THE WEIZMANN INSTITUTE OF SCIENCE
FACULTY OF MATHEMATICS AND COMPUTER SCIENCE

Geometric Functional Analysis and Probability Seminar

Room 155 ,Ziskind Building
on Thursday, May 10, 2018at 13:30

David Jerison (MIT) and Ron Rosenthal (Technion)-

DOUBLE TALK

Abstract:

David Jerison: Localization of eigenfunctions via an effective potential
We discuss joint work with Douglas Arnold, Guy David, Marcel Filoche and Svitlana Mayboroda. Consider the Neumann boundary value problem for the operator $L u = - \mbox{div} (A \nabla u) + Vu$ on a Lipschitz domain Ω and, more generally, on a manifold with or without boundary. The eigenfunctions of L are often localized, as a result of disorder of the potential V, the matrix of coefficients A, irregularities of the boundary, or all of the above. In earlier work, Filoche and Mayboroda introduced the function u solving $Lu = 1$, and showed numerically that it strongly reflects this localization. Here, we deepen the connection between the eigenfunctions and this {\em landscape} function u by proving that its reciprocal $1/u$ acts as an {\em effective potential}. The effective potential governs the exponential decay of the eigenfunctions of the system and delivers information on the distribution of eigenvalues near the bottom of the spectrum.

Ron Rosenthal: Eigenvector correlation in the complex Ginibre ensemble
The complex Ginibre ensemble is a non-Hermitian random matrix on C^N with i.i.d. complex Gaussian entries normalized to have mean zero and variance 1=N. Unlike the Gaussian unitary ensemble, for which the eigenvectors are orthogonal, the geometry of the eigenbases of the Ginibre ensemble are not particularly well understood. We will discuss a some results regarding the analytic and algebraic structure of eigenvector correlations in this matrix ensemble. In particular, we uncover an extended algebraic structure which describes the asymptotic behavior (as N goes to infinity) of these correlations. Our work extends previous results of Chalker and Mehlig [CM98], in which the correlation for pairs of eigenvectors was computed. Based on a joint work with Nick Crawford.