

Exploring the Realm Beyond Exponential Decay in Open Quantum Systems

Thursday, July 25, 2024 1:30 PM (25 minutes)

Recent advancements in quantum mechanics have challenged the classical understanding of decay processes, traditionally encapsulated by the exponential decay law. This presentation, based on our previous work [1], delves into the nonexponential decay regimes in open quantum systems, a domain governed by the continuum. The study illuminates the theoretical predictions and experimental opportunities surrounding deviations from exponential decay, particularly in the context of atomic nuclei, yet extends its relevance to a broad array of many-body open quantum systems including hadrons, atoms, molecules, and nanostructures.

The research introduces novel observables for experimental exploration of the post-exponential decay regime, focusing on the decay of threshold resonances, particle correlations in three-body decays, and interference between near-lying resonances. Through detailed methodological advancements, we shed light on the quantum interference in nonexponential decay and propose promising candidates and scenarios for further experimental verification in the uncharted territory of quantum decay dynamics.

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[1] S. M. Wang, W. Nazarewicz, A. Volya, and Y. G. Ma, *Phys. Rev. Research* 5, 023183 (2023).

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Session Classification: A Mixed Session: Theory & Reactions & Structure