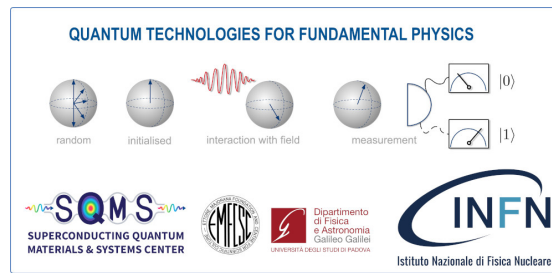


Quantum Technologies for Fundamental Physics



Contribution ID: 55

Type: not specified

Test of Causal Non-Linear Quantum Mechanics by Ramsey Interferometry on the Vibrational Mode of a Trapped Ion

Tuesday, September 5, 2023 9:00 AM (25 minutes)

Kaplan and Rajendran have recently demonstrated that non-linear and state-dependent terms can be consistently added to quantum field theory to yield causal non-linear time evolution in quantum mechanics. Causal non-linear theories have the unavoidable feature that their quantum effects are dramatically sensitive to the full physical spread of the quantum state of the system. As a result, such theories are not well tested by conventional atomic and nuclear spectroscopy. By using a well-controlled superposition of vibrational modes of a 40Ca^+ ion trapped in a harmonic potential, we set a stringent limit of 5.4×10^{-12} on the magnitude of the unitless scaling factor $\tilde{\epsilon}\gamma$ for the predicted causal, non-linear perturbation.

Presenter: RAJENDRAN, Surjeet (The Johns Hopkins University)

Session Classification: Tests of Quantum Mechanics