MATSCIENCE

INSTITUTE OF MATHEMATICAL SCIENCES
MADRAS, INDIA.

THIRTEENTH ANNIVERSARY

ANNUAL REPORT 1974

The Institute of Mathematical Sciences

Madras

"The pursuit of science is at its best
when it is a part of a way of life"

Annual Report 1974

Patron:

Mr. C. Subramaniam

Union Minister for Finance, Government of India

Chairman of the Board of Governors:

Mr. V. R. Nedunchezhiyan

Minister for Education, Government of Tamil Nadu

Director:

Professor Alladi Ramakrishnan

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6.	Professor K. R. Unni Permanent Member The Institute of Mathematical Sciences Madras.	Member

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Professor Alladi Ramakrishnan Director The Institute of Mathematical Sciences Madras.	Member

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Professor Alladi Ramakrishnan Director The Institute of Mathematical Sciences Madras.	Member
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Dr. M. S. Narasimhan School of Mathematics Tata Institute of Fundamental Research Bombay.	Member
Dr. V. C. Kulandaiswamy Director of Technical Education Guindy, Madras.	Member

Academic Council

Professor Alladi Ramakrishnan Director Institute of Mathematical Sciences Madras-600020.	Chairman
Professor R. Vasudevan Institute of Mathematical Sciences Madras-600020.	Member
Professor K. R. Unni Institute of Mathematical Sciences Madras-600020.	Member
Dr. N. R. Ranganathan (Associate Professor) Institute of Mathematical Sciences Madras-600020.	Member
Dr. T. S. Santhanam (Associate Professor) Institute of Mathematical Sciences Madras-600020.	Member

General Information

Aims and Objects

1. To create and provide an atmosphere and environment suitable for creative work and the pursuit of knowledge and advanced learning in the mathematical sciences for their own sake.

2. To promote and conduct research and original investigation of fundamental sciences in general with particular emphasis on Mathematics, Applied Mathematics, Theoretical Physics and Astrophysics.

3. To foster a rigorous mathematical discipline, to stimulate a zest for creative work and cultivate a spirit of intellectual collaboration among academic workers in pure and applied branches of science.

4. To arrange lectures, meetings, seminars and symposia in pursuance of its academic work for the diffusion of scientific knowledge.

5. To invite scientists in India and abroad actively engaged in creative work to deliver lectures and participate in academic activity.

Academic Activities

The primary activity of the Institute is creative research in Mathematical Sciences. In pursuit of the objectives of the Institute weekly seminars as well as series of lectures on various topics of interest, both by visiting scientists and the academic staff of the Institute are held.

To commemorate the inauguration of the Institute an anniversary Symposium is held in January for which scientists from India and abroad are invited to deliver one hour addresses summarising their original work on recent advances in various branches of Mathematical Sciences. The Institute also organises a Seminar in Analysis.

Academic Staff

The Academic Staff consists of Senior Professors, Professors, Associate Professors, Assistant Professors, Visiting Professors, Visiting Scientists, Research Fellows and Research Trainees.

Ph.D. Programme

Facilities are available for postgraduate students to work for Ph.D. degree under the guidance of the academic staff of the Institute in various faculties. Senior and Junior research fellowships are awarded by the Institute.

The Standing Committee of the Inter-University Board of India and Ceylon at its meeting held in February 28, 1967 adopted a resolution recognising the Institute as a suitable centre for research work. In view of the above resolution the Institute is now recognised by the various Indian Universities as a centre for research for the doctorate degree in Theoretical Physics and Mathematics.

