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Semi-classical aspects of the quantum Zeno effect

The quantum Zeno effect is an interesting consequence of the collapse of the wave function axiom. It leads to the dynamics of Hamiltonians of the form $\hat{H}_Z = \Pi \hat{H} \Pi$, where \hat{H} is a quantum Hamiltonian driving a free dynamics and Π an orthogonal projection. In this talk I will take Π to be a spectral projector of a quantum Hamiltonian circle action with a Kähler phase space (for example, the span of the harmonic oscillator eigenstates with energy ≤ 1). After discussing some general semi-classical aspects of Zeno Hamiltonians of this form, I will focus on the construction of quasi-modes (in one degree of freedom), which turn out to concentrate not only on the level sets of H intersected with the classically-allowed region corresponding to Π (the unit disk in the example), but also on its boundary. The boundary concentration has strong implications for the propagation of singularities under \hat{H}_Z . This is joint work with L. Charles, Y. Guedes-Bonthonneau, and S. Vu Ngoc.