Abstract Submitted
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Long-lived Dark Solitons in Ring-Trap Condensates[1] NICK PROUKAKIS, DONATELLO GALLUCCI, Joint Quantum Centre (JQC) Durham-Newcastle, Newcastle University, UK — We demonstrate the feasibility of generation of quasi-stable counter-propagating solitonic structures in an atomic Bose-Einstein condensate confined in a realistic toroidal geometry, and identify optimal parameter regimes for their experimental observation [1]. Using density engineering we numerically identify distinct regimes of motion of the emerging macroscopic excitations, including both solitonic motion along the azimuthal ring direction, such that structures remain visible after multiple collisions even in the presence of thermal fluctuations, and snaking instabilities leading to the decay of the excitations into vortical structures. Our analysis, which considers both mean field effects and fluctuations, is based on the JQC ring trap geometry [2]. References: Gallucci and Proukakis, New J. Phys. (Focus on Atomtronics-enabled Quantum Technologies) [to appear, 2016] (arXiv:1510.07078); [2] Murray et al. Phys. Rev. A 88 053615 (2013).

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Nick Proukakis
Univ of Newcastle

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