Steve Zelditch (Northwestern)

Plank's constant, time, and stationary states in quantum mechanics

Quantum mechanics solved the problem of how a particle can move and be stationary at the same time. It did this by replacing geometry (classical mechanics) by linear algebra (eigenfunctions, eigenvalues and spectral theory). But intuition asks for a geometric picture of the time evolution of quantum states and the topography of eigenfunctions. As Planck's constant $h \to 0$, quantum mechanical objects have asymptotic relations to classical mechanical objects and provide the best picture possible.

My talk will concern the topography of eigenfunctions of the Laplacian on Riemannian manifolds (M, g): their sizes and shapes as measured by their zero sets, sup norms, L^p norms. One theme is to describe the (M, g) possessing extremal eigenfunctions. Another is the real and complex geometry of zero sets. The methods come from micro local analysis and complex geometry.