFs.

Visited Université Paris Diderot - Paris 7, France during Mar 25 – Mar 31, 2017. Research collaboration as a follow-up of a completed CEFIPRA project.

Majumdar, Diptapriyo

Participated in *Mysore Park Workshop on Algorithms and Complexity 2016* held at Infosys Campus, Mysore during Aug 14 – Aug 17, 2016.

Participated in *24th European Symposium of Algorithms 2016* held at Aarhus University, Denmark during Aug 22 – Aug 24, 2016.

Visited Aarhus University, Denmark during Aug 22 – Aug 26, 2016. Attending ESA, IPEC 2016 and presented a paper at IPEC 2016.

Participated in *11th International Symposium of Parameterized and Exact Computation 2016* held at Aarhus University, Denmark during Aug 24 – Aug 26, 2016. Presented a paper

Visited University of Southern Denmark, Odense during Aug 28 – Aug 30, 2016. Research Collaboration with Prof. Anders Yeo

Visited University of Bergen, Norway during Aug 31 – Sep 9, 2016. Research Collaboration

with Algorithms Group at Department of Informatic in University of Bergen. Also gave a seminar in the department.

Visited Chennai Mathematical Institute during Dec 11 – Dec 15, 2016. Attended Rangoli of Algorithms Workshop and FSTTCS 2016.

Participated in *Rangoli of Algorithms 2016* held at Chennai Mathematical Institute, India during Dec 11 – Dec 12, 2016. Pre-FSTTCS Workshop

Participated in *36th IARCS Annual Conference on Foundations of Software Technology and Theoretical Computer Science 2016* held at Chennai Mathematical Institute, India during Dec 13 – Dec 15, 2016.

Visited Birla Institute of Technology Pilani, Goa Campus during Feb 16 – Feb 18, 2017. Attended CALDAM 2017

Participated in *Conference on Algorithms and Discrete Applied Mathematics 2017* held at Birla Institute of Technology, Pilani, Goa Campus during Feb 16 – Feb 18, 2017.

Meesum, Syed M.

Participated in *34th International Symposium on Theoretical Aspects of Computer Science* held at Hannover, Germany during Mar 8 – Mar 11, 2017. Presented a paper titled "Matrix Rigidity from the Viewpoint of Parameterized Complexity".

Menon, Gautam I.

Participated in *Research Scholar Symposium,* held at IIT Bombay on Apr 8, 2016. Gave an invited talk on "Why should physicists think about biology?"

Visited TCIS, Hyderabad during Apr 25 – Apr 28, 2016. Gave a Colloquium on "Two (or three) problems in physical biology"

Participated in *STATPHYS-26, International Conference on Statistical Physics* held at Lyon, France during Jul 18 – Jul 22, 2016. Gave an invited talk on "Active Matter and Nuclear Architecture" at this flagship meeting of the international statistical physics community.

Participated in *Perspectives in Non-Linear Dynamics* held at Humboldt University, Berlin during Jul 24 – Jul 28, 2016. Gave an invited talk on "Spatio-temporal aspects of chromatin fluctuations in stem cells"

Visited IISER, Tirupati during Sep 7 – Sep 8, 2016. Gave an invited Colloquium on "Interdisciplinarity from a user perspective"

Participated in *Big Data and Computational Biology* held at VIT, Vellore on Sep 9, 2016.

Gave an invited talk on "Frontier problems at the biophysics-computational biology interface"

Participated in *Mechanical Forces in Cell Biology* held at NCBS, Bangalore during Oct 6 – Oct 8, 2016. Gave an invited talk on "Active Matter and Nuclear Architecture"

Participated in *One-day Symposium on Statistical Physics on the occasion of Deepak Dhar's retirement* held at TIFR, Mumbai on Nov 17, 2016. Gave an invited talk on "Exclusion Processes and Biological Transport"

Visited ICTS, Bangalore during Nov 21 – Nov 22, 2016. Gave an invited Colloquium on "Active Matter and Nuclear Physics"

Participated in *KSOM workshop for college students* held at Idukki, Kerala during Dec 1 – Dec 4, 2016. Gave two lectures on "Brownian motion, random walks and the diffusion equation"

Participated in *Comp-Flu 2016* held at IIIT, Hyderabad during Dec 12 – Dec 14, 2016. Gave an invited talk on "Stem Cell Chromatin as an active fluid"

Participated in *International Symposium on Computational and Experimental studies of Microtubules and Microtubule-based Motor Proteins* held at IIT Bombay on Dec 14, 2016. Gave an invited talk on "Simulations of Axonal Transport of pre-synaptic vesicles"

Participated in *DAE-Solid State Physics Symposium* held at KIIT, Bhubaneshwar during Dec 25 – Dec 29, 2016. Gave an invited talk on "Chromatin as Active Matter", in addition to serving on the committee for the Young Achiever Award

Visited Max Delbruck Centre for Molecular Medicine during Feb 2 – Feb 4, 2017. Invited to present the BISMB Seminar on "Active Matter and Nuclear Architecture"

Participated in *Workshop on Disease Modelling* held at St Josephs College, Cuddalore during Mar 2 – Mar 3, 2017. Gave two lectures on "Modeling Infectious Diseases", in which the first covered general mathematical background while the second dealt with the derivation of the SIR model and related models.

Participated in *Two-Day conference/meet of DAE-Biologists and Allied Scientists* held at BARC, Mumbai on Mar 10, 2017. Gave an invited talk on "Computational Biology at IMSc, Chennai", summarizing work in this group, as part of a two-day discussion to stimulate greater cooperation and collaborations within the DAE.

Participated in *Driven Soft Matter and Biological Systems* held at Pune University on Mar 11, 2017. Presented an invited talk on "Two problems in physical biology" to a largely graduate audience.

Visited TIFR, Mumbai during Mar 12 – Mar 16, 2017. Invited to give the Theoretical

Physics Colloquium on "Active Matter and Nuclear Physics"

Menon, Shakti N.

Participated in *Dynamics of Complex Systems* held at International Centre for Theoretical Sciences (ICTS) during May 23 – Jun 3, 2016.

Participated in *Games, Epidemics and Behaviour* held at International Centre for Theoretical Sciences (ICTS) during Jun 27 – Jul 1, 2016. Presented a talk entitled "The evolution of collective strategies in communities"

Participated in *10th Conference on Nonlinear Systems and Dynamics (CNSD)* held at IISER Kolkata during Dec 16 – Dec 18, 2016. Presented a talk entitled "Chemical computation in arrays of relaxation oscillators coupled via mutual inhibition"

Mohari, Anilesh

Visited Polish Academy, Krakow, Poland during Sep 20 – Sep 26, 2016. Invited talk in a conference on 'Non-commutative'

Mukhopadhyay, Partha

Visited Department of Physics and Astronomy, University of Kentucky, USA during Jun 27 – Sep 30, 2016. Participated in academic discussions and exchange of research ideas. Presented seminar titled: Small string quantization in curved space and tubular geometry

Visited C.N. Yang Institute for Theoretical Physics, Stony Brook University, USA during Sep 5 – Sep 9, 2016. Participated in academic discussions and exchange of research ideas. Presented seminar titled: Small string quantization in curved space and tubular geometry

Visited Department of Physics, McGill University, Montreal, Canada during Sep 19 – Sep 27, 2016. Participated in academic discussions and exchange of research ideas. Presented seminar titled: Small string quantization in curved space and tubular geometry

Participated in *Indian Strings Meeting 2016* held at Indian Institute of Science Education and Research, Pune during Dec 15 – Dec 21, 2016.

Murthy, M.V.N.

Visited JSS College, Mysore during Apr 28 – Apr 30, 2016. Short Course (6 Lectures) on Relativistic Quantum Mechanics for MSc Students and Teachers.

Participated in *Two Day Meeting celebrating the 80th Birthday of Prof. G Rajasekaran.* held at Chennai Mathematical Institute, Siruseri during Aug 19 – Aug 20, 2016.

Participated in *National Conference on Neutrino Physics* held at Meenakshi College for Women Chennai - 600 024 during Sep 28 – Sep 29, 2016. Delivered a Lecture on the topic "Powering the Sun, Solar Neutrinos".

Participated in *Workshop on Frontiers in Electroweak Interactions of Leptonsand Hadrons* held at Aligarh Muslim University, Aligarh, UP, India during Nov 2 – Nov 6, 2016.

Participated in *The Age of Electroacoustics: Transforming Science and Sound: Book Release* held at IIT Madras, Chennai 600 036 on Feb 7, 2017. Panel Discussion, Member

Participated in *Topics in Contemporary Physics* held at National Institute of Technology, Suratkal, Karnataka during Feb 8 – Feb 9, 2017. Delivered Lectures on "Neutrino Physics"

Nagaraj, D. S.

Visited University of Lille, France during May 27 – Jun 30, 2016. One of the Organizer of a conference on "vanishing Theorems" of University of Lille and University D'Artois, France.

