Abstract Submitted
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Measures of turbulence in Bose-Einstein condensates[1] ANGELA WHITE, NICK PROUKAKIS, CARLO BARENGHI, Joint Quantum Centre (JQC), Durham-Newcastle, School of Mathematics and Statistics, Newcastle University, Newcastle upon Tyne, NE1 7RU, England, UK — Turbulence, a dynamically reconnecting tangle of vortices, is ubiquitous throughout nature and can be found in both classical and quantum fluids. Trapped atomic condensates are an ideal test-bed for investigating the small-scale properties of turbulent tangles of vortices, due to the simple quantized nature of vortices in quantum fluids and the experimental control over condensate dimensionality and vortex dynamics.The quest to understand and study quantum turbulence in trapped atomic Bose-Einstein condensates raises unique challenges. In particular, it is important to understand how to create and characterize turbulent tangles. Motivated by work in classical fluids, we investigate if methods that are known to efficiently mix classical fluids, known as pseudo-Anosov stirring protocols, also efficiently mix trapped atomic condensates. In order to characterize turbulence, we develop some measures that are experimentally accessible, based on the density and distribution of vortices in trapped atomic condensates. At scales larger than the vortex core size, we describe how the momentum spectrum of vortices scales with vortex number. We also investigate velocity correlations as a measure of turbulence and vortex distribution in two-dimensional condensates.

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