Publications

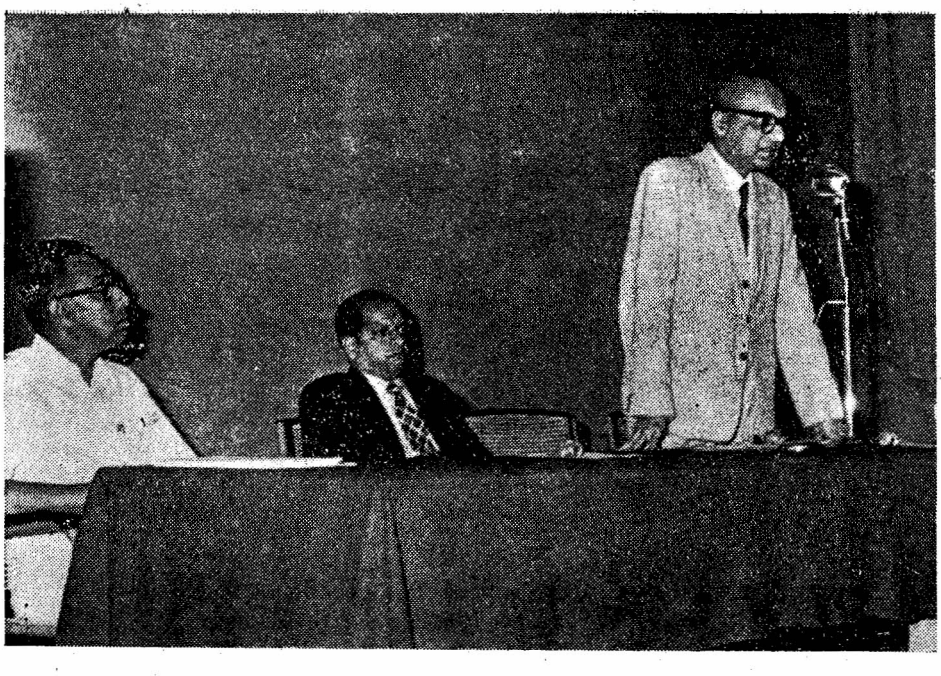
1. RESEARCH PAPERS (Preprints and reprints are available on request)

2. MATSCIENCE REPORTS based on the lecture courses delivered at the Institute both by visiting scientists and academic staff (Price Rs. 5/- within India or U. S. $ 1-00 outside India).

3. PROCEEDINGS OF THE SEMINAR IN ANALYSIS is based on lecture courses delivered at the Institute by visiting scientists or members of the Institute during the Annual Seminar in Analysis (Price Rs. 5/- within India or U. S. $ 1-00 outside India).

4. PROCEEDINGS OF THE CONFERENCE ON CLIFFORD ALGEBRA, ITS GENERALIZATION AND APPLICATIONS, Ooty, 1971. (Price Rs. 10/- within INDIA or U.S. $ 2.00 outside India).

Hon'ble Dr. V. R. Nedunchezhiyan inaugurating the Twelfth Anniversary Symposium.
(L to R) Prof. Alladi Ramakrishnan, Director, Hon'ble Education Minister
and Prof. George Marsaglia, Director, School of Computer Science,
Mc Gill University, Montreal.



Prof. F. J. Noronha, Bangalore University, presiding over the inaugural function of the Sixth Seminar in Analysis, held at Bangalore. (L to R) Prof. K. Sivasubramaniam, Prof. K. R. Unni and Prof. F. J. Noronha.

News of the Institute

Twelfth Anniversary Symposium

The TWELFTH Anniversary Symposium of the Institute was held from the 10th to the 12th January 1974. The symposium entitled 'Computational methods and numerical analysis' was inaugurated by Hon'ble Dr. V. R. Nedunchezhiyan, Minister for Education, Government of Tamil Nadu and Chairman of the Board of Governors of the Institute. Professor George Marsaglia, Director, School of Computer Science, McGill University, Canada, delivered the first lecture of the symposinm.

Lectures in the syposium were delivered by Professors Alladi Ramakrishnan, R. Vasudevan, K. R. Unni, N. R. Ranganathan. K. H. Mariwalla, V. Radhakrishuan, K. Srinivasa Rao, Drs. R. Sridhar, Vimala Walter, S. K. Sen, Messrs. G. N. Keshava Murthy, M. R. Subrahmanya, K. Viswanathan, A. S. Adikesavan and Krishnaswami Alladi.

