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Generalized Coherent States via Markovian Decoherence SERGIO BOIXO, University of New Mexico, Albuquerque, LORENZA VIOLA, Dartmouth College, GERARDO ORTIZ, HOWARD BARNUM, Los Alamos National Laboratory — Coherent states were introduced in the early days of quantum physics as 'quasiclassical' quantum states of an isolated quantum system. The decoherence program defines 'quasiclassical' (or 'pointer') states as states which are most stable in the presence of a coupling with the environment. Pointer states may be identified through the extremization of a 'predictability' functional on the Hilbert space. It has been known for some time that for the harmonic oscillator both concepts coincide under very generic conditions. Coherent states have been extended in the 70s to generalized coherent states. Recently, this approach has served as the basis to define generalized entanglement and conditions for quantum complexity. Here, we investigate the stability of generalized coherent states under Markovian open-system dynamics. In particular, we identify conditions under which generalized coherent states emerge as pointer states for systems described by algebras more general that the standard oscillator algebra. We present a streamlined method to find pointer states in the weak-coupling approximation, and discuss conditions for this approximation to be valid. We find that generalized coherent states and pointer states coincide under more restrictive conditions than the canonical, harmonic-oscillator coherent states. Finally, we address the connection of generalized coherent states to noiseless subspaces and subsystems.

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