Vortex lattice structure dependent on pairing symmetry in noncentrosymmetric superconductors

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Superconducting materials with no spatial inversion symmetry are candidates for realizing novel vortex states. In the noncentrosymmetric superconductors (NCS) of Rashba type in a nonzero magnetic field, the Zeeman effect on quasiparticles is highly anisotropic in the momentum space. We show that this anisotropy in the Zeeman effect facilitates appearance of novel vortex lattices with spatial modulation of Fulde-Ferrell-Larkin-Ovchinnikov (FFLO) type. Further, this anisotropy can couple to the orbital part of the pairing function, implying that the paramagnetic depairing effect itself may be controlled by the pairing symmetry. We report on extensive results on how the vortex lattice structure is affected by some typical pairing symmetry and by a parity mixing peculiar to NCS. A few examples of correspondence between an $H$-$T$ phase diagram and a pairing symmetry in real materials will also be discussed.


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