Sixth Seminar in Analysis

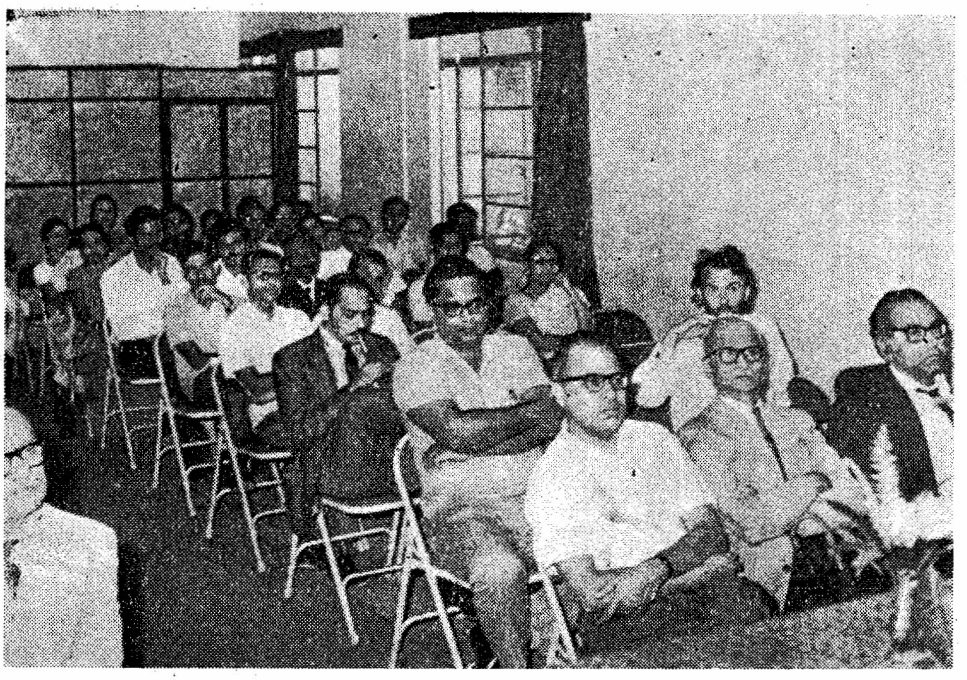
A two week Matscience Conference entitled 'Sixth Seminar in Analvsis' was inaugurated by Professor K. R. Unni at Bangalore on the 11th February, 1974. Professor F. J. Noronha of the Bangalore University presided over the function. More than 25 participants from various institutions all over India participated in the Conference. The proceedings of the conference are in the process of being published as a Matscience Report.

Conference on Mathematics in Medicine and Biology

The conference on Mathematics in Medicine and Biology was held from the 21st to the 23rd February 1974 at Bangalore. The conference was inaugurated by Professor Alladi Ramakrishnan, Director, Matecience. This conference was the first of its kind in our country of an interdisciplnary nature. Mathematicians and physical scientists of various backgrounds came together with practising doctors with a view to define and explore areas of clinical interest where application of sophisticated mathematical and physical concepts can be of vital interest in diagnosis as well as therapy. About thirty participants from all over India including eminent doctors in various fields participated in the conference and about 25 of them presented their papers. There was a lot of exchange of ideas and information between the practising neurosurgeons and the physical scientists who took part in the conference, The proceedings of the conference are in the process of being published as a Matscience Report.

Summer School on Green's Functions

A summer school for a week devoted to the study of Green's functions in theoretical physics was inaugurated by Professor Alladi Ramakrishnan, Director of the Institute, on 22nd September 1974 at Mysore. More than 45 participants consisting of post-graduate teachers, research students and bright graduate students from various institutions and universities all over India attended the summer school. A special feature of this summer school was the participation of undergraduates and pre-doctoral students who have shown interest in creative work. They were given an opportunity to discuss the research problems in informal seminars supplementary to the main programme.



A section of the delegates to the Conference on Mathematics in Medicine and Biology, held at Bangalore.

Another section of the delegates to the Conference on Mathematics in Medicine and Biology.

Academic Staff

Professor Alladi Ramakrishnan — *Director*
Professor R. Vasudevan
Professor K. R. Unni
Dr. N. R. Ranganathan
Dr. T. S. Santhanam
Dr. V. Radhakrishnan
Dr. K. H. Mariwalla
Dr. K. Srinivasa Rao
Prof. K. Sivasubramaniam (Tamil Nadu Government scholar-on deputation)

Senior Research Fellows :

Dr. R. Sridhar*
Mr. M. R. Subrahmanya
Mr. G. N. Keshavamurthy
Dr. Vimala Walter
Mr. A. R. Tekumalla
Mr. R. Jagannathan

Junior Research Fellows :

Mr. A. Vijayakumar
Mr. K. Venkatesh
Mrs. Kasturi Ramanath
Miss S. Poornima
Miss V. Indumathy

Research Trainees :

Mr. H. N. V. Dutt
Mr. A. K. Gangopadhyaya
Mr. G. S. N. Murthy*
Mr. C. V. Deshpande*
Mr. H. Chandrasekar*
Miss. Indra**

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* Persons who have completed their tenure at the Institute
**National Science Talent Scholar.

