

Shift of Resonance Widths as a Probe of Mode Nonorthogonality

Dmitry Savin (Brunel University, UK)

Resonances feature themselves in the energy-dependent S-matrix as its poles in the complex energy plane. They can be analytically described as the complex eigenvalues of an effective non-Hermitian operator. Notably, the associated resonance wavefunctions are known to be nonorthogonal, which has many important applications ranging from nuclear physics to quantum optics and solid state. This talk will consider an open (scattering) quantum system under the action of a perturbation of its interior. It is demonstrated that the resulting shift of resonance widths is a sensitive indicator of the nonorthogonality of resonance wavefunctions, being zero only if those were orthogonal. Focusing further on chaotic systems, we will introduce a new type of parametric statistics in open systems, and derive (within random matrix theory) the distribution of the resonance width shifts in the regime of weakly open system. Application and recent data for microwave cavities will be also discussed.