Participated in *Number Theory conference on Arithmetic Geometry and L - Functions* held at KSOM, Kozhikode during Aug 17 – Aug 21, 2016. Gave a talk titled "Nef and big vector bundles"

Participated in *Science Academies Lecture workshop on Algebra and Analysis*

held at Karpagam University , coimbatore during Jan 4 – Jan 5, 2017. Gave 4 lectures on "Group actions"

Participated in *Workshop and Conference on Seshadri Constant* held at Chennai Mathematical Institute during Jan 30 – Feb 10, 2017. Gave two lectures and handled two toutorials

Visited Manonmaniam Sundaranar University, Trunelveli on Mar 6, 2017. Delivered S.S. .Pillai Endowment lecture "Group action and application"

Participated in *Complex Analytic Geometry* held at T.I.F.R. Mumbai during Mar 27 – Mar 29, 2017. Gave a talk titled "Remarks on Ramanujam-Kawamata-Viehweg Vanishing Theorem". Chaired a session.

Nath, Avijit

Participated in *School on K-theory and its Applications* held at Indian Statistical Institute, Bangalore during Dec 26, 2016 – Jan 7, 2017.

Akhilesh, P

Visited Institut de Mathmatiques de Jussieu during Aug 20 – Oct 20, 2016. studied about

multiple zeta values and multiple Apery like sums, under the guidance of Joseph Oesterle

Participated in *Sage Days 75* held at Inria Saclay, France during Aug 22 – Aug 26, 2016.

Visited Institut de Mathmatiques de Marseille during Oct 21 – Nov 4, 2016. Joint work with Olivier Ramare about Tail of a Moebius sum with coprimality conditions

Participated in *KSOM Lecture Series on Mathematics (Number theory)* held at Kerala School of Mathematics (KSOM), Kozhikode, Kerala during Nov 19 – Nov 24, 2016.

Participated in *Conference on Number Theory celebrating the 70th birthday of J.M. Deshouillers* held at Kerala School of Mathematics (KSOM), Kozhikode, Kerala during Jan 9 – Jan 13, 2017.

Participated in *Combinatorics and Number Theory Meet* held at Harish-Chandra Research Institute (HRI),Allahabad during Feb 19 – Feb 23, 2017.

Prabhakar, Varuni

Visited Tata Institute for Fundamental Research, Mumbai during Oct 11 – Oct 15, 2016. Collaborative work with Prof. Sandhya Koushika

Participated in *Conflict and Cooperation in Cellular Populations* held at National Centre for Biological Sciences during Oct 16 – Oct 19, 2016. Presented a poster on 'Modelling Phototaxis-Mediated Phenomena in Cyanobacterial Colonies', in collaboration with, Shakti N. Menon, & Gautam I. Menon

Prasad, Amritanshu

Visited University of Stuttgart during May 1 – May 31, 2016. Seminar talks, collaborative research.

Raghavan, K. N.

Visited Veltech University, Avadi, Chennai on May 29, 2016. Evaluation of research reports and proposals submitted by mathematics faculty.

Participated in *Eighth Summer Training Programme in Mathematics (supported by NBHM)* held at Ramanujan Institute for Advanced Study in Mathematics, Madras University during Jun 6 – Jun 9, 2016. Conducted three morning sessions of lectures and tutorials in algebra (at MSc level)

Participated in *31st Annnual Conference of the Ramanujan Mathematical Society* held at National College, Trichy during Jun 19 – Jun 21, 2016. Gave an invited talk on "Represen-

tations of the current algebra"

Visited SASTRA University, Kumbakonam, Tamilnadu on Sep 24, 2016. Gave a maths talk in the University's "Knowledge Leadership Forum" series

Participated in *Enriching Mathematics Education: workshop for school mathematics teachers* held at Institute of Mathematical Sciences, Chennai on Sep 26, 2016. Gave a lecture on "Sturm's method for the number of real roots of a real polynomial"

Participated in *Refresher Course* held at Human Resource Development Centre, Hyderabad Central University during Sep 30 – Oct 1, 2016. Gave a series of four lectures to college and university mathematics teachers

Visited Sri Vijay Vidyalaya College of Arts and Science, Dharmapuri, Tamilnadu on Oct 3, 2016. Lectured to MSc students on an application of linear algebra

Visited Periyar University, Salem, Tamilnadu on Oct 3, 2016. Lectured on "Singular Value Decomposition" to the mathematics students of the university

Visited Vellore Institute of Technology, Chennai Campus on Nov 2, 2016. Invited lecture given to students and faculty

Visited Indian Institute of Science Education and Research, Pune during Nov 15 – Nov 16, 2016. Attended a doctoral committee meeting and gave a colloquium talk.

Visited Hyderabad Central University on Nov 19, 2016. NBHM Southern Region Library Committee Meeting

Participated in *A meeting on Algebraic Groups and Geometries* held at Indian Statistical Institute, Bengaluru on Nov 25, 2016. Gave an invited talk in the event which was in celebration of Prof. N. S. Narasimha Sastry's career at ISI

Participated in *Mathematics Workshop for Motivating PG students towards research 2016 (sponsored by NBHM and IMSc)* held at Sri Sarada College for Women, Salem during Dec 1 – Dec 3, 2016. Helped organize the academic program and acted as a resource person

Visited Institute of Mathematics and Applications, Bhubaneswar on Dec 13, 2016. Gave a lecture and interacted with students

Participated in *One day seminar on Srinivasa Ramanujan's birthday* held at Bharatidasan University, Tiruchirapalli on Dec 22, 2016. Gave a lecture to students (Masters, Phd) and faculty

Participated in *NBHM sponsored three-day outreach program in mathematics* held at RBVRR Women's College, Narayanaguda, Hyderabad on Dec 23, 2016. Was a resource person in algebra

Visited Indian Academy of Sciences, Bengaluru on Dec 24, 2016. Attended meeting regarding summer research fellowships in mathematics

Visited Karpagam University, Coimbatore during Jan 4 – Jan 5, 2017. Academic convener and resource person in Academies' Lecture Series Workshop

Participated in *Refresher course for college teachers working in Kerala state: Semisimple algebras and group representations* held at Kerala School of Mathematics, Kozhikkode during Jan 19 – Jan 22, 2017. One of two resource persons

Visited Vel Tech University, Avadi, Chennai on Feb 12, 2017. Evaluation of research proposals by faculty

Participated in *National Level Seminar on Multi Dimension of Math* held at Adhiparasakthi College of Arts and Science, Kalavai, Vellore District, Tamilnadu on Feb 21, 2017. Gave an invited talk

Visited Department of Mathematics, Periyar University, Salem during Mar 21 – Mar 22, 2017. Gave two lectures and interacted with students (MSc, MPhil, PhD) and faculty for two full days.

Participated in *National Conference on Pure and Applied Mathematics* held at Srinivasa Ramanujam Centre, SASTRA University, Kumbakonam on Mar 24, 2017. Gave an invited talk

Rajasekaran, G.

Participated in *INO Collaboration Meeting* held at Homi Bhabha Centre for Science Education, Mumbai during Apr 10 – Apr 11, 2016. Chaired the Plenary session

Visited Institute of Physics, Bhubaneswar during Jun 28 – Jun 29, 2016. Member of Selection Committee for Faculty recruitment

Participated in *Mid-Year Meeting of Indian Academy of Sciences* held at Indian Institute of Science, Bangalore during Jul 1 – Jul 2, 2016.

Visited IISER, Thiruvananthapuram on Jul 18, 2016. Gave a talk: "Hundred Years of Fundamental Physics and a Crisis".

Visited International Centre for Theoretical Sciences, Bangalore during Aug 8 – Aug 10, 2016. Gave a Colloquium: "Hundred Years of Fundamental Physics and a Crisis".

Participated in *Rajajifest* held at CMI during Aug 19 – Aug 20, 2016. Gave a talk: "My Inward Bound Journey (or) How I got Enlightenment".

Participated in *National Conference on Neutrinos* held at Meenakshi College for Women, Chennai during Sep 28 – Sep 29, 2016. Gave the Keynote Address and a Talk on Neutrinos and INO

Participated in *Workshop on Neutrinoless Double Beta Decay* held at IIT, Ropar during Oct 17 – Oct 20, 2016. Gave a talk on Neutrinos, NDBD and INO

Participated in *Workshop on NDBD* held at Himachal Prdesh University, Shimla during Oct 21 – Oct 22, 2016. Gave a talk to students on Neutrinos

Participated in *INO Collaboration Meeting* held at HBCSE, Mumbai during Oct 24 – Oct 25, 2016. Advised all INO students (past and present) to jointly represent to the Government how the delays in the INO execution is affecting their future, The students were warned that if they do not act, INO will be lost.

