Eigenmode delocalization on surfaces of variable negative curvature

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Abstract

On a compact Riemannian manifold of negative curvature, the eigenmodes of the Laplace-Beltrami operator enjoy some delocalization properties in the high frequency limit, due to the hyperbolicity of the geodesic flow. The (de)localization properties can be represented by semiclassical measures associated with sequences of eigenstates: those are probability measures on the unit cotangent bundle, invariant through the geodesic flow, which characterize the asymptotic localization properties of the eigenstates along the sequence.
Using a recent Fractal Uncertainty Principle, Dyatlov and Jin have shown that, on a compact surface of constant negative curvature, any semiclassical measure is supported on the full unit cotangent bundle. As a consequence, for any open subset of the surface, the L2 weights of the eigenstates on this subset are uniformly bounded from below by a positive constant: all eigenstates spread throughout the surface.
I will present an extension of this result to surfaces of variable negative curvature. The main technical difficulty is due to the fact that the foliations formed by the stable and unstable manifolds of the geodesic flow are no longer smooth, which makes the application of the Fractal Uncertainty Principle more delicate. (joint with S.Dyatlov and L.Jin)

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