Physics Colloquium

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Sublinear response as a means for hypersensitive sensing

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ABSTRACT

Non-Hermitian wave physics has offered a variety of surprises and introduced new concepts and methods with both fundamental and technological ramifications. Many of these developments are traced back to the existence of a non-Hermitian spectral degeneracy known as exceptional point (EP). At an EP both the eigenvalues and their corresponding eigenvectors coalesce leading to a collapse of the eigenbasis and of a traditional perturbation theory as a scheme to describe the response of the system to small perturbations. Instead, in the proximity of an EP, one must employ a fractional series expansion with respect to small perturbations for various observables. In many occasions these expansions involve sublinear terms, which can be used for developing hypersensitive sensing platforms. In this presentation we will be reviewing these developments associated with sublinear responses and we will be reporting on recent experimental efforts from our group to implement them for the realization of a novel class of hypersensitive micro-electromechanical and optomechanical accelerometers.