Titles and Abstracts of Talks

Friday, December 17, 2010

Time: 10.45 AM to 11.15 AM

Title: *Shreeram and his mathematical world*

Speaker: Shreedhar Abhyankar, Pune

Abstract: I will embark on a personal and pictorial journey of my brother Shreeram and touch upon his early origins, voyage to the west, and some of his mathematics, mathematical gurus, and fellow mathematicians.

Time: 11.30 AM to 12.00 PM

Title: *Ganitacharya Abhyankar; My Friend*

Speaker: Chintaman B. Gokhale, Mumbai

Abstract: I will narrate my impressions of Prof. Shreeram Abhyankar, the mathematician and the person, as I have known him for the past several years.

Time: 12.30 PM to 1.00 PM

Title: *On extending Abhyankar's Two Point Lemma to positive weights*

Speaker: J. C. Price, University of Arkansas, Fort Smith, USA

Abstract: In 2008, Professor Abhyankar published a series of papers on the Jacobian Conjecture: Some thoughts on the Jacobian Conjecture Part I, Part II, and Part III. We will discuss here some of this work and take a look at why it cannot be applied to positive weights.

Saturday, December 18, 2010

Time: 9.15 AM to 9.45 AM

Title: *Solubility by Radicals and Monodromy of Riemann Surfaces.*

Speaker: Chandrajit Bajaj, University of Texas, Austin, USA

Abstract: A problem of interest in computational algebraic geometry is the determination of whether or not a given curve admits a radical parameterization. One approach to this problem involves looking at an algebraic curve as a branched covering of complex projective space and determining the monodromy group of this cover. I'll give a brief overview of the group theoretic and complex analytic background required to state the important results, describe the connection between radical parameterization and monodromy, then discuss a symbolic-numeric algorithm for the computation of monodromy groups.

Time: 10.00 AM to 10.30 AM

Title: *Desingularization in dimension 3: reduction to Artin-Schreier case.*

Speaker: Vincent Cossart, Université de Versailles, France

Abstract: To begin with, we use Zariski's reduction to local uniformization of valuations. This is still a subtle problem to handle in dimension three and we adapt Abhyankar's ramification techniques to dimension three in order to further reduce local uniformization on singular germs of dimension three over k to that local uniformization on Artin-Schreier and purely inseparable covers of degree p of a regular (three dimensional) germ of variety. This is a joint work with Olivier Piltant.

Time: 11.00 AM to 11.30 AM

Title: *Semigroups of valuations on local rings.*

Speaker: Steven Dale Cutkosky, University of Missouri, Columbus,USA

Abstract: The possible value groups G of a valuation which dominate a local ring R have been extensively studied and classified; G can be any ordered abelian group of finite rational rank. However, the semigroup S of values attained on R is not well understood, although it is known to encode important information about the topology and resolution of singularities of the germ associated to R, and of the ideal theory of R.

We discuss some previous results on this problem, and recent work with Teissier, Kascheyeva, Dalili and V. A. Pham.

Time: 11.45 AM to 12.15 PM

Title: *Generalization of Max Noether's Theorem.*

Speaker: Renato Vidal Martins, ICEx-UFMG, Belo Horizonte, Brazil

Abstract: We will talk on some ways of generalizing to singular curves the following theorem of Max Noether: $\mathrm{Sym}^n H^0(\omega)$ surjects onto $H^0(\omega^n)$, where ω is the dualizing sheaf of a nonhyperelliptic nonsigular curve. The claim extends trivially to Gorenstein curves. We have results for curves with a unique non-Gorenstein singularity which is almost Gorenstein, and, also, for the case where the curve only admits unibranch singularities. For arbitrary integral curves, we note that the whole problem reduces to a question on the semigroup of values.

Time: 12.30 PM to 1.00 PM

Title: *On a property of a Jacobian mate*

Speaker: Leonid Makar-Limanov, Wayne State University, Detroit, USA

Abstract: If a polynomial f has a Jacobian mate then the Newton polygons obtained from f in the process of a resolution of $f(x, y) = 0$ expressing y as a fractional power series by the decreasing powers of x are geometrically the same for all resolutions.

Monday, December 20, 2010

Time: 9.15 AM to 9.45 AM

Title: *Classifying Quaternion Algebras*

Speaker: T. E. Venkata Balaji, IIT Madras

Abstract: Classifying Quaternion Algebras has been done in connection with several problems over the last 73 years or so. We shall give a few instances of these and shall review the most general theorem available about their classification.

Time: 10.15 AM to 10.45 AM

Title: *Fields of definition for plane algebraic curves*

Speaker: Enrique Artal Bartolo, Universidad de Zaragoza, Spain

Abstract: Given a plane algebraic curve, we define, whenever it makes sense, the field of definition as follows: consider the irreducible component of the equisingularity class where the curve lives, and pick the smallest field such that a curve in this component is defined by a polynomial with coefficients in this field.

