Titles and abstracts for SunderFest 2012

K.B. Sinha

On the Koplienko Trace Formula and Beyond

Abstract : Koplienko extended the Krein's formula on the trace of the difference of suitable functions of a self-adjoint operator and of its trace-class perturbation to the next order for the bounded case. Here a new proof, using a finite-dimensional approximation of the given operators, for both the bounded and for unbounded cases are discussed.

Krishna Maddaly

Spectrum and statistics for random operators

Abstract: In this talk we present some questions and results from the theory of random Schroedinger operators involving their spectra and spectral statistics.

Rajeeva Karandikar

Positive conservative semigroups and Markov processes

Abstract: Semigroups and generators have played an important role in the development of the theory of Markov Processes. In this talk, we will discuss this connection and the significant role played by Martingale problems in this framework- with the hope that experts on Quantum Probability and / or Free probability can explore similar connections in their respective theories.

R. Srinivasan

E_0-semigroups on type II_1 factors.

Abstract: We present two works related to the theory of E_0-semigroups on II_1 factors. One is related to computing invariants such as Gauge group, 'multi-units' and the problem of showing some families of E_0-semigroups to be mutually non cocycle conjugate. The other work is related to defining a dual E_0-semigroup corresponding to an E_0-semigroup on II_1 factor M, and extending it to an E_0-semigroups on $B(L^2(M))$. First is a joint work with Oliver T. Margetts and the second is a joint work with V.S.Sunder and Panchugopal Bikram.

M. G. Nadkarni

Cantor's ideas on measure and integral

Abstract: Bourbaki's Outline of History of Mathematics says that 'Cantor Inaugurated Measure Theory'. The purpose of my talk is to discuss this inauguration and show how well he did it.

B. V. Rao

Large Deviations

Abstract: In this talk we give a brief introduction to the theory of Large Deviations. We introduce the theory by starting with a problem in spin systems.

R. B. Bapat

Twenty Five Years of a Permanent Conjecture

Abstract: It was conjectured in Bapat and Sunder (1986) that if A and B are positive semidefinite matrices with the diagonal entries of B equal to 1, then the permanent of the entrywise (or Hadamard) product of A and B does not exceed the permanent of A. The conjecture, which is still open, is weaker than a conjecture of Soules proposed several years earlier. We discuss these as well as some other conjectures involving permanents of positive semdidefinite matrices.

Siva Athreya

Brownian Motion on R-trees

Abstract: The real trees form a class of metric spaces that extends the class of trees with edge lengths by allowing behavior such as infinite total edge length and vertices with infinite branching degree. We use Dirichlet form methods to construct Brownian motion on any given locally compact R-tree equipped with a Radon measure ν such that $\text{supp}(\nu) = T$. We shall discuss various properties of the Brownian motion and recent work on approximations of the same via random walks.

Gadadhar Misra

Infinitely divisible metrics and curvature inequalities for operators in the Cowen-Douglas class

Abstract: The curvature of a contraction in the Cowen-Douglas class of rank one on the unit disc is bounded above by the curvature of the backward shift operator. However, in general, an operator satisfying this curvature inequality need not be contractive. We find a stronger inequality for the curvature which ensures contractivity of the operator. We describe generalization to the case of commuting tuples.

Rajarama Bhat

Bures distance for completely positive maps

Abstract: D. Bures had defined a metric on states of C*-algebras using GNS representations of states. This notion has been extended to completely positive maps by D. Kretschmann, D. Schlingemann and R. F. Werner. We present a Hilbert von Neumann Module version of this theory. This is a joint work with K. Sumesh.

Vijay Kodiyalam

On Sunder's work

Abstract: I'll try to illustrate some aspects of Sunder's work by looking at specific examples.

Masaki Izumi

Group-subgroup subfactors revisited

Abstract: The group-subgroup subfactor for a finite group G with its subgroup H is given by the simultaneous crossed products of the two groups. Although every information of it is encoded in the pair $H \subset G$, there are several nontrivial and interesting works about it. For example, a natural question is whether the group-subgroup subfactor uniquely recovers the original pair $H \subset G$, which was solved in negative by Kodiyalam and Sunder in 2000. In this talk I'll give an overview of group-subgroup subfactors. I'll also mention my recent work on Goldman's type theorem for the 3^n1 graph.

Zeph Landau
Planar Depth

Abstract: We'll talk about an older result with the birthday boy that introduces the notion of the planar depth of a subfactor and investigates this invariant for a few examples.

Shamindra Ghosh
Affine representations of planar algebras

Abstract: In this talk, we will describe a nice representation theory for planar algebras. In the literature, these representations had been very useful in constructing certain subfactors. We will outline a very general method of constructing such representations. We then introduce tensor product and contragradients. In the end, we discuss a few examples and some analytical properties of planar algebras involving these representations.

This is a joint work with Paramita Das and Ved Prakash Gupta

S. Sundar
Inverse semigroups and the Cuntz-Li algebras.

Abstract: Let R be an integral domain such that every non-zero quotient R/mR is finite. Consider the unitaries and isometries on $\ell^2(R)$ induced by the addition and the multiplication operation of the ring R. The C*-algebra generated by these unitaries and isometries is called the ring C*-algebra and was studied by Cuntz and Li.

In my talk, I will explain how inverse semigroups can be used to understand these C*-algebras. Also some generalisation of the ring C*-algebras will be discussed.

Ved Prakash Gupta
Drinfeld center of a planar algebra

Abstract: Motivated by a conjecture of Kevin Walker in the world of TQFT's, Vaughan Jones conjectured the following analogy for the (affine) representations of subfactor planar algebras:

If $N \subset M$ is a finite depth subfactor and P is the associated subfactor planar algebra, then the category of finite dimensional Hilbert affine representations of P is equivalent to the Drinfeld center of the N-N-bimodule category generated by ${}_N L^2(M)_M$.

An affirmative result towards this conjecture had already appeared in a work of Ghosh, from which it could be deduced that the conjecture holds (at least, as additive categories) for the planar algebra associated to the fixed-point subfactor (arising from an outer action of a finite group).

In this talk, we discuss the Jones-Walker conjecture in greater generality. We observe that when the depth of a planar algebra is infinite, the conjecture does not hold in full generality; however, an extra finiteness condition (namely, *finite P-support*) on the Hilbert affine representations (which follows automatically for finite depth) proves to be a saving grace. Finally, with the tensor described in Shamindra's talk, we show that the equivalence is indeed a tensor equivalence.

This is a joint work with Paramita Das and Shamindra Kumar Ghosh.