Eisenbud Lectures 2014

Speaker: Peter Sarnak, Institute for Advanced Study and Princeton University

The following lectures were held December 2 – December 4 at Brandeis University:

Lecture 1: December 2, 2014
Title: "The topology of random real hypersurfaces and percolation."
Abstract: The topologies of the connected components of the zero sets of random real projective
hypersurfaces of high degree follow a universal law of distribution. We explain this (and a more general
phenomenon for random band limited functions), its source and some possible connections to
percolation.

Lecture 2: December 3, 2014
Title: "Nodal domains for Maass (modular) forms."
Abstract: The eigenstates of the quantization of a classically chaotic hamiltonian are expected to behave
like random monochromatic waves. We discuss this in the context of the eigenfunctions on the modular
surface-ie "Maass Forms ", and especially what can be proved about their nodal domains.

Lecture 3: December 4, 2014
Title: "Families of zeta functions, their symmetries and applications."
Abstract: The local statistical laws for the distribution of the zeros of the Riemann Zeta function and
more generally of families of zeta functions, follow one of 4 of the 10 universal random matrix
ensembles. We review some this phenomenon, especially in connection with applications.