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【635】 Superconductivity without inversion and time-reversal symmetries

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In 3D, only time-reversal ($\mathcal{T}$) and inversion ($\mathcal{I}$) symmetries are essential for superconductivity. We examine the 2D case and find that $\mathcal{T}$ and $\mathcal{I}$ are not required, and having a combination of either symmetry with a mirror operation (M_z) on the basal plane suffices. Combining energetic and topological arguments, we classify superconducting states without $\mathcal{T}$ and $\mathcal{I}$ present, a situation encountered in several experimentally relevant systems. With only $\mathcal{I}$ combined with M_z , the system is generically fully gapped, potentially with topologically-protected chiral edge modes. All other cases do not support chiral Majorana edge states, but the superconductor can have point nodes with associated topologically-protected flat-band edge modes. Our analysis provides guidance on the design and search for novel 2D superconductors.

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