
Department of Mathematics

Indian Institute of Technology Bombay



Department Colloquium

Speaker:

Prof. Tony Puthenpurakal,

Department of Mathematics,
Indian Institute of Technology Bombay



Title: Brauer-Thrall Conjectures and Commutative Algebra

Abstract: Brauer-Thrall conjectures for representation theory of Artin algebra's was proved many years ago (in 1968). However the techniques invented by Auslander to prove this conjecture has found more applications than just proving the original conjectures. These techniques have been extended in commutative algebra to study Maximal Cohen-Macaulay modules over Cohen-Macaulay isolated singularities. I will also discuss a result of mine in this direction.

Date : Wednesday, October 05, 2016

Time : 16:00-17:00

Venue: Ramanujan Hall, Dept. of Mathematics



Department Colloquium

Speaker:

Prof. Parthanil Roy,

Statistics and Mathematics Unit
Indian Statistical Institute, Kolkata



Title: Extreme value theory for stable random fields indexed by finitely generated free groups

Abstract: In this work, we investigate the extremal behaviour of left-stationary *symmetric* α -stable ($S\alpha S$) random fields indexed by finitely generated free groups. We begin by studying the rate of growth of a sequence of partial maxima obtained by varying the indexing parameter of the field over balls (in the Cayley graph) of increasing size. This leads to a phase-transition that depends on the ergodic properties of the underlying quasi-invariant action of the free group but is different from what happens in the case of $S\alpha S$ random fields indexed by \mathbb{Z}^d . The presence of this new dichotomy is confirmed by the study of stable random fields generated by the canonical action of the free group on its Furstenberg-Poisson boundary with the measure being Patterson-Sullivan. When the action of the free group is dissipative, we also establish that the scaled extremal point process sequence converges weakly to a new class on point processes that we have termed as *randomly thinned cluster Poisson processes*. This limit too is very different from that in the case of a lattice.

This talk is based on a joint work with Sourav Sarkar, who carried out a significant portion of the work in his master's dissertation at Indian Statistical Institute.

Date : Wednesday, August 31, 2016

Time : 16:00-17:00

Venue: Ramanujan Hall, Dept. of Mathematics

Department of Mathematics

Indian Institute of Technology Bombay



Department Colloquium

Speaker:

Prof. Bruce Hajek,

Prof. of Computer Science and Electrical Engineering
University of Illinois at Urbana-Champaign
NR Kamat Chair Prof. EE Dept, IIT Bombay



Title: Bounds Implied by Drift and Applications

Abstract: The drift of a real-valued random sequence at a particular time is equal to the conditional expected change in the sequence over the next time step, given the information known about the sequence up to the given time. If the drift is zero the sequence is known as a martingale. The actual change in the sequence is equal to the drift plus a conditional mean zero deviation. After each time step, a new drift can be calculated, and the random deviations from the drift add up over time. It is thus important to bound the cumulative effect of the deviations, to quantify whether the values of the sequence over a long period of time evolve according to the drift. This talk identifies an incomplete list of bounds implied by drift that have been used in many applications, including to analyze the performance of randomized algorithms for non-convex global optimization problems.

