Ramanujan Award Ceremony and The Abel Symposium

February 23, 2012

TEA BREAK		
	Welcome & Award Ceremony	9.30 a.m. -10.10 a.m.
P. Nang	**On the classification of regular holonomic D-modules on skew-symmetric matrices.**	10.150 a.m.-11.05 p.m.
TEA BREAK		
Noga Alon	**On Graphs, Integers and Communication**	11.30 a.m.-12.20 p.m.
Ragni Piene	**Cayley polytopes and toric geometry**	12.25 p.m.- 1.15 p.m.
LUNCH		
David Donoho	**Optimal Phase Transitions in Compressed Sensing**	2.30 p.m.-3.20 p.m.
TEA BREAK		
Terence Tao	**Structure and randomness in the prime numbers** **(Public Lecture, jointly organised by ICTS-TIFR, School of Mathematics, TIFR)**	4.00 p.m.-5.15 p.m.

Lecture Theatre (AG-66)@@

Title & Abstract

Speaker: P. Nang, ENS, Gabon.
Title : On the classification of regular holonomic D-modules on skew-symmetric matrices.
Abstract: We give a classification of regular holonomic D-modules on $2m \times 2m$ skew-symmetric matrices related to the action of the general linear group $GL(2m, C)$. Actually we establish one more case of the conjecture by T. Levasseur.
Speaker : Noga Alon, Tel Aviv University.
Title : On Graphs, Integers and Communication.
Abstract: Tools from Extremal Graph Theory are helpful in the study of problems in Additive Number Theory, Theoretical Computer Science, and Information Theory. I will illustrate this fact by several closely related examples.

Speaker : Ragni Piene, University of Oslo.
Title: Cayley polytopes and toric geometry.
Abstract: The "Cayley trick" expresses the resultant of two polynomials in one variable as the discriminant of a polynomial in two variables. Generalized and translated into the language of lattice polytopes and toric geometry, the trick consists in building a n-dimensional polytope from $k+1$ polytopes of dimension $n-k$ so that the new polytope has no interior lattice points. Such a polytope is called a *Cayley polytope*.

Let $P \subset \mathbb{R}^n$ be a convex lattice polytope. The *codegree* of P is an integer between 1 and $n+1$ that measures the "hollowness" of P: it is the smallest integer m such that the dilated polytope mP contains interior lattice points. A Cayley polytope as above has codegree at least $k+1$. A recent result, due to Dickenstein, Di Rocco, Nill, and Piene, says that the only polytopes of dimension n and codegree at least $(n+3)/2$ are Cayley polytopes with k at least $(n+1)/2$. The proof relies on the study of the polarized toric variety (X, L) defined by P.

Speaker: David Donoho, Stanford University.
Title : Optimal Phase Transitions in Compressed Sensing.
Abstract : "Compressed Sensing" is an active research area which touches on harmonic analysis, geometric functional analysis, applied mathematics, computer science electrical engineering and information theory. Concrete achievements, such as speeding up pediatric MRI acquistion times from several minutes to under a minute, are now entering daily use.

In my talk I will discuss the notion of phase transitions in combinatorial geometry, describe how they precisely demarcate the situations where a popular algorithm in compressed sensing – ell_1 minimization – can succeed. Then I will discuss the issue: what is the best possible phase transition of any algorithm, we get different answers depending on the assumptions we make. In both cases, we describe novel algorithms precisely achieving the optimal phase transition, in quasi-linear time.

This talk surveys joint work with several authors, including Andrea Montanari and Jared Tanner, as well as Iain Johnstone and Arian Maleki.

Speaker: Terence Tao, UCLA
Title: Structure and randomness in the prime numbers.
Abstract: God may not play dice with the universe, but something strange is going on with

the prime numbers - Paul Erdos

The prime numbers are a fascinating blend of both structure (for instance, almost all primes are odd) and randomness. It is widely believed that beyond the "obvious" structures in the primes, the primes otherwise behave as if they were distributed randomly; this "pseudorandomness" then underlies our belief in many unsolved conjectures about the primes, from the twin prime conjecture to the Riemann hypothesis. This pseudorandomness has been frustratingly elusive to actually prove rigorously, but recently there has been progress in capturing enough of this pseudorandomness to establish new results about the primes, such as the fact that they contain arbitrarily long progressions. We survey some of these developments in this talk.