Approximations of spectra of Schrödinger operators with complex potentials on $\mathbb{R}^d$

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We study spectral approximations of Schrödinger operators $T = -\Delta + Q$ with complex potentials on $\Omega = \mathbb{R}^d$, or exterior domains $\Omega \subset \mathbb{R}^d$, by domain truncation. Our weak assumptions cover wide classes of potentials Q for which T has discrete spectrum, of approximating domains Ω_n, and of boundary conditions on $\partial\Omega_n$ such as mixed Dirichlet/Robin type. In particular, $\Re Q$ need not be bounded from below and Q may be singular. We prove generalized norm resolvent convergence and spectral exactness, i.e. approximation of *all* eigenvalues of T by those of the truncated operators T_n *without* spectral pollution. Moreover, we estimate the eigenvalue convergence rate and prove convergence of pseudospectra. Our results are illustrated by numerical computations for several examples, such as complex harmonic and cubic oscillators.

The talk is based on:

[1] S. Bögli, P. Siegl, and C. Tretter: *Approximations of spectra of Schrödinger operators with complex potentials on* $\mathbb{R}^d$, arXiv:1512.01826.