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Long-time Behavior of Nuclear Spin Decays on Various Lattices
ERIC SORTE, BRIAN SAAM[1], University of Utah — The transverse nuclear magnetic resonance (NMR) decays of ^{129}Xe in polycrystalline xenon were recently shown to have a universal property: in the long-time regime (after a few times T_2), these decays all converge to the same sinusoidally modulated exponential function irrespective of the initial transverse spin configuration (prepared by a sequence of one or more rf pulses). The present work constitutes a comprehensive experimental exploration of this phenomenon. It examines transverse decays for several different isotopic concentrations of ^{129}Xe, employs additional pulse sequences, and performs similar measurements in a different material: ^{19}F in single-crystal and polycrystalline CaF_2. With the possible exception of polycrystalline CaF_2 where the observation of the long-time behavior is limited by the experimental resolution, these systems all display the long-time universal behavior, characterized by particular values of the exponential decay coefficient and beat frequency that were unique for each lattice. This behavior has been theoretically predicted based on the notion that microscopic chaotic mixing plays a role in these decays.

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