

Single-photon-induced quantum coherence in an atomic ensemble

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Atomic ensemble interacting with nonclassical light provides an interesting platform for studying the quantumness of macroscopic systems. Here, we study the generation and dynamics of the quantum coherence in an atomic ensemble induced by a single photon. We show that the extended Leggett-Garg inequality and quantum coherence witness both provide useful means to verify and characterize the quantum nature, with the latter being a more sensitive indicator. Our calculation also shows that, while higher optical density provides stronger indication of quantumness, lower optical density can prolong the presence of quantumness.