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Phase Coherence of Schrödinger Cat Sates in Gaseous BECs[1]
WILLIAM REINHARDT, University of Washington, Seattle — A quantum state diffusion (QSD) numerical study, initially carried out in the simple Bose-Hubbard model, of the stability of both the creation and stability of macroscopic superposition states of gaseous Bose condensates in double well traps is reported. It is assumed that observations are made in the far-detuned quantum non-demolition regime, and that de-phasing dominates particle loss. Within the framework of these assumptions, which avoids consideration of highly pedigreed cats, we present the results of a phase space analysis of QSD, with surprising results. Presence of continuous, but far-detuned, observation destabilizes the formation of cats following pi-phase imprinting of the part of the condensate in one of the wells, but in a surprisingly predictable manner, suggesting methods for at least partially negating its influence. Further, once macroscopic superposition states are formed, there are parameter regimes where simple single shot observation of the density profiles, and in some cases even continuous monitoring, of even quite extreme macroscopic superpositions has little effect on their continuing stability.

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