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Spectra, current flow and wave function morphology in a model PT-symmetric quantum dot with external interactions FELIX TELLANDER, Department of Astronomy and Theoretical Physics, Lund University, KARL-FREDRIK BERGGREN, Department of Physics, Chemistry and Biology, Linkping University — We use numerical simulations to study a two-dimensional (2D) quantum dot (cavity) with two leads for passing currents (electrons, photons, etc.) through the system. By introducing an imaginary potential in each lead the system is made symmetric under parity-time inversion ($\mathcal{PT}-$symmetric). This system is experimentally realizable in the form of e.g. quantum dots in low-dimensional semiconductors, optical and electromagnetic cavities and other classical wave analogues. The computational model introduced here for studying spectra, exceptional points (EPs), wave function symmetries and morphology, and current flow includes thousand of interacting states. This supplements previous analytic studies of few interacting states by providing more detail and higher resolution. The Hamiltonian describing the system is non-Hermitian, thus the eigenvalues are in general complex. The structure of the wave functions and probability current densities are studied in detail at and in between EPs. The statistics for EPs is evaluated and reasons for a gradual dynamical crossover (DC) are identified.

Felix Tellander
Lund Univ/Lund Inst of Tech

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