Abstract Submitted
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Stochastic Quantum Gas Dynamics[1] NICK P. PROUKAKIS, STUART P. COCKBURN, School of Mathematics and Statistics, Newcastle University — We study the dynamics of weakly-interacting finite temperature Bose gases via the Stochastic Gross-Pitaevskii equation (SGPE). As a first step, we demonstrate [jointly with A. Negretti (Ulm, Germany) and C. Henkel (Potsdam, Germany)] that the SGPE provides a significantly better method for generating an equilibrium state than the number-conserving Bogoliubov method (except for low temperatures and small atom numbers). We then study [jointly with H. Nistazakis and D.J. Frantzeskakis (University of Athens, Greece), P.G.Kevrekidis (University of Massachusetts) and T.P. Horikis (University of Ioannina, Greece)] the dynamics of dark solitons in elongated finite temperature condensates. We demonstrate numerical shot-to-shot variations in soliton trajectories (S.P. Cockburn et al., arXiv:0909.1660.), finding individual long-lived trajectories as in experiments. In our simulations, these variations arise from fluctuations in the phase and density of the underlying medium. We provide a detailed statistical analysis, proposing regimes for the controlled experimental demonstration of this effect; we also discuss the extent to which simpler models can be used to mimic the features of ensemble-averaged stochastic trajectories.

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