Participated in *Workshop on New Frontiers in Electroweak Interactions of Leptons and Hadrons* held at Aligarh Muslim University during Nov 2 – Nov 6, 2016. Gave a talk:"Does the Wolfenstein form of the mixing matrix work for leptons also?"

Participated in *Frontiers in Quantum Field Theory* held at Banares Hindu University during Nov 6 – Nov 10, 2016. Gave an evening talk:"The Story of the Neutrino".

Participated in *Science Academies' Refresher Course in Quantum Mechanics* held at Abdur Rahman University, Vandalur during Dec 5 – Dec 10, 2016. Gave 12 lectures in Quantum Mechanics

Participated in *Science Academies' Refresher Course in Advanced Quantum Mechanics* held at Government College of Arts and Science, Melur during Dec 19 – Dec 24, 2016. Directed the Course of two weeks duration and gave 12 lectures on Advanced Quantum Mechanics

Visited IISER, Thiruvananthapuram during Dec 27 – Dec 28, 2016. Member of screening committee for faculty recruitment

Participated in *Strings (Past, and Future)* held at International Centre for Theoretical Sciences, Bangalore during Jan 11 – Jan 13, 2017.

Participated in *Science Academies' Workshop on Advances in Particle Physics* held at EVR Periyar Government College of Arts and Science, Trichy during Feb 6 – Feb 7, 2017. Was the Convener of the Workshop and gave two talks: 1. Standard Model and What Next? 2.Neutrinos and INO

Participated in *DST-SERC School on Nuclear Physics* held at Bharathiar University, Coimbatore during Feb 24 – Feb 25, 2017. Gave four lectures on Standard Model, Higgs Boson, Neutrinos and INO

Visited SRM University, Kattankulathur on Mar 7, 2017. Interviewed candidates for Faculty

recruitment

Participated in *Workshop on Laser Plasma Accelerator* held at International Centre for Theoretical Sciences, Bangalore during Mar 13 – Mar 17, 2017. 1.Participated in the brain-storming sessions to plan the National Centre for Laser plasma Accelerator. 2.Gave a talk:"Hundred Years of Fundamental Physics and a Crisis".

Raman, Venkatesh

Participated in *Workshop on Graph Theory and its Applications* held at SRM University, Ramapuram on Apr 12, 2016. Gave a talk on 'Graph Problems associated with IPL Tournament'

Visited IIT Jodhpur during Apr 25 – Apr 29, 2016.

Participated in *5th Annual Mysore Park Workshop on Recent Trends in Algorithms and Complexity* held at Infosys Campus, Mysore during Aug 14 – Aug 17, 2016. Gave a talk on '25 years of Parameterizations'

Participated in *Workshop on Design and Analysis of Efficient Algorithms and its Applications* held at SRM University, Kattankulathur, Chennai during Aug 22 – Aug 26, 2016. Coordinated the academic program and gave three one hour talks

Participated in *School on Parameterized Complexity* held at IIT Gandhinagar on Nov 3, 2016. Gave an introductory talk on Parameterized Complexity and another on W-hardness

Participated in *NMI Workshop on Complexity Theory* held at IIT Gandhinagar during Nov 4 – Nov 6, 2016. Gave a one hour talk on Alternate Parameterizations

Participated in *Workshop on Algorithms* held at BS Abdur Rahman University, Vandalur, Chennai during Nov 8 – Nov 12, 2016. Organized the academic program and gave several talks

Participated in *BioCS16 Mini-meeting on the computer science/biology interface* held at IMSc Chennai during Dec 10 – Dec 11, 2016. Gave a talk on 'Burrows-Wheeler Transform and FM Index'

Participated in *Rangoli of Algorithms* held at Chennai Mathematical Institute, Chennai during Dec 11 – Dec 12, 2016.

Participated in *36th IARCS Annual Conference on Foundations of Software Technology and Theoretical Computer Science (FSTTCS)* held at Chennai Mathematical Institute, Chennai during Dec 13 – Dec 15, 2016.

Participated in *ACM-India Annual Event* held at Calcutta University and Amity University during Jan 19 – Jan 21, 2017.

Participated in *MSR India Academic Research Summit 2017* held at IISc Bangalore on Jan 25, 2017.

Ramanujam, R.

Visited Tata Institute of Fundamental Research, Mumbai during Apr 10 – Apr 11, 2016. Gave a colloquium on "Equilibria in large games".

Visited Institute of Technology, Bandung, Indonesia during May 25 – May 27, 2016. Gave a talk on "A logician's view of game theory".

Participated in *31st Annual Conference of Ramanujan Mathematical Society* held at National College, Tiruchirappalli during Jun 18 – Jun 21, 2016. Gave a talk on "Infinite games in theory of computation".

Visited Birla Institute of Technology and Science, Goa campus during Nov 10 – Nov 12, 2016. Gave three lectures in the computer science department.

Visited University of Liverpool, UK during Nov 27 – Dec 3, 2016. Gave a talk on "Questions for study of epistemic logics".

Participated in *International Conference of the Indian Mathematics Consortium* held at Banaras Hindu University, Varanasi during Dec 14 – Dec 17, 2016. Gave a talk in the Logic Session on "Logical dynamics in game theory".

Participated in *International Conference on Advanced Computing Methods* held at Madras Institute of Technology, Anna University during Jan 19 – Jan 21, 2017. Gave a talk titled "Feeling secure: the need for formal proof".

Participated in *National Workshop on Computational Mathematics* held at Anna University during Mar 2 – Mar 15, 2017. Gave a tutorial lecture on "First order logic and graph theory".

Ray, Purusattam

Visited Earthquake Research Institute, University of Tokyo, Japan during Mar 28 – May 14, 2016. Scientific collaboration and seminar presentation.

Participated in *Statphys Kolkata IX* held at SINP, Kolkata during Dec 13 – Dec 16, 2016. Invited speaker

Visited Physics Department, Calcutta University during Dec 16 – Dec 30, 2016. Scientific collaboration and seminar presentation.

Sahu, Abhishek

Participated in *Mysore Park Workshop* held at Mysore Infosys campus during Aug 14 – Aug 17, 2016.

Participated in *NMI Workshop* held at IIT Gandhinagar during Nov 2 – Nov 6, 2016.

Participated in *Rangoli of Algorithms* held at Chennai Mathematical Institute during Dec 11 – Dec 12, 2016.

Participated in *FSTTCS* held at Chennai Mathematical Institute during Dec 13 – Dec 15, 2016.

Samal, Areejit

Visited Vellore Institute of Technology (VIT) on Apr 13, 2016. Invited talk

Visited Institute of Bioinformatics and Applied Biotechnology (IBAB), Bangalore on Apr 16, 2016. Invited talk

Visited Max Planck Institute for Mathematics in the Sciences, Leipzig, Germany during May 29 – Jun 27, 2016. Research collaboration

Visited Technical University of Munich, Germany during Jun 27 – Jun 28, 2016. Research collaboration

Visited ICTP, Trieste, Italy during Jun 28 – Jul 27, 2016. Simons Associate

Participated in *International conference on Structural and Functional Genomics* held at SASTRA University, Thanjavur, India during Aug 19 – Aug 20, 2016. Invited talk

Participated in *Aspects of Gene and Cellular Regulation* held at IMSc, Chennai, India during Aug 25 – Aug 26, 2016. Research talk

Participated in *Workshop on Big Data and Computational Biology,* held at VIT, Vellore, India on Sep 10, 2016. Invited talk

Participated in *Current Research Trends in Computational Techniques in Bioinformatics* held at Madurai, India during Sep 21 – Sep 23, 2016. Invited talk

Visited Vellore Institute of Technology (VIT) on Oct 6, 2016. Invited talk

Visited IIIT Bhubaneswar during Nov 5 – Nov 6, 2016. Invited Talk

Participated in *National Symposium on Bioinformatics and Computational Systems Biology*

held at Central University of Himachal Pradesh, Dharamsala during Nov 12 – Nov 14, 2016. Invited talk

Participated in *AICTE Short-Term Training Programme on Systems Biology* held at IIT Madras, Chennai during Feb 6 – Feb 11, 2017. Invited talk

Participated in *Heads of Max Planck Partner Group Meeting* held at IISER Mohali, India during Mar 3 – Mar 5, 2017. Invited talk

Participated in *Computational Platforms for Research in Bioinformatics: Challenges at the Interface of Computer Science and Biology* held at SSN College of Engineering, Chennai, India during Mar 25 – Mar 26, 2017. Invited talk

Sankaran, Parameswaran

Visited Anna University, Guindy on Sep 9, 2016. Gave a talk on groups and symmetry.

Participated in *Group theory and geometry* held at Maitreyi College, New Delhi. during Oct 13 – Oct 14, 2016. Gave three lectures on "group theory".

Participated in *Discussion meeting on "Group theory and computational methods"* held at ICTS, Bengaluru during Nov 11 – Nov 12, 2016. Gave an invited talk on "Bieri-Neumann-Strebel invariants and applications".