Invitations and Delegations

In response to invitations from various research institutions, Professor Alladi Ramakrishnan, Director of the Institute, gave lectures at the following research Centres in the United States on his recent work during May–June, 1974:

Universities of California at Irvine and Riverside; Florida State University, Tallahassee; Ohio State University, Columbus, Ohio; U. S. Naval Research Laboratory, Washington D. C.; Oak Ridge National Laboratory, Tennessee; National Bureau of Standards, Washington; San Jose State University, San Jose; University of Texas at Dallas, Texas. He also visited the University of Manitoba, Winnipeg, Canada.

He participated in the international conference on Numerical Analysis held at Dublin during 29th July – 2nd August 1974. During this tour he also visited the following research centres:

University of York, England; University of Dublin, Dublin, Ireland; International Centre for Theoretical Physics, Trieste; Theoretical Physics Division, CERN, Geneva, Switzerland.

He participated by invitation in the International Symposium (16–27 Dec. 1974) on Recent Trends of Research in Statistics organised by Indian Statistical Institute, Calcutta. He delivered the Cullis memorial lecture of Calcutta Mathematical Society. He was invited to be the Chief Guest in an International Research Symposium on Thermodynamic Equilibrium in Radiation Field in the presence of matter sponsored by S. N. Bose Institute of Physical Sciences, University of Calcutta. He delivered invited lectures in S. N. Bose Institute.

Professor R. Vasudevan organised and presented two papers in the Matscience conference on Mathematics in Medicine and Biology held in Bangalore in February 1974. Was invited to give lectures at the summer school in Biomathematics conducted by the University Grants Commission at Jadhavpur University, Calcutta in June 1974. Was invited to give lectures at the Bose Centenary Symposium in Bangalore at the Indian Institute of Science (Institute of Theoretical Studies) Bangalore. Was invited by Professor R. E. Bellman to spend four months at the Department of Electrical Engineering, University of Southern California, Los Angeles, California, U.S.A.

Professor K. R. Unni spent nine weeks at the University of Montreal at the invitation of Prof. Q. I. Rahman and seven weeks at the University of Alberta at the invitation of Prof. A. Sharma.

Professor N. R. Ranganathan participated as a delegate of Matscience in the International symposim (16–27 Dec. 1974) on Recent Trends of Research in Statistics, organised by the Indian Statistical Institute, Calcutta where in he presented a paper. He also gave invited lectures at the Applied mathematics centre, University of Calcutta, Saha Institute of Nuclear physics, Indian Association for cultivation of Science, Jadavapur, Department of Physics and Metrology, Indian Institute of Technology, Kharagpur, and Department of Physics, Visvabharathi University, Santiniketan. He was an invited lecturer to Summer Orientation Programme for Post graduate teachers organised by Presidency College, Madras.

Professor T. S. Santhanam has been invited to spend a year at the Physikalisches Institut of Wurzburg University, West Germany and three months at the International Centre for Theoretical Physics, Trieste, Italy. He gave invited lectures at the Presidency College, Madras and the American College, Madurai. He gave a seminar at the Centre for Theoretical Studies, Indian Institute of Science, Bangalore. He visited the Radio Astronomy Centre at Ooty. At the Matscience conference on 'Green's functions and applications' held in Mysore he gave a series of lectures on 'Green's functions in Particle Physics'. He is an examiner for the Post-graduate Studies in Physics of the Mysore University.

Professor K. Srinivasa Rao participated in the International Conference on 'Few-body problems in Nuclear and Particle Physics' held at the University of Laval, Quebec, Canada, in August 1974. Was visiting Scientist at the McGill University, Montreal, Canada, during September 1974 ; Post-doctoral research Fellow at the McMaster University, Hamitton, Canada, during October 1974 and Visiting Scientist at the Instituto de Fisica, Universidad de Mexico, Mexico, D. F., during November 1974. Visited and gave seminars during October–December 1974 at the following institutions in U. S. A.: University of Illinois, Urbana; Cornell University, Ithaca; Rensselaer Polytechnic Institute, Troy; University of Rochester, Rochester; The Catholic University of America, Washington, D. C.; Texas Technical University, Lubbock; University of Texas, Austin; and at the following institutions in Canada: McGill University, Montreal; McMaster University, Hamilton; Institute de physique Nucleaire, University of Montreal, Montreal; Mathematische Recherche, University of Montreal, Montreal; and at the University of Mexico Mexico, D. F.

