

UNIVERSAL BEHAVIOR OF RANDOM LINEAR COMBINATIONS OF LAPLACE EIGENFUNCTIONS

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In this talk we will discuss the behavior of random linear combinations of high-energy Laplace eigenfunctions on compact Riemannian manifolds. I will explain how to study local properties of these waves, such as the number of critical points or the shape of their zero sets. I will explain why when the energy of the waves grows to infinity the limiting behavior is fully described by the behavior of Euclidean Laplace eigenfunctions of eigenvalue 1 (the geometry of the manifold where the eigenfunctions live is forgotten!). This allows us to show for instance that there is a universal distribution of the topological types of the connected components of the zero sets of the waves. I will explain how every single topological type is achieved, and how every possible nesting configuration of the zero sets components is also attained for large enough frequencies. This is based on joint works with Boris Hanin and Peter Sarnak.