Visited Central University of Kerala, Kasaragod on Dec 1, 2016. Gave a talk on "The geometry of the upper half plane".

Participated in *Seminar on Topology and analysis* held at Government College, Kasaragod, Kerala during Dec 1 – Dec 2, 2016. Gave a talk on "Congruent numbers and elliptic curves".

Participated in *Ramanujan Day Seminar* held at Ramanujan Institute, University of Madras on Dec 22, 2016. Gave a talk on 'Bernoulli numbers and the topology of spheres'.

Participated in *Recent trends in mathematics* held at Vimala College, Thrissur, Kerala during Jan 19 – Jan 20, 2017. Gave a talk on 'Congruent numbers'.

Visited Department of Mathematics and Statistics, University of Sao Paulo, Sao Paulo, Brazil during Feb 6 – Feb 16, 2017.

Participated in *National Seminar on emerging trends in theoretical and computational mathematics* held at PSGR Krishnammal College for Women, Coimbatore on Mar 1, 2017. Gave a talk on 'Classification of surfaces'.

Participated in *Workshop on computational mathematics* held at Department of Mathematics, Anna University, Chennai on Mar 3, 2017. Gave a talk on 'Formula of Pick'.

Sathiapalan, Balachandran

Visited Bishop Moore College, Mavelikara, Kerala during Nov 29 – Nov 30, 2016. Gave lectures on Relativistic Quantum Mechanics to MSc students/teachers. Organised by Indian Academy of Sciences

Sharma, Vikram

Participated in *FSTTCS* held at CMI, Chennai during Dec 13 – Dec 15, 2016.

Visited Dayalbagh Engineering Institute, Agra during Dec 19, 2016 – Feb 28, 2017.

Sinha, Sitabhra

Participated in *Workshop on Complex networks and emerging applications* held at International Center for Mathematical Sciences, Edinburgh during Mar 28 – Apr 1, 2016. Gave invited talk on "Meso-scale networks in neuroscience: dynamical models for the collective activity of brain regions"

Participated in *Meeting on Network Theory: Conceptual advances and practical applications* held at The Institute of Mathematical Sciences, Chennai on Apr 26, 2016. Gave invited talk on "Strong community organization of populations can promote long-term recurrence of epidemic diseases"

Visited Centre for Soft Computing, Indian Statistical Institute, Kolkata on May 20, 2016. Gave invited talk on "Modeling the dynamics of brain activity at the meso-scale"

Participated in *Discussion Meeting on Games, Epidemics and Behavior* held at International Centre for Theoretical Sciences, Bengaluru during Jun 27 – Jul 1, 2016. Gave two invited talks on "Strong community organization of populations can promote long-term recurrence of epidemic diseases" and "Contagion, coordination and communities: Diffusion of innovations on social networks with modular organization"

Participated in *Symposium on Pathogens and Host Response (SIGID-2016 Conference)* held at National Institute of Immunology, New Delhi during Aug 10 – Aug 12, 2016. Gave invited talk on "Learning and memory in the eukaryotic cell: Emergence of sensitization and de-sensitization in intra-cellular signaling"

Participated in *Conference on Complex Systems* held at Beurs Van Berlage, Amsterdam, The Netherlands during Sep 19 – Sep 22, 2016. Gave invited talk on "Modeling the dynamics of brain activity at the meso-scale" and contributed talk on "Complex dynamics of urban traffic congestion: A novel kinetic Monte Carlo simulation approach"

Participated in *Conference on Latest Advances in Computational and Applied Mathematics* held at Mahindra Ecole Centrale, Hyderabad during Dec 15 – Dec 17, 2016. Gave invited

talk on "Modeling the dynamics of brain activity at the meso-scale"

Visited Christ University, Bengaluru on Dec 20, 2016. Gave two invited talks on "Inferring the Laws of Finance from Big Data" and "Understanding society through physics: Market bubbles, popularity and diffusion of innovation"

Visited Midnapore College, Midnapore, West Bengal on Jan 29, 2017. Gave invited talk on "Mathematics of the heart: Spiral waves and sudden cardiac death"

Participated in *AICTE Short-Term Training Programme on Systems Biology* held at Department of Biotechnology, Indian Institute of Technology, Madras during Feb 6 – Feb 11, 2017. Gave two invited lectures on "Introduction to Complex Networks: A Tutorial on Network Models" and "Strong community organization of populations can promote long-term recurrence of epidemic diseases"

Participated in *Workshop on Disease Modeling* held at St Joseph's College, Cuddalore, Tamil Nadu during Mar 1 – Mar 2, 2017. Gave two invited lectures on "Network Epidemiology: Modeling contagia spreading on social and transportation networks"

Visited Department of Biotechnology, SASTRA University, Thanjavur on Mar 4, 2017. Gave invited talk at SAMHITA Biotech Tech-fest on "Sing the body electric: Engineering a solution to sudden cardiac death"

Visited Indian Institute of Science Education and Research, Pune during Mar 6 – Mar 8, 2017. Gave Physics Seminar Series invited talk on "Patterns, broken symmetries and computation: Emergent complexity in collective dynamics of spatially extended systems of oscillators" and Science Club invited talk on "Can economics be a physical science"

Participated in *Conference on Information Transfer Across Scales: Molecules to Behavior* held at Centre for Research in Nanosciences and Nanotechnology, Calutta University, Kolkata during Mar 10 – Mar 11, 2017. Gave invited talk on "Will selfish vulcans cooperate? Co-action solution for non-cooperative games among rational agents"

Participated in *Mini-conference in Statistical Physics* held at Department of Physics, Calcutta University, Kolkata during Mar 17 – Mar 18, 2017. Gave invited talk on "To vaccinate or not, that's the game! Vaccination response of a social network of rational agents"

Srinivas, K.

Participated in *RMS Annual Conference* held at National College, Trichy during Jun 17 – Jun 21, 2016. Attended RMS EC meeting.

Visited CUSAT, Cochin during Sep 28 – Sep 29, 2016. Delivered 'Professor Wazir Hasan Abdi Memorial Lecture' with the title *"Secure communication through insecure channels"*.

Subramanian, C. R.

Visited National Institute of Goa during Oct 25 – Oct 27, 2016. Was an Invited Speaker at a National Workshop on Cryptography and its Applications.

Participated in *National Workshop on Computational Mathematics* held at Department of Mathematics, Anna University during Mar 2 – Mar 15, 2017. Was a Guest Speaker

Sunder, V. S.

Participated in *2016 Asian Mathematical Conference* held at Bali during Jul 26 – Jul 30, 2016. Chaired one session and gave an invited lecture 'On a tensorial Schur product'.

Visited Indian Statistical Institute, Bangalore during Sep 22 – Sep 24, 2016. Attended TSSRK Fest and gave a lecture on 'My take on the Spectral Theorem'.

Participated in *Non-Commutative Analysis* held at IMSc during Feb 6 – Feb 16, 2017. Attended conference and workshop, also chaired the first session of the former

Venugopalan, Sushmita

Visited ICMAT, Madrid during Sep 12 – Oct 11, 2016.

Participated in *Hitchin 70: Celebrating 30 years of Higgs bundles and 15 years of generalized geometry* held at ICMAT, Madrid during Sep 12 – Sep 16, 2016.

Participated in *Teachers Enrichment Workshop* held at IMSc during Nov 21 – Nov 26, 2016. A series of six lectures were given for engineering college teachers.

Participated in *Geometry and Physics of Moduli spaces* held at Indian Institute of Science, Banaglore during Mar 27 – Mar 31, 2017.

Viswanadham, G. K.

Participated in *AIS on Analytic theory of algebraic numbers* held at KIIT, Bhubaneswar during Jun 13 – Jul 2, 2016. Tutor for analytic number theory course

Visited Harish Chandra Research institute, Allahabad during Sep 1 – Sep 15, 2016.

Participated in *Two day Number Theory Meet* held at HRI, Allahabad during Sep 6 – Sep 7, 2016. Delivered a talk with title "Analytic continuation of multiple zeta functions"

Visited Nagoya University, Japan during Dec 1 – Dec 15, 2016.

Visited Kyushu University during Dec 15 – Dec 22, 2016.

Participated in *International conference on Number theory* held at KSOM, Calicut during Jan 9 – Jan 13, 2017. Delivered a talk on "Multiple zeta functions and their weighted variants"

Viswanath, Sankaran

Visited IIT Kanpur during Apr 1 – Apr 3, 2016. Delivered a colloquium talk.

