Abstract Submitted
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Characterizing the momentum distribution of vortex systems in an expanded Bose-Einstein condensate[1] A. JOY ALLEN, Joint Quantum Centre (JQC) Durham-Newcastle, School of Mathematics and Statistics, Newcastle University, ANGELA C. WHITE, Quantum Systems Unit, Okinawa Institute of Science and Technology Graduate University, Okinawa, Japan, NICK G. PARKER, NICK P. PROUKAKIS, CARLO F. BARENGHI, Joint Quantum Centre (JQC) Durham-Newcastle, School of Mathematics and Statistics, Newcastle University — The quantization of the vorticity and the ease of experimental accessibility and control make Bose-Einstein condensates ideal systems to study the dynamics of disordered arrangements of vortices, or vortex tangles. Recently, the experimental generation of a vortex tangle in a cigar shaped BEC [1] has revealed that upon expansion the condensate maintains its aspect ratio, in contrast to the well-established inversion of aspect ratio for an elongated non-turbulent BEC. We investigate the requirements for this self similar expansion by numerically modelling the expansion of a BEC with various vortex configurations, including vortex lattices, array of vortex dipoles and vortex tangles. Furthermore, we calculate the momentum distribution [2] of these condensates, both before and during the expansion, with the aim to determine whether this quantity characterizes the vortex configuration in a reliable way.

[1] Henn et al. PRL 103, 045301 (2009).
[2] Thompson et al. Laser Phys. Lett. 11, 015501 (2014).

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