Time: 11.15 AM to 11.45 AM

Title: *Newton trees for ideals in C[[x,y]].*

Speaker: Pierrette Cassou-Nogues, Université Bordeaux, France

Abstract: In this talk we will define Newton trees associated to ideals in C[[x,y]], using the Newton process. As an application we will show how to compute some invariants of the ideal from its tree, such as the Hilbert Samuel multiplicity. This is a common work in process with Wim Veys.

Time: 12.15 AM to 12.45 PM

Title: *The plane Jacobian conjecture*

Speaker: Ignacio Luengo, Universidad Complutense de Madrid, Spain

Abstract: We deal with the Jacobian conjecture in the plane, presenting recent and new methods and results.

Tuesday, December 21, 2010

Time: 9.15 AM to 9.45 AM

Title: *Fourier Elimination and Proofs in Linear Programming*

Speaker: Vijay Chandru, Strand Life Sciences, Bangalore

Abstract: A classic variable elimination or projection technique with systems of linear inequalities is a technique that dates back to the work of Fourier in 1824. A number of simple and not so simple results in theory of convex polyhedra, linear programming and polyhedral combinatorics turn out to be elegantly derived from this simple technique of Fourier. We will illustrate a few such derivations.

Time: 10.00 AM to 10.30 AM

Title: *On arrangement of complex hyperplanes whose fundamental groups is a direct sum of free groups.*

Speaker: Kwai-Man Fan, National Chung Cheng University, Taiwan

Abstract: We shall discuss some aspects of the topology of the complement of a union of complex hyperplanes whose fundamental group is a direct sum of free groups. Combining the works of many different authors in the past 30 years, we now have a much better understanding of the topology of these arrangements.

Time: 11.00 AM to 11.30 AM

Title: *A Few Results on Sums of Cubes*

Speaker: Paul Loomis, Bloomsburg University, USA

Abstract: We consider integer solutions of the equation $(a_1 + a_2 + \cdots + a_k)^2 = a_1^3 + a_2^3 + \cdots + a_k^3$. Answering a question by David Pagni, we prove that $(1, 2, \ldots, k)$ are the only solutions to the equation with distinct positive entries. We also prove that $L \geq 0$, $L \neq 7$ and $L \not\equiv 2 \pmod 3$ are necessary and sufficient conditions for there to exist a solution $(a_1, \ldots, a_k)$ with $a_1 + \cdots + a_k = L$. We will also look at solutions with negative or repeated entries, touching on a result of Liouville, taxicab numbers, and other problems.

Time: 11.45 AM to 12.15 PM

Title: *Generalized epimorphism theorem*

Speaker: S. M. Bhatwadekar, TIFR, Mumbai

Abstract: Let R be a noetherian normal domain containing $\mathbb{Q}$. Further, let $\alpha : R[X, Y] \to R[T]$ be a surjective R-algebra homomorphism. Then

1. $P = \ker(\alpha)$ is a principal ideal, say the ideal generated by F.
2. F is a variable in $R[X, Y]$, i.e., $\exists\, G \in R[X, Y]$ such that $R[X, Y] = R[F, G]$.

Time: 12.30 PM to 1.00 PM

Title:*Invariants of quadratic forms in algebra and geometry*

Speaker: Phillipe Cassou-Nogues, Université Bordeaux, France

Abstract: In this talk we describe a generalization in a geometric set up of a theorem of Serre on the Hasse-Witt invariant of the trace form of a separable field extension. This is a joint work with B. Erey and M. J. Taylor.

Wednesday, December 22, 2010

Time: 9.15 AM to 10.15 AM

Title: *Bhaskaracharya's Lilawati*

Speaker: Devadatta-Shatri Patil, Pune

Abstract: We will give an account of parts of the treatise *Lilawati* by Bhaskaracharya, especially some lesser known aspects. This talk will be presented in both Sanskrit and English.

Time: 11.00 AM to 11.30 AM

Title: *Multiplication : From Thales to Lie*

Speaker: Pradipkumar H. Keskar, BITS, Pilani

Abstract: As is well known, multiplication was studied by the Norwegian mathematician Sophus Lie using its analyticity as a binary operation. In particular, he connected it to the addition (of the corresponding Lie Algebra). On the other hand, the ruler construction of the multiplication can be traced back to Thales of Miletus, who used it to find some distances. We explore the connection of this construction to the ruler construction of addition and the lead it provides to Lie theory.

Time: 12.00 PM to 12.30 PM

Title: *Geometric methods for non-convex optimization*

Speaker: Narendra Karmarkar, Pune

Abstract: The subject of Non-convex optimization includes all "NP-complete" problems in computer science, integer programming and bounded version of diophantine equations,i.e. finding integer solutions to system of polynomial equations with integer coefficients, given a prior bound on the magnitude of input coefficients, and magnitude of acceptable solution.

In previous work on linear programming, methods which are purely algebraic or purely combinatorial turned out to be "exponential-time" algorithms, whereas the best known polynomial-time method is base on Riemannian Geometry. This method has been extended to convex optimization .

For extension of this approach to non-convex problems, concepts from differential geometry alone are not adequate, and a common generalization of certain concepts from algebraic geometry and differential geometry is required. In this talk, I will describe efforts in this direction.
