MAFIA - the seminar you can't refuse

Weakly coupled bound states of Schrödinger operators with complex potentials in one and two dimensions

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Abstract:

We consider the (not necessarily self-adjoint) Schrödinger operator of the form $H_\beta = -\Delta - V_\beta$ in $L^2(\mathbb{R}^d)$, $d \in \{1, 2\}$, where $V_\beta : \mathbb{R}^d \to \mathbb{C}$ is a complex-valued potential, depending on some parameter $\beta \in \mathbb{C}$, such that $V_\beta \to 0$ as $\beta \to 0$ in an appropriate sense. We derive sufficient conditions, depending on the decay behaviour of V_β and the spatial dimension, for the existence of an eigenvalue $\lambda_\beta \in \sigma_p(H_\beta) \setminus [0, \infty)$, as $\beta \to 0$, and also obtain an asymptotic expansion for this eigenvalue. Finally, we provide conditions on V_β, under which H_β never has an eigenvalue in $\mathbb{C} \setminus [0, \infty)$, as $\beta \to 0$.