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Incorporating Dissipation in Quantum Dynamics ALBERTO ACEVEDO, California State University San Bernardino, MANUEL BERRONDO, JEAN-FRANCOIS S. VAN HUELE, Brigham Young University — Dissipative effects in nature are sometimes useful, often neglected, but almost always present in real physical systems. Microscopic dissipative effects offer special challenges. We discuss the application of an algebraic method designed to determine the time evolution of explicitly time-dependent quantum systems to cases where dissipation occurs. We show how the Caldirola-Kanai Hamiltonian which leads to a damping term in the classical equation of motion can be incorporated into the quantum operator formalism in both the position-momentum and the ladder operator algebras of quantum oscillators. We then study the time evolution of simple oscillators, driven oscillators, and optomechanically coupled oscillators. We discuss the unitarity of the evolution and compare the Caldirola-Kanai model with other approaches that include dissipation in quantum evolution.

Jean-Francois Van Huele
Brigham Young University

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