Quantum resonances in presence of classical chaos

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We consider scattering of scalar waves by hard obstacles or potentials, in the high frequency (or semiclassical) regime. Beside a continuous spectrum. the quantum Hamiltonian also admits a discrete spectrum of resonances (generalized eigenvalues), which influence the long time evolution. We aim to quantitatively describe this resonance spectrum, taking into account the underlying classical dynamics (for instance, the billiard flow outside of the obstacles).

We focus on situations where this classical dynamics is chaotic: the trapped trajectories are all unstable, and form a fractal set in phase space. We will show how both the instability and the "complexity" of this trapped set influence the semiclassical distribution of the resonances.

The talk will be a survey of results obtained jointly with M.Zworski, J.Sjöstrand, and more recently by L.Vacossin.