Eigenfunction concentration via geodesic beams

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A vast array of physical phenomena, ranging from the propagation of waves to the location of quantum particles, is dictated by the behavior of Laplace eigenfunctions. Because of this, it is crucial to understand how various measures of eigenfunction concentration respond to the background dynamics of the geodesic flow. In collaboration with J. Galkowski, we developed a framework to approach this problem that hinges on decomposing eigenfunctions into geodesic beams. In this talk, I will present these techniques and explain how to use them to obtain quantitative improvements on the standard estimates for the eigenfunction's pointwise behavior, Lp norms, and Weyl Laws. One consequence of this method is a quantitatively improved Weyl Law for the eigenvalue counting function on all product manifolds.