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Spontaneously broken time-reversal symmetry in high-temperature cuprate superconductors. MIKAEL FOGELSTROM, MIKAEL HAKANSSON, TOMAS LOFWANDER, Chalmers — Conventional superconductors are strong diamagnets that through the Meissner effect expel magnetic fields. It would therefore be surprising if a superconducting ground state would support spontaneous magnetics fields. Such time-reversal symmetry broken states have been proposed for the high-temperature superconductors, but their identification remains experimentally controversial. Here we show a route to a low-temperature superconducting state with broken time-reversal symmetry that may accommodate currently conflicting experiments. This state is characterised by an unusual vortex pattern in the form of a necklace of fractional vortices around the perimeter of the material, where neighbouring vortices have opposite current circulation. This vortex pattern is a result of a spectral rearrangement of current carrying states near the edges. Ref. M. Håkansson, T. Löfwander, and M. Fogelström, Nature Phys.11 755, (2015)

Mikael Fogelstrom
Chalmers

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