Theory of Superconductivity in Mesoscopic Systems[1] JIAWEI HUO, WEIQIANG CHEN, Department of Physics, The University of Hong Kong, Hong Kong, China, SRINIVAS RAGHU, Department of Physics, Stanford University, Stanford, CA, 94305, FUCHUN ZHANG, Department of Physics, The University of Hong Kong, Hong Kong, China — By using Bogoliubov-de Gennes (BdG) equations, we study superconducting (SC) states in a quasi 2-dimensional system of radius R. It is shown that no vortices exist in s-wave SC samples with $R < R_c \sim \xi(0)$, the $T = 0$ coherence length. We predict that chiral p-wave states exhibit superconductivity for $R < R_c$ only in the presence of a vortex with opposite chirality. This *reentrant* SC phase is a consequence of non-zero chirality of the pairing order parameter and implies the presence of chiral edge currents. Our study may be applied to sharply probing the pairing symmetry of unconventional superconductors.

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