Reflections on Smilansky model

Pavel Exner

Doppler Institute for Mathematical Physics
and Applied Mathematics, Prague

The aim of this talk is to analyze several classes of Schrödinger operators with potentials that are below unbounded but their negative part is localized in narrow channels. A prototype of such a behavior can be found in Smilansky model devised to illustrate that an an irreversible behavior is possible even if the heat bath to which the systems is coupled has a finite number of degrees of freedom. We review its properties and analyze a regular version of this model, as well as another system in which $x^p y^p$ potential is amended by a negative radially symmetric term. All of them have the common property that they exhibit an abrupt parameter-dependent spectral transition: if the coupling constant exceeds a critical value the spectrum will cover the whole real axis, corresponding to the particle escape to infinity. We also discuss resonance effects in the Smilansky model. The results come from a common work with Diana Barseghyan, Vladimir Lotoreichik and Miloš Tater.

Mailing addresses:
Department of Theoretical Physics, NPI
Czech Academy of Sciences
CZ-25068 Řež – Prague;
Department of Physics, FNSPE
Czech Technical University
Břehová 7, CZ-11519 Prague

E-mail:
exner@ujf.cas.cz