5.4 Visitors from Other Institutions

Rahul Srivastava	15.1.16 - 14.4.16	IMSc
Dibyakrupa Sahoo	27.2.16 - 27.5.16	South Korea
Naresh Dhapkh	24.3.16 - 7.4.16	IUCAA, Pune
Raghavaram P.	1.4.16 - 10.4.16	IISC, Bangalore
Rashidal Islam	1.4.16 - 31.5.16	Kolkata
Sooraj S	1.4.16 - 30.6.16	International School on Photonic, CUSAT
Balachandran A.P.	3.4.16 - 2.7.16	Syracuse university NY
Mahendra Kumar Prajapat	5.4.16 - 10.4.16	IIT, Mumbai
Sunil Singh Shah	9.4.16 - 20.4.16	HNB Garhwal University, Uttarkhand
Prabhat Semwal	9.4.16 - 20.4.16	HNB Garhwal University, Uttarkhand
Reji Kumar	10.4.16 - 26.5.16	NSS College, Chengannur
Rick Remsing	11.4.16 - 20.4.16	Temple University, US
Sridhar S.	11.4.16 - 10.7.16	University of Gent
Haridass N.D.	17.4.16 - 17.5.16	TIFR-TCIS Hyderabad
Ashwin Ganesan	18.4.16 - 22.4.16	VIT Mumbai
Ravinder B.	18.4.16 - 3.5.16	TIFR, Mumbai
Muthukumar M.	19.4.16 - 22.4.16	University of massachusetts, Amherst
Manoranjan Kumar	23.4.16 - 29.4.16	SNBCS, Kolkata

Krishnaswamy S.	25.4.16 - 28.4.16	Madurai Kamaraj University, Madurai
Shruti Dogra	25.4.16 - 15.6.16	IISER, Mohali
Manimala Mitra	27.4.16 - 29.4.16	IISER, Mohali
Murali K Srinivasan	27.4.16 - 30.4.16	IIT, Bombay
Jurgen Jost	29.4.16 - 30.4.16	Max planck Institute, Germany
Xianging Jost	29.4.16 - 30.4.16	Max planck Institute, Germany
Akhilesh B.J.	30.4.16 - 15.5.16	University of Mysore
Madhuparna Karmakar	1.5.16 - 30.6.16	HRI,Allahabad
Deeksha Adil	1.5.16 - 31.3.17	IISER, Pune
Usha Keshav Sangale	3.5.16 - 29.5.16	SRTM University, Nanded
Saibal Ray	3.5.16 - 21.5.16	Govt. college of Engineering ceramic technology,Kolkata
Ramesh G.	4.5.16 - 20.6.16	Bharathidasan University
Sandhya Koushika	5.5.16 - 27.5.16	TIFR Colaba, Mumbai
Sandipan Sengupta	8.5.16 - 27.5.16	IIT Gandhinagar
Jai Ganesh G	10.5.16 - 9.8.16	IGCAR, Kalpakkam
Saumia P.S	13.5.16 - 11.6.16	JINR, Dubna
Dipanjan Ghosh	16.5.16 - 16.7.16	Jadavpur University, Kolkata
Shiv Chaitanya K.V.S.	19.5.16 - 17.7.16	BITS Pilani, Hyderabad

Gopal Chandra Shit	22.5.16 - 17.6.16	Jadavpur University, Kolkata
Sk Monoghar	23.5.16 - 11.6.16	Aliah University, Kolkata
Mubeena T	25.5.16 - 28.5.16	Government College, Kasaragad, Kerala
Prasanna Venkataraman	26.5.16 - 27.5.16	ACTREC, Mumbai
Hari Krishnan S	27.5.16 - 10.7.16	Loyola College, Chennai
Koushik V.	27.5.16 - 10.7.16	Loyola College, Chennai
PadmanabhanT.	28.5.16 - 4.6.16	IUCAA, Pune
Samir Kunkri	30.5.16 - 17.6.16	Maha Vidhyalaya, Kolkata
Sudip Mazumder	31.5.16 - 4.7.16	Dept. of Mathematics, Jadavpur Univeristy, Kolkata
Bhaskar Saha	3.6.16 - 5.6.16	St. Xavier College, Mumbai
Somshubhro Bandyopadhyay	6.6.16 - 10.6.16	SNBNCBS, Kolkata
Krishnaswamy S.	6.6.16 - 10.6.16	Madurai
Sumana Dutta V.	6.6.16 - 11.6.16	IIT, Guwahati
Swetha P	7.6.16 - 15.7.16	NIT Calicut, Kozhikode
Satyakkar	8.6.16 - 10.6.16	Indian Association for cultivation of science, Kolkata
Guruprasad Kar	9.6.16 - 17.6.16	ISI, Kolkata
Ramij Rahaman	9.6.16 - 17.6.16	University of Allahabad, Allahabad
Anindita Banerjee	10.6.16 - 10.6.16	SNBNCBS, Kolkata

Anubhooti	11.6.16 - 15.6.16	Hyderabad Central University
Anurupadevi Y	11.6.16 - 15.6.16	Hyderabad University
Bikas Chandra Paul	13.6.16 - 25.6.16	NBU, Siliguri
Tushar Kanti Bose	13.6.16 - 17.6.16	Indian Association for cultivation of science, Kolkata
Meduri C.Kumar	16.6.16 - 20.6.16	IIT, Guwahati
Shruti Dogra	16.6.16 - 14.7.16	IISER, Mohali
Pushkar Shripadjoglekar	17.6.16 -8.7.16	Vishwakarma Institute of Technology, Pune
Tathagata Banerjee	19.6.16 - 5.8.16	University of Gottingen, Germany
Sivakumar M.	21.6.16 - 24.6.16	School of Physics, University of Hyderabad
Kumar Murty	21.6.16 - 27.6.16	University of Toronto, Canada
Albin James	22.6.16 - 23.6.16	University of south california, Los Angels
Subash B.	22.6.16 - 21.9.16	Bharathidasan University, Tiruchirapalli
Anil Kumar Karan	26.6.16 - 2.7.16	NISER, Bhubaneswar
Naddishankaraiah	29.6.16 - 30.6.16	JNU University, New Delhi
Krishnaswamy S.	1.7.16 - 8.7.16	Madurai Kamaraj University, Madurai
Jebarathinam C.	1.7.16 - 30.9.16	IIT, Madras
Madhuparna Karmakar	1.7.16 - 31.7.16	HRI, Allahabad
Subinay Das Gupta	4.7.16 - 14.7.16	University of Calcutta

Sachin Jain	4.7.16 - 5.7.16	Cornell University, USA
Arindam Biswas	4.7.16 - 31.7.16	CMI, Chennai
Sourabh Lahiri	5.7.16 - 9.7.16	ESPCI, paris
Nidhi Purohit	10.7.16 - 31.8.16	Amity University, UP
Anurag Tripathi	11.7.16 - 27.7.16	IIT, Hyderabad
Satyajit Guin	13.7.16 - 28.7.16	IISER, Mohali, Punjab
Deepika Bansal	17.7.16 - 30.7.16	University of Delhi, Delhi
Sandeep K. Goyal	17.7.16 - 24.7.16	IISER, Mohali
Jayashree Ramadas	18.7.16 - 14.10.16	TIFR, Mumbai
Ashutosh Rai	18.7.16 - 29.7.16	University of Latvia, Riga Latvia
Rohith Varma	20.7.16 - 31.7.16	Kerala
Shrobona Bagchi	24.7.16 - 30.7.16	HRI, Allahabad
Rahul Joshi	24.7.16 - 27.7.16	Christ University, Bangalore
Peterwong	31.7.16 - 17.8.16	Bates College, Lewiston, USA
Gaurav Rattan	1.8.16 - 31.12.16	IMSc (former)
Madhuparna Karmakar	1.8.16 - 31.8.16	HRI, Allahabad
Kurmapu Murali Krishna	1.8.16 - 31.10.16	IIT, Madras
Jayanth J.	1.8.16 - 31.10.16	IIT Roorkee
Pankaj Pundir	1.8.16 - 31.5.17	IIIT Chittoor

Mithilesh Nayak	2.8.16 - 7.9.16	IIT, Delhi
Kushal A.	3.8.16 - 10.8.16	IISC, Bangalore
Anirban Polley	3.8.16 - 6.8.16	University of Chicago, USA
Bhaskar Sen Gupta	4.8.16 - 6.8.16	Yale University
Sandeep C	5.8.16 - 4.11.16	IBB Pune
Lakshmanan M.	7.8.16 - 14.8.16	Bharatidasan University, Tiruchirapalli
Manickam M.	8.8.16 - 12.8.16	KSOM, Kozhikode
Krishnawamy S.	8.8.16 - 19.8.16	Madurai
Joyjit Kundu	8.8.16 - 11.8.16	Lawrence Berkeley nation Lab, USA
Somshubhro Bandyopadhyay	10.8.16 - 11.8.16	SNBNCBS, Kolkata
Anindya S Chakrabarti	14.8.16 - 20.8.16	IIM, Ahmedabad
Masroor C P	16.8.16 - 23.8.16	University of Hyderabad, Hyderabad
Adhikari S.D.	16.8.16 - 17.8.16	HRI, Kolkatta
Sreeraj T. P	17.8.16 - 14.11.16	SNBCS, Kolkata
Pallab Basu	21.8.16 - 22.8.16	TIFR, ICTS, Bangalore
Srinivasarama Krishnan	23.8.16 - 25.8.16	TIFR, Mumbai
Rajeev Kumar Jain	25.8.16 - 27.8.16	University of Southern Denmark
Andrzejzuk	26.8.16 - 9.9.16	France Univ. Denis, Paris

