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Detection and utilization of topological superconductors in solid state systems¹

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Majorana modes are fermion-like excitations that were originally proposed in particle physics by Ettore Majorana and are characterized as being their own anti-particle. In condensed matter systems Majorana modes occur as fractionalized excitations with topologically protected degeneracy associated with such excitations. In this talk, I will start by reviewing a recent set of proposals for realizing Majorana modes in a large class of spin-orbit coupled, time-reversal symmetry broken superconducting systems. I will then discuss the possibility of confirming topological superconductivity using the fractional Josephson effect. Finally, I will discuss the possibility of using such Majorana modes for topological quantum computation.

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