Mr. G. N. Keshava Murthy was invited to spend a period of six months during April–September 1974 at the University of Liege, Belgium. During this period and in October 1974 he gave seminar talks and had discussions with the mathematicians at Technisch Hochsoule, Aachen ; University of York, Mathematisk Universitat, Aarhus and the University of Lausanne, Switzerland. He also participated in a week long working seminar on Random series, Convex sets and Geometry of Banach spaces held at the Mathematics Universitat, Aarhus during October 14–20 1974.

Mr. M. R. Subrahmanya participated in a course on Control theory and Topics in Functional Analysis held at the International Centre for Theoretical Physics, Trieste, Italy, during September–November 1974. He gave two lectures to the participants and discussed his work with many distinguished mathematicians like Professor Olech, Director Banach International Centre, Warsaw, Pallu de la Barrier, University of Paris VI to mention a few. Spent a week as a Visiting Scientist at the University of Gottingen at the invitation of Professor B. Brosowski and discussed about their joint work. He gave lectures at the followidg places : Lehrstuhl fur Mathematik, Technical University of Aachen ; Institut de Mathematics, University of Liege; Department of Mathematics, University of York, England.

Invited Lectures

Professor Marshall H. Stone Department of Mathematics University of Massachusetts Massachusetts, USA.	"Some unifying tendencies in mathematics"
Professor K. H. Bhatt Physical Research Laboratory Ahmedabad.	"Structure of f-p Shell Nuclei"
Dr V. S. Ramamurthy Nuclear Physics Division Bhabha Atomic Research Centre Bombay.	"On the determination of nuclear deformation potentital energy surfaces"
Professor J. Ruvalds Department of Physics University of Virginia, U.S.A.	"Excitations in Liquid Helium"
Dr. B. J. Sanderson Department of Mathematics University of Warwick, England.	"Geometric Homology"
Professor G. V. Gehlen Department of Physics University of Bonn, W. Germany.	"Amplitude zeroes in scattering and photoproduction processes"
Dr. J. Pasupathy Tata Institute of Fundamental Research, Bombay.	"Asymptotic behaviour of scattering amplitude"
Professor Dr. Klaus Bethge Heidelberg University Heidelberg, W. Germany.	"Heavy ion Physics"
Dr. Jagdeesh Bandekar Molecular Biophysics Unit Indian Institute of Science Bangalore.	1. "Structure of water I: Inter-molecular structure" 2. "Structure of water II: Intra-molecular structure"

Dr. S. Swaminathan Mathematics Department Dalhousie University Halifax, N. S., Canada.	" The approximation problem in Banach spaces "
Dr. J. C .Parikh Physical Research Laboratory Ahmedabad.	" Nature of Multiparticle spectra "
Dr. P. W. A. Dayanada Department of Mathematics University of Singapore, Singapore.	" Some models of Epidemics "
Prof. D. Kannan Department of Mathematics University of Georgia Georgia, U.S.A.	" A construction of the diffusion process "
Dr. S. C. K. Nair Physics Department Calicut University, Calicut.	" Anamolous behaviour of high-spin rotational states "
Professor John E. Lavery Department of Mathematics Tunghai University, Taiwan.	1. " Conjugate quasilinear Dirichlet and Neumann problems and a posterior error bounds ". 2. " Solution of conjugate quasilinear Dirichlet and Neumann problems with a posterior error bounds and generalisations " 3. " Recent experimental developments in general relativity "
Dr. R. Bandyopadhaya Jadavpur University Jadavpur.	1. " Magnetic Field and instability in Stars " 2. " Determination of the nuclear radius of Galaxy and pattern velocity of density-wave on the Galactic disk " 3. " Gravitational instability criterion by the method of expansion derivative" 4. " Mass outflow from the Galactic nucleus "

