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Unstable Quantum Systems Coupled Via Continuum and Super **Radiance** JUAN BURGOS, VLADIMIR ZELEVINSKY — Exited states of a quantum system are unstable and decay into the continuum. The dynamics of a of a quantum signal through a two dimensional lattice with open decay channels coupled to the continuum is treated by means of this discretized effective non-hermitian Hamiltonian. The energies and widths are treated as real and imaginary parts of complex eingenvalues for the effective Hamiltonian. Coupling through the continuum reorganizes the dynamics of the system, as a result the energy widths of the intrinsic states are redistributed and very broad states are formed absorbing a significant part of all the summed energy widths. As a result these broad, super-radiant states become highly unstable, with short lifetimes, while the remaining states become trapped and long lived. This notion of super radiance was suggested by Dicke, over fifty years ago, for systems pertaining to coherent states in quantum optics, much later was it realized that the mechanism of super radiance arises in many other areas of physical phenomena in atomic, nuclear and particle physics. A sharp, sort of phase transition, between weak and strong coupling to the continuum is considered. The weak coupling limit corresponds to isolated sharp resonances, whereas strong coupling corresponds to the collectivization of widths and the formation of the short lived Dicke states.

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