Z$_2$ Topologically Obstructed Superconducting Order$^1$ CANON SUN, YI LI, Johns Hopkins University — We propose a class of topological superconductivity in which the pairing order is Z$_2$ topologically obstructed in a time-reversal invariant system in three dimensions. When two Fermi surfaces are related by time-reversal and mirror symmetries, such as those in a Z$_2$ Dirac semimetal, the inter-Fermi-surface pairing in the weak-coupling regime inherits the band topological obstruction. As a result, the pairing order cannot be well-defined over the entire Fermi surface and forms a time-reversal invariant generalization of U(1) monopole harmonic pairing. A tight-binding model of the Z$_2$ topologically obstructed superconductor is constructed based on a doped Z$_2$ Dirac semimetal and exhibits nodal gap function. At an open boundary, the system exhibits a time-reversal pair of topologically protected surface states.

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