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# Altermagnetic spin splitting of the quasiparticle spectrum in multiband superconductors

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Multiband superconductors contain internal orbital or sublattice degrees of freedom, which can qualitatively alter the properties of the superconducting state. In particular, the internal structure of the superconducting order parameter, rather than its momentum dependence, can have nontrivial transformation properties, leading to so-called internally anisotropic pairing states. These states can exhibit phenomena absent in single-band superconductors, such as Bogoliubov Fermi surfaces.
Here, we investigate superconductivity in a two-orbital model with spin-orbit coupling, but spin-degenerate bands due to time-reversal- and inversion symmetry. Focusing on even-parity, time-reversal-symmetry-breaking superconducting states, we investigate pairing states with a non-unitary orbital structure, which generate spin splitting of the Bogoliubov quasiparticle bands. Interestingly, these bands exhibit either altermagnetic- or ferromagnetic-like spin structures, depending on the symmetry of the pairing state. These spin splittings are unique to multi-orbital systems and are related to the time-reversal-odd bilinear formed by the order parameter components.
Finally, we discuss possible experimental manifestations of the altermagnetic-like Bogoliubov quasiparticles, thereby providing experimental fingerprints of time-reversal symmetry-breaking superconductivity with nontrivial internal structure.