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Multiple timescale analysis of dynamical evolution near two coalescing eigenvalues in open quantum systems SAVANNAH GARMON, Osaka Prefecture University, GONZALO ORDONEZ, Butler University — Recently the physics of coalescing eigenvalues at an exceptional point (EP) has been studied in a wide range of physical contexts, including open quantum systems. At an EPN at which N eigenvalues coalesce the Hamiltonian can no longer be diagonalized but instead only reduced to a Jordan block of dimension N. In order to describe the survival probability $P(t)$ for an initially prepared state in the vicinity of two coalescing levels, we further subdivide the EP2 case into the EP2A and EP2B [1], where the EP2A involves the coalesce of two virtual bound states to form a resonance/anti-resonance pair and the EP2B occurs when two resonances collide to form two new resonances. We show that in the vicinity of the EP2B the usual exponential decay appearing for resonances on intermediate timescales is modified as $P(t) \sim te^{-\Gamma t}$. However, the long-time evolution near the EP2B follows a $1/t^3$ power law decay. Meanwhile the evolution for the EP2A is non-exponential on all timescales, and may be strongly influenced by continuum threshold effects [2]. [1] S. Garmon, M. Gianfreda, and N. Hatano, Phys. Rev. A 92, 022125 (2015). [2] S. Garmon, T. Petrosky, L. Simine and D. Segal, Fortschr. Phys. 61, 261 (2013). [3] N. Hatano and G. Ordonez, J. Math. Phys. 55, 122106 (2014).

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