Professor C. Berge University of Paris Paris VI France	"Graph Theory"
Professor P. R. Krishnaiah Aerospace Research Laboratories Wright Patterson Laboratories U.S. Air Force Base, Ohio, USA.	"Multivariant Analysis"
Professor G. Kalyanpur University of Minnesota Minneapolis, U.S.A.	1. "Topics in Gaussian processes" 2. "Filtering Theory"
Mr. Krishnaswami Alladi Vivekananda College, Madras.	1. "On sets generated by Arithmetical Progressions" 2. "Tribonacci numbers and related functions" 3. "Some asymptotic formulae related to Euler's function" 4. "Moebius inversion formula" 5. "On the asymptotic distribution of functions Modulo an Integer" 6. "Diophantine Approximations" 7. "A Farey sequence of Fibonacci numbers" 8. "Approximation of irrationals with Farey Fibonacci fractions" 9. "A rapid method to form Farey Fibonacci fractions" 10. "On polynomials generated by triangular arrays" 11. "Magic squares and matrix transformations" 12. "Generalized Fibonacci probabilities" 13. "Duality among a certain class of functions" 14. "On the rational approximation of irrationals" 15. "On the distribution of functions modulo an integer"

MATSCIENCE REPORTS

Report No.	*Author*	*Title*
77	—	Proceedings of the Conference on 'Fourier Optics, Lasers and Holography', Mysore, 1971.
80	Krishnaswami Alladi	Lectures on Diophantine Approximations.
81	Alladi Ramakrishnan	Applications of the theory or stochastic processes to physical problems.

OTHER PUBLICATION

1. 'Proceedings of the International Conference on Functional Analysis and Applications', held at MATSCIENCE, Madras (1973) (Ed. by J. H. Williamson, H. G. Garnir and K. R. Unni) has been published as a Lecture Notes in Mathematics 399, Springer Verlag (1974). This contains the articles of about 50 Visiting Professors from all over the world in addition to those of members of the Institute.

Library

Books

During the year under report 837 new books including bound periodicals and lecture notes were added to the library bringing the total number of volumes to 13,180. These include many of the recent publications in pure and applied mathematics and theoretical physics.

Periodical

Exchange contacts were established with the following institutions and we started receiving the following items from them :

1.	Institute of Mathematics Academia Sinica : Nankang, Taipei, Taiwan, China	" Bulletin of the Institute of - Mathematica-Academia Sinica"
2.	Japan Academy, Ueno Park, Tokyo, Japan	" Proceedings of the Japan - Academy "
3.	Universite de Paris - Sud, Centre d'orsay Batiment, France	" Publications Mathematiques - d'orsay "

Apart from these we are regularly receiving periodicals and lecture notes from 45 institutions throughout the world in exchange.

Lecture Notes

Lecture notes of various institutions all over the world are regularly received in exchange to MATSCIENCE REPORT and SEMINAR IN ANALYSIS.

Lists Published

1. List of Preprints received in the library (issued Fortnightly).
2. List of New Additions (issued Bi-monthly.)
3. List of available MATSCIENCE REPORTS and SEMINAR IN ANALYSIS (issued yearly).
4. List of Institute Publications (Reprints & Preprints) (issued yearly).
5. List of Periodicals received in the library (issued yearly).

APPENDICES

Matscience - A Haven of Freedom*

The Institute of Mathematical Sciences or MATSCIENCE as it is well-known or the Jewel of Tamil Nad as I called it before the President of India, is the only one of its kind in our country devoted to the pursuit of mathematical sciences in all their ramifications from abstract mathematical logic to the applications of analytical methods to technology and the life sciences. In structure and constitution it is modelled on the famous Institute for Advanced Study at Princeton with accepted emphasis on creative research on international standards of excellence. Its academic staff is divided into three groups, permanent members who are full or associate professors of established reputation in their respective fields, visiting scientists providing stimulus and competition for creative thought and younger members working for their Ph.D. under the guidance of the permanent members. The Ph.D. programme is intended to bring senior scientists into close contact with the younger generation and in this sense it is an additional feature not usually present in centres for advanced learning outside the universities.

The most striking feature of the Institute is the complete freedem given to a scientist during the tenure of his work here. It is accepted as axiomatic that excellence in creative work can be achieved only when a person is able to think and work in 'enlightened leisure' with 'absolute freedom' to publish the results of his research. The relevance of research to economic development and the utilisation of mathematical methods are achieved by bringing scientists in different disciplines together rather than by prescribing, imposing, predetermining or restricting the nature of work of a creative scientist. To stimulate exchange of ideas, active workers from other centres are frequently invited to give seminars at the Institute on their research work and opportunities are afforded to members of our Institute to participate in scientific meetings at home and abroad.

