

Abstract Submitted
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Studies of a toroidal superfluid Bose-Einstein condensate with a weak link S. ECKEL, J.G. LEE, F. JENDRZEJEWSKI, A. KUMAR, K.C. WRIGHT, W.D. PHILLIPS, C.J. LOBB, G.K. CAMPBELL, Joint Quantum Institute, NIST and the University of Maryland — We have created a toroidally-shaped BEC of ^{23}Na mechanically stirred with a rotating barrier potential. In this system, we have observed hysteresis in the persistent current state, which is a common feature of superfluid and superconducting systems with Josephson junctions. The barrier, which is modeled as a weak link, induces phase slips in the superfluid between well-defined persistent current states. The rotation frequency at which these phase slips occur differ, depending on whether the phase slip results in an increase or decrease of the persistent current. In addition to the observed hysteresis, we will discuss recent progress toward measuring the current-phase relationship of our weak link. With both hysteresis and the appropriate current-phase relation, it is possible that our toroidal BEC could be used as a sensitive rotation sensor, in a manner analogous to an RF-SQUID's sensitivity to magnetic field.

Gretchen Campbell
Joint Quantum Institute, NIST and the University of Maryland

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