Artificial interface conditions in quantum transport models.

In a recent collaboration with F.Nier and A.Faraj, it has been shown that a simple modification of the Laplacian through artificial interface conditions allows an alternative approach to the adiabatic evolution of quantum resonances. The use of this modified framework, may hopefully provide with effective equations for the non-linear dynamics of Schrödinger-Poisson systems in the regime of quantum wells in a semiclassical island.

In this perspective, it is important to control the deformations effects introduced on the spectrum and on the time propagator by such interface conditions. In particular we are interested in uniform-in-time estimates of the perturbed semigroup. The main difficulty is due to the non-selfadjont character of our class of operators involving a lack of accretivity for the corresponding generator of the quantum dynamics. In this framework, a standard approach would only provide with finite-time estimates for the dynamical system. Our approach consists in constructing interwining operators leading to a dynamical comparison between the modified non-selfadjoint model and the corresponding 'physical' Hamiltonian.