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Spontaneous Vortices in Imbalance Populated Fermion Gas, Finite Size System JUNG-JUNG SU, YUN-PIL SHIM , REMBERT DUINE, ALLAN H. MACDONALD, Department of Physics, University of Texas at Austin — Atomic Fermion gases with mismatched densities have attracted much interest recently both experimentally and theoretically. These gases are related to superconductors in a magnetic field, to color superconductivity in high density QCD and to other systems. The main focus of recent research is on the possibility of unusual pairing states, the Larkin-Ovchinnikov-Fulde-Ferrel(LOFF)[1] phase, the Deformed Fermi surface(DFS)[2] and other states have been suggested in the past few years. We work specifically on two-dimensional systems with circular hard walls which contain atoms with two different hyperfine states and different populations. In addition to phase separation, a phenomenon that has already been observed[3], we consider the possibility of the spontaneous formation of vortices and giant vortices in some regions of parameter space. [1] Qinghong Cui, C.-R. Hu, J.Y.T. Wei, and Kun Yang, cond-mat/0510717 [2] A. Sedrakian et al.,cond-mat/0404577 [3] R. Hulet, preprint.

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