Arpen Das	26.8.16 - 5.10.16	IOP Bhubaneswar
Jyotirmoy Ganguly	28.8.16 - 4.9.16	IISER, Pune
Steven Spallone	28.8.16 - 2.9.16	IISER, Pune
Debarun Gosh	28.8.16 - 4.9.16	IISER, Pune
Priyanka Bughel	29.8.16 - 9.11.16	Miranda House College, New Delhi
Mainak Poddar	30.8.16 - 5.9.16	Middle East Technical Univ., Cyprus
Maguni Mahakhud	31.8.16 - 2.11.16	IOP, Bhubaneswar
Nisarg Shailesh Bhatt	1.9.16 - 30.11.16	IIT, Roorkee
Surajit Sengupta	4.9.16 - 8.9.16	TIFR, Bombay
Amruta Sahoo	5.9.16 - 9.9.16	Univ. of Hyderabad
Surbeswar Pal	6.9.16 - 17.9.16	IISER, TVM
Parveena Shamim. J	7.9.16 - 6.12.16	IIT, Madras
Bhaskaran Muralidaran	7.9.16 - 8.9.16	
Swarnali Majumder	7.9.16 - 10.9.16	SINP, Kolkata
Nachiket Nitin Sakhadeo	9.9.16 - 28.2.17	Visva Bharati, Satini ketan
Pierre Matsumi	10.9.16 - 30.9.16	Rinmyaku Institute, Tokyo, Japan
Prasanna Venkataraman	12.9.16 - 18.9.16	
Krishna Swamy S.	12.9.16 - 16.9.16	MKU, Madurai
Mohan Ravichandran	12.9.16 - 30.9.16	Mimar Sinan University, Turkey

Adithya Murali	13.9.16 - 14.12.16	BITS-Philani, Hyderabad
Manickam M.	14.9.16 - 16.9.16	KSOM
Raghavan Rangarajan	14.9.16 - 13.12.16	PRL, Ahmedabad
Biswajyoti Saha	14.9.16 - 19.9.16	TIFR, Mumbai
Ekata Saha	14.9.16 - 19.9.16	TIFR, Mumbai
Vandanashree M	14.9.16 - 30.11.16	
Rebeya Basu	15.9.16 - 22.9.16	IISER, Pune
Arnab Saha	17.9.16 - 24.9.16	University of Pune
Arup Kumar Pal	18.9.16 - 23.9.16	ISI, Delhi
Subadh R.Shenoy	20.9.16 - 23.9.16	TCIS-TIFR, Hyderabad
Gyan Prakash	20.9.16 - 5.10.16	HRI, Allahabad
Nicolino Biagio Co Guloo	24.9.16 - 30.9.16	University Milan, Italy
Ajit Iqbal Singh	25.9.16 - 30.9.16	INSA, New Delhi
Dileep Jatkar	25.9.16 - 2.10.16	HRI, Allahabad
Geethan Thangavelu	25.9.16 - 30.9.16	
Sudhir Narayan Pathak	25.9.16 - 23.10.16	Brandeis University, USA
Purabi Mukharji	27.9.16 - 5.10.16	University of Calcutta
Bosco Emmanuel	28.9.16 - 28.12.16	CSIR, CERI

Parimala Raman	30.9.16 - 31.12.16	Energy University, Atlanta, USA
Sk. Monowar Hosseir	1.10.16 - 16.10.16	Aliah University, Kolkata
Md. Mehedi Kaleu	1.10.16 - 16.10.16	Aliah University, Kolkata
Amit Dutta	2.10.16 - 4.10.16	IIT, Kanpur
Infant Gabriel B	3.10.16 - 2.1.17	
Santhosh Kumar S	4.10.16 - 12.10.16	IISER, Trivandrum
Samir Kunkri	5.10.16 - 24.10.16	Mahadevananda Mahavidyalaya, Kolkata
Sudhara Rani	6.10.16 - 18.10.16	IISER, Tirupati
Didier Caucal	8.10.16 - 19.10.16	UPEM
Marion Legonidel	8.10.16 - 15.10.16	Univ. la Reunion
Alexandre Mansord	8.10.16 - 19.10.16	Univ. la Reunion
Antone Meyer	8.10.16 - 18.10.16	Univ. Paris east
Christian Dehomme	8.10.16 - 19.10.16	Univ la Reunion
Sachin Subhash Sharma	12.10.16 - 27.10.16	IIT, Kanpur
Prosenjit Singha Deo	13.10.16 - 20.10.16	SNBNCBS, Kolkata
Saibal Ray	14.10.16 - 6.11.16	Govt. College of Engineering Ceramic Technology, Kolkata
Swarup Proia	15.10.16 - 30.10.16	University of Calcutta, Kolkatta
Lakshmi S. Mohan	15.10.16 - 31.10.16	PRL, Ahmedabad
Chethan Krishna	16.10.16 - 18.10.16	IISc, Bangalore

Sunil Simon	17.10.16 - 20.10.16	IIT, Kanpur
Krishnaswamy S.	17.10.16 - 21.10.16	Madurai
Sayan Biswas	17.10.16 - 19.10.16	Centre of Astroparticle Physics Space Sciences
Ronald Benjamia	18.10.16 - 21.10.16	Heinrich Heine University, Dusseldorf, Germany
Vijayalakshmi M.	18.10.16 - 23.10.16	IBAB, Bangalore
Manickam M.	22.10.16 - 31.10.16	KSOM, Kozhikode, Kerala
Saibam Shyam Chand Singh	22.10.16 - 26.10.16	Jamia millva islamia, New delhi
Preeti Raman	24.10.16 - 1.11.16	IIT, Mumbai
Sourav Tarafder	25.10.16 - 31.10.16	St. Xavier College, Kolkata
Usha K. Sangale	29.10.16 - 27.11.16	SRTM University, Nanded
Raghavram P.	1.11.16 - 23.11.16	IISc, Bangalore
Jayanth J.	1.11.16 - 31.1.17	IIT, Roorkee
Ragavendran K.	1.11.16 - 31.1.17	SINP
Abhiram Soori	2.11.16 - 4.11.16	ICTC, Bangalore
Shambadeb Basu	3.11.16 - 9.11.16	CES, IISC
Balasubramanian K. N	3.11.16 - 3.12.16	HRI, Allahabad
Sathish Kumar P.	4.11.16 - 4.2.17	University of Madras
Saemen Basay	7.11.16 - 28.1.16	SISSA, Trieste

Mamta Balodi	9.11.16 - 19.11.16	Lucknow
Gyan Prakash	10.11.16 - 18.11.16	HRI, Allahabad
Grace Cheng Loi	13.11.16 - 19.11.16	IISc, Bangalore
Parongana Sena	15.11.16 - 19.11.16	University of Calcutta
Kiran Rajashekariah	16.11.16 - 16.2.17	Oxford University, Chennai
Krishnaswamy S.	18.11.16 - 25.11.16	MKU Madurai
Aninda Sinha	23.11.16 - 24.11.16	IISC, Bangalore
Haridass N.D.	23.11.16 - 2.12.16	TIFR
Tanmoy Sarkar	27.11.16 - 10.12.16	IIT, Mumbai
Philippan	27.11.16 - 15.12.16	CNRS, Paris
Usha Devi A.R.	27.11.16 - 4.12.16	Bangalore University
Saradha Natarajan	28.11.16 - 4.12.16	TIFR, Mumbai
Vishwas V	28.11.16 - 29.11.16	George Town University, Washington, DC, USA
Shruti Dogra	28.11.16 - 28.2.17	IISER, Mohali
Kenita Mona L	28.11.16 - 15.2.17	PSGR Krishnammal College, Coimbatore
Rupali S Talole	30.11.16 - 4.12.16	RTM Nagpur University, Nagpur
Rupali Laxman Saxone	30.11.16 - 4.12.16	University of Pune, Pune
Hashish Shivakumar	1.12.16 - 30.4.17	Anna University, Chennai