To estimate its present achievements and understand the future programme we must be aware of the circumstances that led to the creation of the Institute. The stirring story of its creation is part of the annals of Indian science. I take this opportunity to recall the magic moments when the miracle happened. Till the year 1952 there was no research department in physics in the University of Madras. I had the privilege of joining as its first member in June 1952. Frequent travels during the ten years of my tenure at the University convinced me that theoretical physics should be fostered side by side with experimental work and mathematics should form the real basis for theoretical physics. Since opportunities in the university were meagre for theoretical

*Talk delivered by Professor Alladi Ramakrishnan at the All India Radio, Madras, on Friday, the 23rd August. 1974.

physics, I gathered a group of young aspirants in my family home Ekamra Nivas where we discussed current problems at informal seminars. This attracted the attention of Professors Bohr and Dirac, Bellman and Lighthill, Salam and Chandrasekhar and through a series of events each improbable as the other, the Institute was created on the 3rd January, 1962 by the Government of Madras with the support of the then Prime Minister of India, Jawaharlal Nehru and the finance minister of our State C. Subramaniam. The creation of Matscience set in motion an intellectual renaissance, the nature and magnitude of which will be realised in the years to come. We have been fortunate in rceceiving the continued support of the Government of Madras through the successive Chairmen of the Board of Governors, Subramaniam, Venkataraman and now Nedunchezhiyan. We hope the assistance of the Government of India will match the magnificent support of the State Government.

Our initial efforts for the first four years were confined to the theory of stochastic processes and the physics of elementary particles. Professor Bhabha can well be considered the father of research in stochastic theory in India and Matscience as the rightful heir to this legacy and tradition. I was initiated into stochastic theory in the year 1947 when I worked under Professor Bhabha on the famous fluctuation problem of Cosmic Radiation. The work done in association with my colleagues amounts to an extension, expansion, modification development of Bhabha's original ideas and this is the highest tribute I can pay to my most revered teacher and guide. This has naturally resulted in the creation of new techniques and methods which are finding increasing applications. In the year 1971, a summary of this work was presented at the International Conference on Point Processes at I. B. M. Yorktown Heights, New York. It is extensively quoted in text books of A. T. Bharucha-Reid (McGraw Hill), M. S. Bartlett (Cambridge), T. E. Harris (Springer Verlag) and in innumerable papers.

My distinguished colleagues Professors Vasudevan, Ranganathan and Radhakrishnan are carrying on this 'stochastic tradition' with remarkable ingenuity to a wide range of applications in statistical mechanics, solid state physics and even biology and medicine.

After the amazing triumph of Feynman's formalism of quantum electrodynamics in 1949, no one dared to attempt improvements or suggest alterations in the theory. For the first time the division of the propagator was suggested at Matscience, the new concept of Feynman patterns introduced and the mathematical consequences studied in intricate detail. Reference to this has been made by Professor Weinberg and the most recent work in the Physical Review indicates a surge of interest in these new aspects of Feynman formalism. Detailed announcements were made in a well-attended seminars at Stanford and Berkely as early as 1962, in Rochester in 1963. A summary was presented at the Capital Conference on graph theory in 1973 at Washington, D.C.

Professor Bhabha's predilection towards matrix theory is well known in scientific circles and my own interest in that subject can be traced to my association with him as early as 1974. I need only refer to the series of original papers contained in my book 'L-matrix Theory or the Grammar of Dirac Matrices'. All the papers have been reviewed in Mathematical Reviews.

The new approach to matrix theory was presented at the international conference on Numerical Analysis at Dublin this year in an invited one-hour address.

Today, the Dirac equation for the electron is the only valid equation in physics and attempts were made by Bhabha to extend such equations to other elementary particles. There are other possible extensions than that suggested by Professor Bhabha and this is included in my book on 'L-matrix theory'. This led to higher dimensional Dirac matrices, the generalized Clifford algebra and a new approach to internal quantum numbers and a generalization of the Gall-Mann-Nishijma relation. The paper on internal quantum numbers was presented at the Rutherford Centenary Conference in the year 1971 held at Christ Church, New Zealand.

The most active members of our group in high energy and nuclear physics are Professors Santhanam and Srinivasa Rao who have worked on various branches of physics — weak. electro-magnetic and strong interactions.

The contribution entitled 'Einstein — A natural completion of Newton' has appeared in the Solomon Bochner issue of the Journal of Mathematical Analysis and Applications (1973). It purports to set at rest all futile speculations regarding the existence of faster than light particles by means of a simple and elegant mathematical approach. This work was presented at the University of Texas at Dallas before accredited experts on gravitation theory.