Date : Wednesday, August 17, 2016

Time : 16:00-17:00

Venue: Ramanujan Hall, Dept. of Mathematics

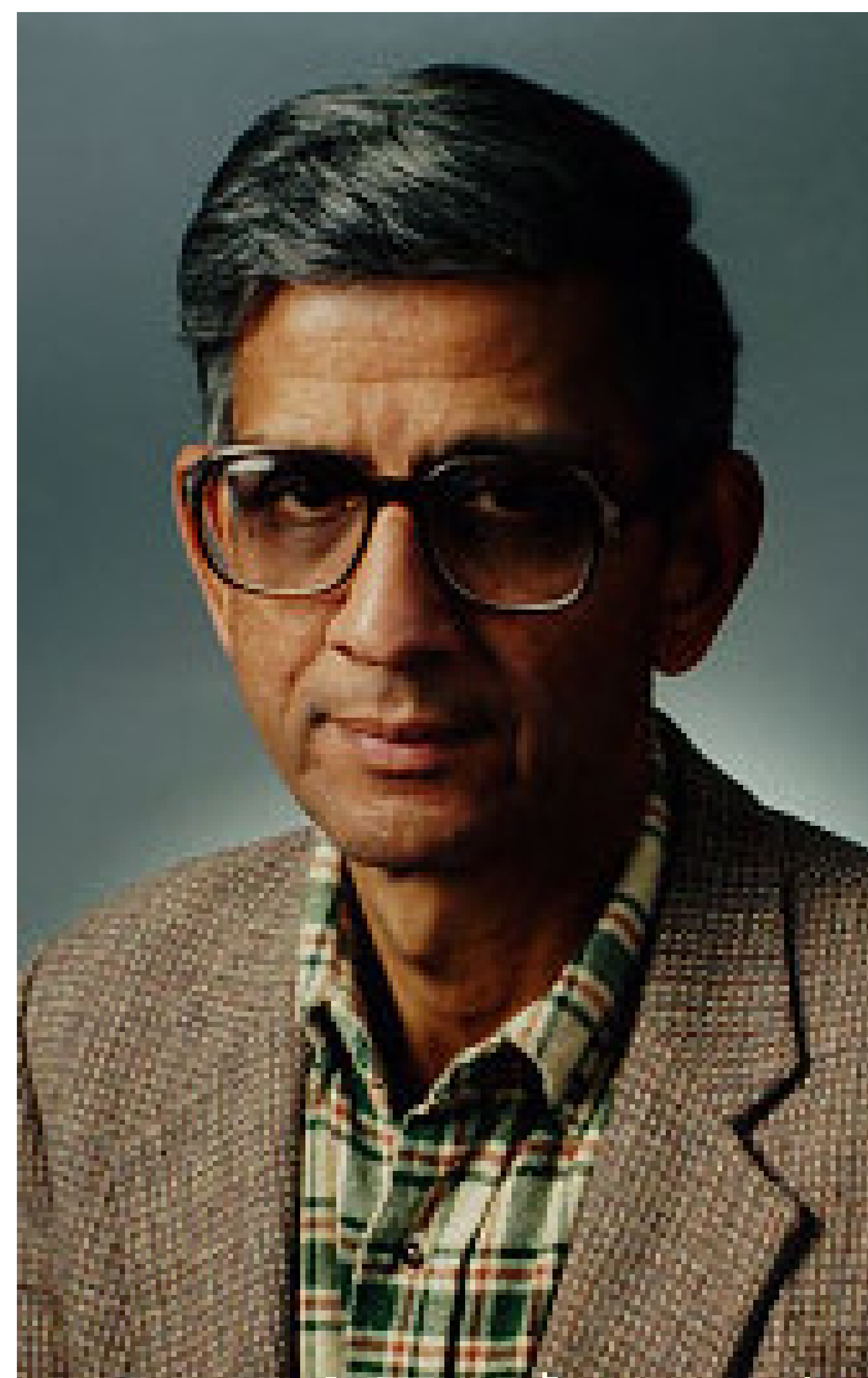


Department Colloquium

Speaker:

Prof. K. B. Athreya

Emeritus Professor, Iowa State University



Title: Glivenko Cantelli theorems

Abstract: The classical version of Glivenko Cantelli thm asserts uniform convergence of the empirical cdf to the true cdf for iid real valued random variables. In this talk we extend that result to regenerative sequences, exchangeable sequences and stationary sequences all with possible delays. We discuss the extension to the vector case. This is based on joint work with Vivek Roy.