Andreas Krebs	4.12.16 - 18.12.16	University of Tubingen, Germany
Abhishek M. Iyer	4.12.16 - 9.12.16	TIFR, Mumbai
Rakesh Tibrewala	5.12.16 - 11.12.16	Lamiit, Jaipur
Bikas Chandra Paul	5.12.16 - 19.12.16	North Bengal University, Darjeeling
Arnab Bandyopadhyay	5.12.16 - 7.12.16	University of Kansas, USA
Sunjeet Jena	6.12.16 - 2.1.17	IIT, Bhuvaneswar
Sachin Gautam	6.12.16 - 14.12.16	Perimeter Institute
Xavier Viennot	8.12.16 - 13.12.16	CNRS France
Karthikeyan B.S.	8.12.16 - 9.12.16	Bharathidassan University, Trichy
Srushti Goyal	9.12.16 - 7.1.17	IISER, Kolkatta
Balasubramanian K.M.	9.12.16 - 9.1.17	HRI, Allahabad
Aritre Banik	9.12.16 - 18.12.16	IIT, Jodhpur
Meirav Zehari	9.12.16 - 24.12.16	University of Bergen, Norway
Krishnaswamy	10.12.16 - 19.12.16	Madurai
Hans Van Ditmarsch	13.12.16 - 2.1.17	Loria, Vandoeuure France
Preeti Raman	14.12.16 - 30.12.16	IIT, Mumbai
Mathangi Sundarajan	15.12.16 - 14.4.17	Sri Ramachandra University,Porur, Chennai
Anurag Tripathi	15.12.16 - 28.12.16	IIT Hyderabad

Dipanjan Ghosh	16.12.16 - 15.1.17	Jadavpur University, Kolkata
Mridupawan Deka	17.12.16 - 17.1.16	Joint Institute for Nuclear Research, Dubna
Tanmoy Biswas	18.12.16 - 31.1.17	IISER, Kolkatta
Mudit Rai	18.12.16 - 25.12.16	IIT, Mumbai
Umang Mehta	18.12.16 - 24.12.16	IIT, Mumbai
Indu Satija	18.12.16 - 25.12.16	Univ. Fairfox, USA
Ignacio Ojea Quintana	18.12.16 - 21.12.16	Columbia University, New York, USA
Arpan Das	19.12.16 - 21.12.16	IOP, Bhuvaneswar
Ahmad Mubarak	19.12.16 - 18.1.17	Loyola College
Hari Krishnan S	19.12.16 - 18.1.17	Loyola College
Koushik V	19.12.16 - 18.1.17	Loyola College
Nige Higson	19.12.16 - 29.12.16	Penn State University, USA
Sayantan Sharma	19.12.16 - 23.12.16	Brookhaven national Lab, N.Y., U.S.A
Gopal Chandra Shit	19.12.16 - 7.1.17	Javdarpur University, Kolkatta
Praveen Kumar R	21.12.16 - 30.4.17	Bharathidasan University, Trichy
Sunil Singh Shah	22.12.16 - 9.1.17	Glacier Project, Garhwal
Munshi R.	22.12.16 - 23.12.16	ISI, Kolkata
Swarup Poria	22.12.16 - 2.1.17	University of Calcutta, Kolkata
Sudarkodi Venkatesan	23.12.16 - 7.1.17	IIT, Kanpur

Nitin Saurabh	25.12.16 - 9.1.17	Charles University, Prague, Czech Republic
Priyadharshini K.	26.12.16 - 30.4.17	Bharathidasan University, Trichy
Roshani Narasimhan	26.12.16 - 30.4.17	Institute of Information, Gujarat
Maria Quadeer	26.12.16 - 25.3.17	IIT Madras, Chennai
Shiv Chaitanya K.V.S.	26.12.16 - 30.12.16	BITS, Hyderabad
Mrinal kanti Das	26.12.16 - 29.12.16	ISI, Kolkatta
Gyan Prakash	26.12.16 - 6.1.17	HRI, Allahabad
Ravi Kunjwal	26.12.16 - 5.1.17	Perimeter Institute, Canada
Poulose Poulose	27.12.16 - 29.12.16	IIT, Guwahati
Malay Banerjee	27.12.16 - 31.12.16	IIT, Kanpur
Bhaduri R.K.	27.12.16 - 14.1.17	McMaster University, Canada
Srinivasa Vardhan	27.12.16 - 7.2.17	New york University
Tushar Sharma	28.12.16 - 10.1.17	Department of Geology, Uttarkhand
Sourav Chatterjee	28.12.16 - 30.12.16	Northwestern University
Srinivasa Rao Satti	29.12.16 - 26.1.17	Seoul National University, South Korea
Sasidevan V	29.12.16 - 30.12.16	Frankturt Institute for Adv. Institute, Germany
Arindam Banerjee	29.12.16 - 30.12.16	Purdue University
Yuri Bilu	30.12.16 - 21.1.17	University of Bordeaux, France

Reefali S Talole	1.1.17 - 8.1.17	RTM Nagpur University, Nagpur
Prabal Paul	1.1.17 - 15.1.17	Biola Institute of technology Sciences, Goa
Mohan N. Chintamani	1.1.17 - 15.1.17	University of Hyderabad
Rohan Raghava Poojary	1.1.17 - 23.1.17	TIFR, Mumbai
Shoney T.N.	2.1.17 - 9.1.17	NIAS, Bangalore
Rahul Roy	2.1.17 - 7.1.17	ISI, Delhi
Xavier Viennot	2.1.17 - 19.3.17	CNRS
Seungbun Jo	3.1.17 - 25.1.17	University of Siegen, Germany
Fahad Panolan	3.1.17 - 14.1.17	University of Bergan, Norway
Naveen S Prabhakar	4.1.17 - 11.1.17	Stony Book university, USA
Dehouillers Jean Marc	4.1.17 - 22.1.17	Bordeaux INP
Khadekar G.S.	4.1.17 - 8.1.17	RTM Nagpur University, Nagpur
Tushar Sharma	5.1.17 - 7.1.17	Kasturba Medical College, Manipal
Matthias Brack	5.1.17 - 27.1.17	University of Reginsburg
Saumia P.S.	5.1.17 - 24.1.17	Joint Institute for Nuclear Research, Dubna
Pruisken A.M.M.	5.1.17 - 18.2.17	University of Amsterdam, Netherlands
Jean Marc Deshouillers	6.1.17 - 14.1.17	University of Bordeaus, France
Yendrembam Chaoba Devi	8.1.17 - 7.4.17	SNBNCBS, Kolkata

Rajesh kumar Gupta	8.1.17 - 11.1.17	King's college London
Deshpande N.G.	9.1.17 - 14.1.17	University of Oregan Eugene, USA
Roy D.P.	9.1.17 - 22.1.17	HBCSE
Bithika Jain	09.1.17 - 14.1.17	South Korea
Manas Agarwal	10.1.17 - 20.4.17	IIT, Roorkee
Deeptanshu Singh	10.1.17 - 15.4.17	IIT, Roorkee
Priyotosh Bandyopadhyay	10.1.17 - 13.1.17	IIT, Hyderabad
Satyajit Seth	10.1.17 - 12.1.17	Germany
Bhaswar Ghosh	11.1.17 - 11.4.17	Marburg
Lakshmi S Mohan	11.1.17 - 29.1.17	PRL Ahmedabad
Sanal M	15.1.17 - 31.5.17	University of Kerala
Bharath Chand R P	15.1.17 - 31.5.17	University of Kerala
Rudra Sekhar Manna	15.1.17 - 17.1.17	Germany
Asweel Ahmed	16.1.17 - 15.4.17	Dept. of Physics, Pondicherry Unviersity
Samyukta Ramnath	16.1.17 - 15.5.17	Bits, Palani, Goa
Anindya S	16.1.17 - 22.1.17	Chayrabarbi, IIT, Ahmedabad
Bhargav Vaidhya	16.1.17 - 18.1.17	University of Torino, Italy
Ajit Iqbal Singh	19.1.17 - 21.1.17	INSA
Rukmini Dey	22.1.17 - 28.1.17	TIFR, Bangalore

Ferit Ozturk	23.1.17 - 27.1.17	Bagacici University, Istanbul, Turkey
Subhasree Pradhan	24.1.17 - 29.1.17	IIT, Kharagpur
Bocherer S.	26.1.17 - 28.1.17	University of Mannheim, Germany
Loganayagam R.	29.1.17 - 4.2.17	TIFR, Bangalore
Anil Shukla	30.1.17 - 11.2.17	IIT, Kanpur
Kannan Moudgalya	1.2.17 - 2.2.17	IIT, Mumbai
Manas Kulkarni	1.2.17 - 3.2.17	TIFR, Bangalore
Gautam Sekar	1.2.17 - 30.4.17	
Krishanu Deyasi	1.2.17 - 31.3.17	IISER, Kolkatta
Krishna Rao Ragavendran	1.2.17 - 30.4.17	SINP
Swagato Sanyal	3.2.17 - 8.2.17	TIFR NUS
Narmada Sambaturu	8.2.17 - 9.2.17	IISc, Bangalore
Nandita Jayaraj	10.2.17 - 11.2.17	Cochin
Kumari Saloni	11.2.17 - 14.4.17	IIT, Guwahati
Arvind Ayyer	12.2.17 - 15.2.17	IISc, Bangalore
Krishnaswamy S.	13.2.17 - 28.2.17	Madurai
Shibu Saw	15.2.17 - 14.5.17	University of Sydney
Lalit Kumar Saini	18.2.17 - 26.3.17	Delhi University

