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Searching for Majorana Fermions in 2D Spin-orbit Coupled Fermi Superfluids at Finite Temperature MING GONG, Department of Physics, the University of Texas at Dallas, Richardson, Texas, 75080 USA, GANG CHEN, Department of Physics and Astronomy, Washington State University, Pullman, Washington, 99164 USA, SUOTANG JIA, State Key Laboratory of Quantum Optics and Quantum Optics Devices, College of Physics and Electronic Engineering, Shanxi University, Taiyuan 030006, CHUANWEI ZHANG, Department of Physics, the University of Texas at Dallas, Richardson, Texas, 75080 USA, CHUANWEI ZHANG TEAM, JIA COLLABORATION — Recent experimental breakthrough in realizing spin-orbit (SO) coupling for cold atoms has spurred considerable interest in the physics of 2D SO coupled Fermi superfluids, especially topological Majorana fermions (MFs) which were predicted to exist at zero temperature. However, it is well known that long-range superfluid order is destroyed in 2D by the phase fluctuation at finite temperature and the relevant physics is the Berezinskii-Kosterlitz-Thouless (BKT) transition. In this Letter, we examine finite temperature effects on SO coupled Fermi gases and show that finite temperature is indeed necessary for the observation of MFs. MFs are topologically protected by a quasiparticle energy gap which is found to be much larger than the temperature. The restricted region for the observation of MFs have been obtained. Phys. Rev. Lett. In Press.

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