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Topological superconducting states and protected qubit manipulations[1]

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Topological superconducting states supporting Majorana fermion excitations have been recently proposed as platforms for topological quantum computation. Of particular importance are semiconductor-superconductor and topological insulator-superconductor heterostructures, which have been shown to support Majorana fermions at order parameter defects under appropriate external conditions. Here I will focus on topologically non-trivial properties of two-dimensional semiconductors and one-dimensional quantum wires placed adjacent to superconductors, and discuss the possible protected qubit manipulations that may eventually lead to topological quantum computation.

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