Trisha Nath	19.2.17 - 25.2.17	Gottingen University
Asmita Mukherjee	20.2.17 - 22.2.17	IIT Bombay
Upayan Baul	20.2.17 - 23.2.17	University of Texas Austin, USA
Taushif Ahmed	20.2.17 - 24.2.17	Germany
Usha K Sangale	21.2.17 - 23.2.17	SRTM University, Nanded
Balaji Raman	21.2.17 - 23.2.17	Vellore
Gaurav Narain	21.2.17 - 6.3.17	China, Beijing
Juergen Horbach	22.2.17 - 27.2.17	Dusselurf
Manickam	23.02.17 - 10.3.17	KSOM Kozhikode
Babodh Shukla	26.2.17 - 18.3.17	NEHU, Shillong
Vikas Shivani	27.2.17 - 28.2.17	Imperial College, London
Samrith Ram	27.2.17 - 10.3.17	HRI, Allahabad
Jayanth J.	1.3.17 - 31.5.17	IIT, Roorkee
Sumit Giri	5.3.17 - 7.3.17	Tel Aviv Univ.
Satyanarayan	5.3.17 - 12.3.17	Mukhopadhyay Univ
Mayuresh Surmis	6.3.17 - 10.3.17	RAC, Ooty
Bidya Binay Karak	10.3.17 - 14.3.17	NCAR, CO, USA
Maria Quadeer	11.3.17 - 25.3.17	IIT, Madras
Rishi Vyas	12.3.17 - 17.3.17	Israel

Ramakrishnan B.	13.3.17 - 17.3.17	HRI Allahabad
Sibasish Banerjee	13.3.17 - 20.3.17	France
Anirban Basu	19.3.17 - 29.3.17	HRI Allahabad
Grace Lhaineiyam	19.3.17 - 26.3.17	IISc
Haroon Kalam	22.3.17 - 25.3.17	ICGEB, Aruna Asaf Ali Marg, New Delhi
Kushal A.	22.3.17 - 24.3.17	IISc, Bangalore
Prashanth M. Gade	22.3.17 - 27.3.17	Nagpur university
Chamakuri Nagaiah	22.3.17 - 25.3.17	MEC Hyderabad
Stevon Spallone	23.3.17 - 29.3.17	IISER Pune
Sengupta J.	24.3.17 - 31.3.17	TIFR Mumbai
Soumyabrata Chatterjee	26.3.17 - 29.3.17	IOP, Bhubaneswar
Subinay Dasgupta	26.3.17 - 1.4.17	University of Calcutta
Nadeesh Garg	27.3.17 - 31.3.17	IIT, Delhi
Richa Tripathi	28.3.17 - 9.4.17	Gandhinagar, Gujarat
Anarta Roy	28.3.17 - 15.5.17	IISER, Bhopal
Subhasish Mandal	28.3.17 - 30.3.17	USA
Manuel Jesus Perez	31.3.17 - 8.4.17	ICMAT, Madrid, Spain
Luis Angel Caluo Pascual	31.3.17 - 8.4.17	ICMAT, Madrid, Spain

Chapter 6

Infrastructure

6.1 Computer Facilities

Enhancement of Computer Facility during 2016-17

- New Laptops were issued to newly joined faculty and also to those faculty who requested for replacement of laptops which are older than 4 years. The following Apple Macbook Pro, Apple iPad Pro Dell Latitudes Lenovo Thinkpad laptops are distributed.

- The existing Mathematica Software 25 network licenses upgraded to version 11.

- 85" Dell Optiplex desktops which includes 25 micro-desktops replaced with the desktops of obsolete and older than 7 years.

- The various compute servers of Dual Socket CPU based 20 servers and Multi-Integrated-Core based 4 servers to meet the demand of the computing user groups with additional accessories of IB switch/cards, RAMs, SSD are integrated into the existing HPC facility.

- Dell Servers with various capacities were installed to manage the following services, PoS Canteen billing system through OpenERP(ODOO), CUPS server for printers, WiFi portal access, Tally IMSc Accounting-Payroll, user storage & backup, LDAP authentication and Mail delivery.

- 27" Dell LED Monitor was purchased for Dr. Saket Saurab for his project activities

- Internet bandwidth upgraded from 34 Mbps to 40 Mbps through the service provider M/s. Bharti Airtel

- Additional LAN Switches with Network Management S/W are installed in the campus

- A Smart Television 48" LED(Sony) included in the multipurpose Integrated Media Room facility to handle the Video Conferences, Skype meetings, etc.,

- The IMSc Canteen billing system was newly implemented with the OpenERP(ODOO) based Point-of-Sale module customized by in-house team. In this regard we have deployed Multi-touch LED displays(3), All-in-One multi-touch desktops(2), which are enabled with RFID card readers(3). All the IMSc members(in-roll) can utilize the canteen transaction through credit system by swiping their IMSc-ID cards and other

visitors can utilise the facility over top-up cards on advance payments. Walk-in users can use by purchasing coupons. The initiative of cash-less transaction in the billing counter was very much successful. Next move will be to make the complete office automation using OpenERP(ODOO).

Activities : Dr.G.Subramoniam, Scientific Officer-F participated in the Nodal Officers meet at ECIL, Hyderabad during Sep 23-24, 2016 organised by ECIL & ANUNET-Mumbai.

Mr.B.Raveendra Reddy, Scientific Officer-F attended the Nodal Officers meeting on CISAG, DAE, Mumbai during 2016

6.2 The Library

The Institute Library holds a total collection of 72885 books and bound periodicals as on March 31, 2017. This includes an addition of 785 volumes during the current year April 2016 - March 2017. The NBHM has recognized this Institute library as Regional Library for Mathematics. An average of about 4000 external users in a year from colleges, universities and research institutions from different parts of the country make use of the library facilities for their academic and research information needs.

The library has a well balanced collection of both print and online journals on the major subject areas of each of the four disciplines such as Computational Biology, Mathematics, Theoretical Computer Science and Theoretical Physics. The library subscribes to over 350 national and international journals.

The library has access to over 3500+ online journals from major publishers such as Elsevier, American Mathematical Society, American Physical Society, Springer Verlag, World Scientific, Institute of Physics, Wiley, etc.

Library has also access to Nature online, Science Online, ACM Digital Library, SIAM Journals Archive, Duke Mathematical Journal, and JSTOR Full digital archive. It also has a perpetual online access to backfile collection of journals contents from Volume 1 from some of the major publishers like Elesevier under DAE consortium, Springer, World Scientific, Wiley, deGruyter, Cambridge University Press, Turpion, IOP Publishing and Annual Reviews Electronic Backvolume collection.

Access to online journals is restricted to members of the Institute.

Services

Apart from developing the collection, the library offers reprographic and inter library loan services. Using Libsys software on a linux platform, the library catalogue has been computerized and made available online to the readers both within and outside the Institute Campus. Online request for acquisition of books and status of borrowings have also been enabled using Libsys. Library has implemented RFID based system for self check-in and checkout of library materials. The library also provides effective 24x7 access to its resources with the help of RFID enabled access control system, perhaps the only library of this kind in the country.

Library has a website dedicated to host all the electronic information resources and to provide information about the library and its services.

Library is a member of DAE Libraries Consortium that subscribes to SCIENCE DIRECT SERVICE of Elsevier.

Library is also coordinating the MathSciNet consortium which provides online access to MathSciNet for participating institutions in the southern region.

Library is an institutional member of AMS, MALIBNET, CURRENT SCIENCE Association, and IAPT.

Acknowledgment

6.3   Hostel, Guest House, Recreation Facilities

The students hostel has 90 rooms (including a few double occupancy rooms) and can accommodate 97 students and currently operates to its full capacity. The rest of the students are accommodated in off campus hostel leased by the institute. The hostel building is equipped with TV halls, music room, laundry zones and news paper reading lounges on each floor. Currently the guest house has a total of 47 fully furnished units of rooms including 24 units of flat-lets (with Kitchen, refrigerator and cooking stove etc). A few students including married students, Post-doctoral fellows (married & single) and academic visitors of the institute are accommodated in the flat-lets of the guest house.

The institute has two well equipped Canteens one each for general use and students mess where breakfast, lunch and dinner including the evening snacks are served on all days of the week.

The Institute has a large sports complex with modern gymnasium, Indoor badminton court, table-tennis tables and other Indoor games. The Institute also has a mini football ground and tennis court for the use of members of the institute.

Management's love of nature and aesthetics is reflected in the pleasant greenery and harmonious landscaping of the institute campus.