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Nonclassicality and decoherence of photon-subtracted squeezed states ASOKA BISWAS, Dept. of Chemistry, Univ. of Southern Califonia, Los Angeles, California 90089, GIRISH S. AGARWAL, Dept. of Physics, Oklahoma State Univ., Stillwater, Oklahoma 74078 — Single-photon subtracted squeezed vacuum states are equivalent to Schrodinger kitten states and show non-Gaussian nature in phase space. Such states are useful in entanglement distillation, loophole-free test of Bell's inequality, and quantum computing. We discuss nonclassical properties of these states in terms of the sub-Poissonian statistics and the negativity of the Wigner function. We derive a compact expression for the Wigner function from which we find the region of phase space where Wigner function is negative. We find an upper bound on the squeezing parameter for the state to exhibit sub-Poissonian statistics. We then study the effect of decoherence on the single-photon subtracted squeezed states. We present results for two different models of decoherence, viz. amplitude decay model and the phase diffusion model. In each case we give analytical results for the time evolution of the state. We discuss the loss of nonclassicality as a result of decoherence. We show through the study of their phase-space properties how these states decay to vacuum due to the decay of photons. We show that phase damping leads to very slow decoherence than the photon-number decay and the state remains nonclassical at long times.

Asoka Biswas
Dept. of Chemistry, Univ. of Southern Califonia, Los Angeles, California 90089

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