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**Stability of Half-Quantum Vortices in px+ipy Superconductors**[1]
SUK BUM CHUNG, University of Illinois at Urbana-Champaign, HENDRIK BLUHM, EUN-AH KIM, Stanford University — We have analyzed the possibility of finding half-quantum magnetic vortices in a quasi-two-dimensional $p_x + ip_y$ superconductor (such as $Sr_2RuO_4$ is believed to be). The predicted exotic properties of these excitations - such as containing Majorana fermion core states with non-Abelian statistics - have recently attracted much attention for their potential application to topological quantum computation. However, these excitations have not been observed yet. In fact, an isolated half-quantum vortex has a divergent energy cost in the bulk due to the associated *unscreened* spin current. However, we have shown in our work that tightly bound pairs of half-quantum vortices with a finite separation may be stable or metastable when the ratio of spin superfluid density to superfluid density $\rho_{sp}/\rho_s$ is small - something we can reasonably expect in $Sr_2RuO_4$. Furthermore, we find that it might be possible to isolate them with present experimental techniques in submicron-sized samples; such samples may selectively allow only single half-quantum vortices to enter. Such an experiment which would be of great fundamental and potential practical interest.

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