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Exploring super-radiance phenomena in mesoscopic systems[1]
ALEXANDER VOLYA, Florida State University, VLADIMIR ZELEVINSKY, Michigan State University — Mesoscopic physics is a term used to address many-body world between macro and micro. Quantum wires and dots, prototypes of quantum computers, molecular structures, atomic nuclei and even multi-quark hadrons all fall under this definition. From formation to decay, the life of a mesoscopic system is inseparable from outside perturbations; the coupling to the continuum of external states is a common element. The super-radiance to be discussed in this talk is a robust collective phenomenon appearing when this coupling becomes strong. Using schematic and realistic examples from different branches of science and from nuclear physics in particular we address the formation of a collective super-radiant mode in nuclei and condensed matter systems under conditions of regular and chaotic dynamics. Phase transition into super-radiant regime, competition of collective decay mode and other collective many-body features are to be discussed. Super-radiance saturates the entire continuum coupling in a few states making the remaining quantum many-body states quasi-stable. This counterintuitive enhancement of stability that appears in response to a strong continuum coupling is investigated.

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