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Title: Quantum Dynamics near Exceptional Points

Abstract: Enhancement of response to perturbations near exceptional points (EPs) of non-Hermitian systems is well known in the classical regime. I shall describe two situations where the quantum dynamics of non-Hermitian quantum systems shows enhancement as an EP is approached. The first is the generation of entanglement between two weakly coupled non-Hermitian qubits, where the qubit-qubit coupling perturbs the system from a third order EP. The second is vibrationally assisted energy transfer in a trapped-ion quantum simulator, where the weak coupling of vibrational to electronic degrees of freedom perturbs the transfer of excitation energy between ions away from a second order EP. I shall present the basic features of each system and show how the proximity to an EP in each case enhances the desired dynamics (generation of entanglement or energy transfer between ions) over the dynamics of the corresponding Hermitian quantum system, with increased enhancement as the EP is approached.

Reference: Z. Li, W. Chen, M. Abbasi, K. W. Murch, K. B. Whaley, Speeding up entanglement generation by proximity to higher-order exceptional points, arXiv:2210.05048.