Abstract Submitted
for the DAMOP17 Meeting of
The American Physical Society

Thermally activated phase slips of a Bose-Einstein condensate in a ring trap MASAYA KUNIMI, IPPEI DANSHITA, Yukawa Institute for Theoretical Physics, Kyoto University — Recently, the NIST group has experimentally measured the lifetime of the superflow of Bose-Einstein condensates in ring traps and found that it significantly depends on the temperature [1]. If the superflow decays dominantly due to thermally activated phase slips(TAPS), the lifetime is expected to obey the Arrhenius law. They argued that the measured lifetime is inconsistent with the Arrhenius law. However, their estimation of the energy barrier, which determines a dominant contribution to the temperature dependence of the lifetime, is not quantitatively accurate so that more profound theoretical analyses are needed in order to examine the possibility of the superflow decay via TAPS. In this work, we quantitatively calculate the lifetime of the superflow due to TAPS by the Kramers formula combined with the mean-filed theory [2,3]. Recently, this formalism has been successfully applied to explaining the experiments of the damping of dipole oscillations of 1D Bose gases in optical lattices [4], in terms of TAPS [3]. We will compare our results with the NIST experiment. [1] A. Kumar, et al., arXiv:1608.02894. [2] J. S. Langer and V. Ambegaokar, Phys. Rev. **164**, 498 (1967). [3] M. Kunimi and I. Danshita, arXiv:1610.08982. [4] L. Tanzi et al., Sci. Rep. **6**, 25965 (2016).

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Date submitted: 24 Jan 2017 Electronic form version 1.4