



Michigan Mathematics G. Y. Rainich Lectures March 16 & 18, 2010

Professor Terence Tao

*James & Carol Collins Professor of Mathematics
University of California, Los Angeles*

Salem Prize, 2000

Fields Medal, 2006

SASTRA Ramanujan Prize, 2006

MacArthur Fellowship, 2007

Ostrowski Prize, 2007

King Faisal International Prize for Science

National Academy of Sciences, Foreign Member

American Academy of Arts and Sciences, Member



The Proof of the Poincaré Conjecture

Tuesday, March 16 • 4:10 p.m. • Room 1324 East Hall Auditorium

In a series of three terse papers in 2003 and 2004, Grisha Perelman made spectacular advances in the theory of the Ricci flow on 3-manifolds, leading in particular to his celebrated proof of the Poincaré conjecture (and most of the proof of the more general geometrization conjecture). Remarkably, while the Poincaré conjecture is a purely topological statement, the proof is almost entirely analytic in nature, in particular relying on nonlinear PDE tools together with estimates from Riemannian geometry to establish the result. In this talk we discuss some of the ingredients used in the proof, and sketch a high-level outline of the argument.

Discrete Random Matrices

Thursday, March 18 • 4:10 p.m. • Room 1324 East Hall Auditorium

The spectral theory of continuous random matrix models (e.g. real or complex gaussian random matrices) has been well studied, and very precise information on the distribution of eigenvalues and singular values is now known. But many of the results rely quite heavily on the special algebraic properties of the matrix ensemble (e.g. the invariance properties with respect to the orthogonal or unitary group). As such, the results do not easily extend to discrete random matrix models, such as the Bernoulli model of matrices with random ± 1 signs as entries. Recently, however, tools from additive combinatorics and elementary linear algebra have been applied to establish several results for such discrete ensembles, such as the circular law for the distribution of eigenvalues, and also explicit asymptotic distributions for the least singular values of such matrices. We survey some of these developments in this talk.

***A reception for the speaker will be held at 5:00 p.m.
Tuesday, March 16, in the Mathematics Upper Atrium, East Hall***

The Rainich Lectures were established in 1983 through a gift from Professor Emeritus Raymond Wilder and his wife Una, to honor Yuri Rainich, Mathematics faculty member from 1926-1956.