Abstract Submitted
for the DAMOP20 Meeting of
The American Physical Society

Controlled persistent current transport between toroidal quantum gases THOMAS BLAND, Newcastle University, ARTEM OLIINYK, OKSANA CHELPANOVA, IGOR YATSUTA, Taras Shevchenko National University of Kyiv, CHARLES HENRY, Georgia Southern University, LUIGI AMICO, University of Catania, LEONG CHUAN KWEK, National University of Singapore, MARK EDWARDS, Georgia Southern University, NICK PROUKAKIS, Newcastle University, ALEXANDER YAKIMENKO, Taras Shevchenko National University of Kyiv — Realizing transport of quantized vorticity between ring-shaped atomic Bose-Einstein condensates could be a key step in diverse cold atom quantum technologies and atomtronic devices. In this work we present recent results on the deterministic transfer of persistent current between co-planar rings of cold atoms, creating a prototype atomtronic switch through a tunable weak link at the common interface of two density-coupled rings. We explicitly demonstrate such transfer with the presence of both rotation and linear translation, within the context of pure mean-field simulations (Gross-Pitaevskii equation) and examine the sensitivity of this process to finite-temperature fluctuations (by self-consistently coupling the dissipative Gross-Pitaevskii equation to a quantum Boltzmann equation for the thermal cloud, known as the Zaremba-Nikuni-Griffin method). These investigations open perspectives for the development of a novel type of quantum sensor based on angular momentum transfer in atomtronic circuits.

Thomas Bland
Newcastle University

Date submitted: 31 Jan 2020 Electronic form version 1.4