Quantum Coherence in an Atomic Ensemble

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Study of the quantum behavior in a macroscopic object has been a long-standing interest to physicists since Schrodinger’s seminal example of “cat” state. We study the highly-correlated state in a cigar-shaped atomic ensemble created by a single photon excitation, and discuss how its quantum properties, as distributed throughout a macroscopic scale, preserve over time. In particular, we study the quantum dynamics of the atomic ensemble by quantum witness and the violation of the extended Leggett-Garg inequality.