We have an equal interest in the general theory of relativity and the fundamental principles of quantum mechanics and work in these domains is going under the direction of my eminent colleague Professor K. H. Mariwalla.

As will be seen from the above summaries, our research work is closely connected with the contributions of the eminent Indian scientists, Bhabha and Chandrasekhar, the reputed statisticians Bartlett and Kendall, the world famous Nobel Prizemen Feynman and Gell-Mann and the scientific seers of all time, Einstein and Dirac.

While working in theoretical physics, we were quite conscious of our inadequacies and well aware of the all pervasive nature of the mathematical discipline. The preamble to the constitution of our Institute puts unambiguous

emphasis on the development of mathematical sciences in the widest possible range. In January 1966, a significant beginning was made in pure mathematics in a spirit so well expressed by Professor Marshall H. Stone the mathematician's attitude to other disciplines such as physics is something like. "I try to help every one but I have also my own concerns".

Professor Unni is our leading mathematician and with singleness of purpose he devoted himself to the building of the mathematics group with the initial impetus given to him by Professor Hayman, a visiting professor at Matscience in 1966. Unni's main interest is in functional analysis but he is orienting the future programme in our Institute so that it can play a very important role in the applications of mathematical sciences to economic and social needs retaining its identity as an international centre in functional analysis. The success of the International Conference in January 1973 through the active participation of over sixty mathematicians from over twenty countries is the highest tribute which the worldwide mathematical community has paid to our country in general and Matscience in particular.

The students of Matscience are finding easy access to the great centres of learning after obtaining their Ph.D. degree. Our academic staff is in close contact with about 200 research institutes abroad and with more than 300 scientists of outstanding eminence the world over. It is with justifiable pride that we can look back on the achievements of the Institute for the past twelve years.

We look forward to the future with unfailing faith in the mathematical talents of the rising generation. We cannot promise them affluence or soft comforts or pleasant methods of acquisition of worldly goods. What we can offer are, an open window to let in and out the vital breezes of new ideas, a table and a blackboard for serious work, freedom from interference in contemplative thought, a ready access to a well equipped library and above all, stimulating contact with their compeers all over the world.

These are attractions enough to make the mathematician's career worth pursuing despite modest salaries and meagre benefits. We hope the most gifted minds of our country are lured to this enchanting world of numbers and functions, algebraic or analytic, limits and approximations, rational or irrational.

Welcome to MATSCIENCE – the haven of freedom.

Prof. Alladi Ramakrishnan
Director MATSCIENCE, Madras-20.

By Courtesy : All India Radio, Madras

LIST OF PUBLICATIONS

OF

Professor ALLADI RAMAKRISHNAN

Monographs

1. Probability and stochastic processes.
(Handbuch der Physik, V. 3, Springer-Verlag, pp. 524–651, 1959)

2. Elementary Particles and Cosmic Rays.
(Pergamon Press, 580 p. 1962)

3. L–Matrix Theory or The Grammar of Dirac Matrices.
(Tata McGraw-Hill, Delhi, 1972)

Astrophysics

1. On an integral equation of Chandrasekhar and Munch.
(Astrophysical Jour. **115**, 141, 1952)

2. A stochastic model of a fluctuating density field - I.
(Astrophysical Jour. **119**, 443, 1954)

3. A stochastic model of a fluctuating density field - II.
(Astrophysical Jour. **119**, 682, 1954)

4. ——— (with P. M. Mathews)
On the solution of an integral equation of Chandrasekhar and Munch.
(Astrophysical Jour. **119**, 81, 1954)

5. On stellar statistics.
(Astrophysical Jour. **122**, 24, 1955)

6. ——— (with S. K. Srinivasan)
Correlation problems in the study of the brightness of the milky way.
(Astrophysical Jour. **123**, 479, 1956)

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i. Member, Editorial Board of Journal of Mathematical and Physical Sciences (an I. I. T. Journal) Madras.

ii. Associate Editor of the International Journal of Mathematical Biosciences.

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3. Remarks on cancellation of Schwinger and Sea - Gull terms (with K. Venkatesan).
4. On magnetic translation groups and Generalized Clifford Groups (with R. Jagannathan), (under preparation).
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7. On commuting quaternion structures in Clifford algebra (with R. Jagannathan), (under preparation).
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Professor T S. SANTHANAM

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