Abstract Submitted
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Quasi-1D Bose gas experiments: a quantitative study via the stochastic Gross-Pitaevskii equation[1] STUART P. COCKBURN, DONATELLO GALLUCCI, NICK P. PROUKAKIS, School of Mathematics and Statistics, Newcastle University, UK — A number of quantitative experiments have been performed in the last few years looking at properties of very elongated weakly-interacting quasi-one-dimensional Bose gases, where fluctuations have to be taken fully into account. We show here that a treatment based on a modified stochastic Gross-Pitaevskii equation provides an accurate ab initio model for describing such experiments. In particular, our approach reproduces accurately the in situ density profiles obtained in the experiments of Trebbia et al. [Phys. Rev. Lett. 97, 250403 (2006)] and van Amerongen et al. [Phys. Rev. Lett. 100, 090402 (2008)], while excellent agreement is found between the SGPE density fluctuation data and that from the recent experiment of Armijo et al. [Phys. Rev. Lett. 105, 230402 (2010)]. Our treatment is based on explicitly solving a one-dimensional stochastic Gross-Pitaevskii equation, with the effect of beyond-ground-state transverse occupied modes accounted for by simultaneously modifying the inherent system nonlinearity and treating thermally excited transverse modes as independent, ideal Bose gases.

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Stuart P. Cockburn
School of Mathematics and Statistics, Newcastle University, UK

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