From eigenvalues to resonances

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First, we will recall few results about the eigenvalues of the Laplacian on compact manifolds, their reslationship with the geometry of the manifold, in particular for hyperbolic ones. Then we will introduce the concept of quantum resonances, first for simple potential scattering on the line (or the Euclidean space more generally), then for finite volume hyperbolic manifolds and for infinite volume ones (with assumptions on the geometry). We will explain how they replace eigenvalues in several cases, in particular in trace formulas or wave asymptotics. Finally, if there remains time, we will mention a few known results and open problem about their asymptotic distributions.

References:
1. the book of Iwaniec: Spectral theory of automorphic functions,
2. the paper by Peter Perry: The Spectral Geometry of Geometrically Finite Hyperbolic Manifolds - to appear in Festschrift for the Sixtieth Birthday of Barry Simon.