Date : Thursday, July 28, 2016

Time : 16:00-17:00

Venue: Ramanujan Hall, Dept. of Mathematics

Department of Mathematics

Indian Institute of Technology Bombay

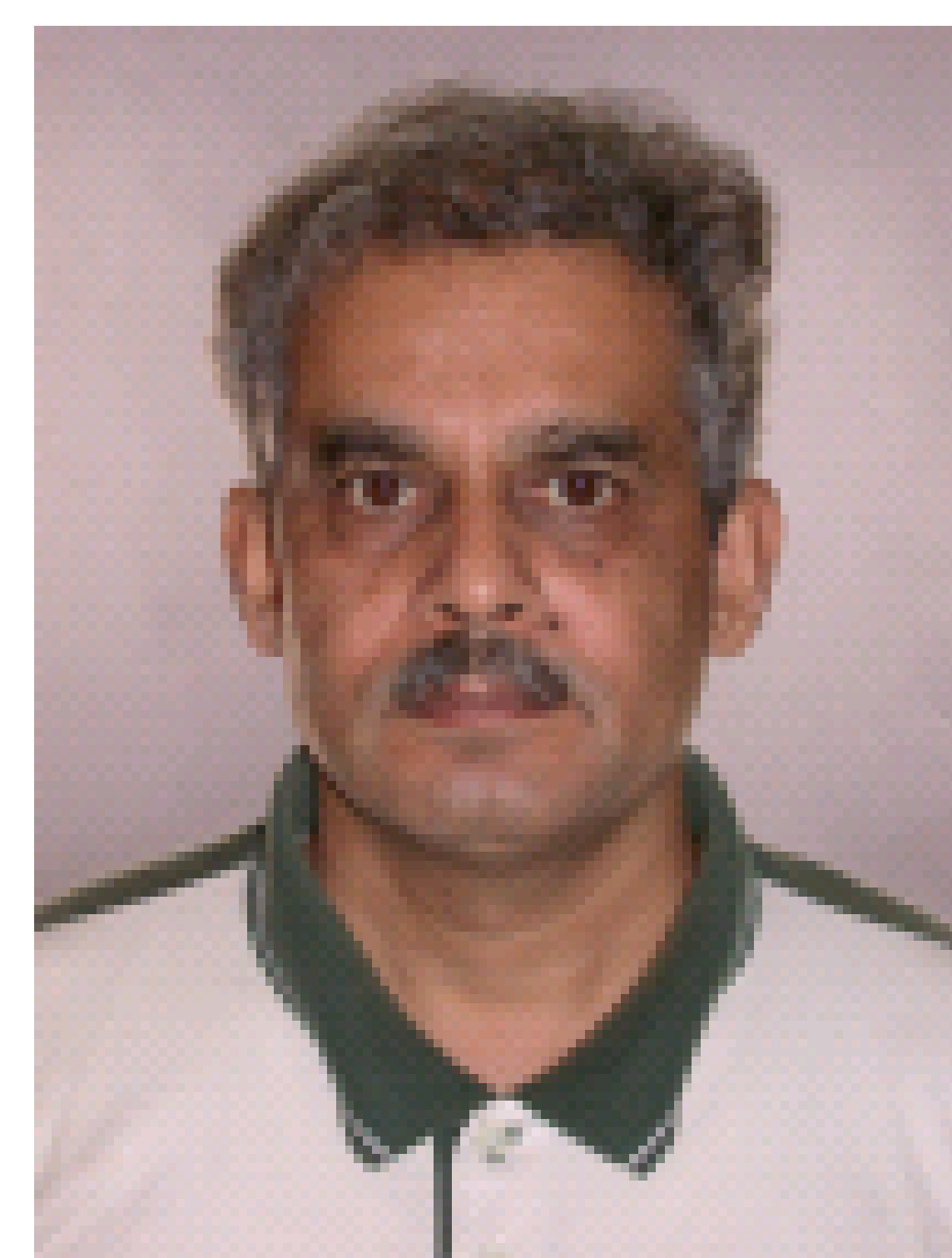


Department Colloquium

Speaker:

Prof. Rajendra Vasant Gurjar

Department of Mathematics, IIT Bombay



Title: Reductive Group Actions on Affine and Local Rings

Abstract: In the first part of the talk we will review some basic results about reductive groups, their actions on affine varieties, rings of invariants, etc.

In the second part I will mention many results I have proved in this area.

In the last part I will state some results about reductive group actions on local analytic rings. Making use of these recent proofs of two conjectures I had made in 1990 will be mentioned.

Date : Thursday, July 21, 2016

Time : 16:00-17:00

Venue: Ramanujan Hall, Dept. of Mathematics

Department of Mathematics

Indian Institute of Technology Bombay



Department Colloquium

Speaker:

Prof. Avinash Sathaye,
Univ. of Kentucky, Lexington



Title: Sub-principle planes

Abstract: An affine domain A over a field k is called a sub-principle plane if it satisfies the following:

- $A = k[p, q] \subset k[u, v]$ where $k[u, v]$ is a polynomial ring in two variables over k .
- There is a polynomial $g \in k[u, v]$ such that $k[p, q, g] = k[x, y]$.

We will discuss the problem of identifying properties of p, q which ensure the condition of A being a sub-principle plane.

The problem is clearly important in order to determine if the polynomial $F(X, Y, Z)$ defining the kernel of the homomorphism $k[X, Y, Z] \rightarrow k[u, v]$ is an abstract plane. A detailed description of A is hoped to help with the solution of the three dimensional epimorphism problem.

Date : Wednesday, July 13, 2016

Time : 16:00-17:00

Venue: Ramanujan Hall, Dept. of Mathematics

Department Colloquium

Speaker:

Prof. Dr. Markus Brodmann,
Institut für Mathematik, Universität Zürich



Title: Bounding cohomology of coherent sheaves over projective schemes

Abstract: Let $X = (X, \mathcal{O}_X)$ be a projective scheme over a field and with twisting sheaf $\mathcal{O}_X(1)$. Let \mathcal{F} be a coherent sheaf of \mathcal{O}_X -modules. The *cohomology table* of \mathcal{F} is defined as the family

$$h_{\mathcal{F}} := (h^i(X, \mathcal{F}(n)))_{(i,n) \in \mathbb{N}_0 \times \mathbb{Z}}.$$

We give a survey on results about the set of cohomology tables

$$h_{\mathcal{C}} = \{h_{\mathcal{F}} \mid (X, \mathcal{F}) \in \mathcal{C}\},$$

for certain classes \mathcal{C} of pairs (X, \mathcal{F}) . We particularly look at the following questions:

- (1) Under which conditions is the set $h_{\mathcal{C}}$ finite, if \mathcal{C} is the class of all pairs (X, \mathcal{F}) for which \mathcal{F} has a given dimension?
- (2) Under which conditions is the set $h_{\mathcal{C}}$ finite, if \mathcal{C} is the class of all pairs (X, \mathcal{F}) in which $X = \mathbb{P}^r$ is a given projective space and \mathcal{F} is an algebraic vector bundle over X ?
- (3) What can be said if X runs through all smooth complex projective surfaces and $\mathcal{F} = \mathcal{O}_X$ is the structure sheaf of X ?

Our results are related to the theory of Hilbert functions, Hilbert polynomials and Hilbert schemes, but also to Castelnuov-Mumford regularity and to vanishing results for cohomology.

Date : Tuesday, July 05, 2016

Time : 16:00-17:00

Venue: Ramanujan Hall, Dept. of Mathematics