

Spin-squeezing and Dicke state preparation through single-photon heterodyne measurement

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We investigate the collapse of a coherent superposition of two-level atoms induced by a single-photon heterodyne quantum non-demolition (QND) measurement, and show that such a measurement process leads to the generation of spin-squeezed and Dicke states. We describe the stochastic process of the measurement and the associated atomic evolution in a wavevector formalism. Analytical formulas of the atomic distribution momenta are derived in the weak coupling regime for both short and long time behavior and are in good agreement with those from a Monte-Carlo simulation.

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