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### **Non-abelian anyons on dislocations in Kitaev's honeycomb spin liquid<sup>1</sup>**

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Kitaev's honeycomb model [1] is an exactly solvable model of a quantum spin liquid. Its gapped phase exhibits  $Z_2$  topological order and has low-energy excitations in the form of  $Z_2$  fluxes (visons). Previous studies [2] have demonstrated that even trivial lattice defects such as vacancies induce free magnetic moments with peculiar properties. We show [3] that certain kinds of lattice dislocations and bond defects in this system carry even more exotic excitations: unpaired Majorana fermions. Each pair of such defects (known as twists [4]) gives rise to a non-local physical (complex) fermion mode made out of two Majorana (real) fermions connected by a  $Z_2$  gauge string. Their interaction decays exponentially with the distance. The non-local fermion can be created or annihilated by winding a vortex around a dislocation. The vortex also changes its topological charge in this process. The model remains exactly solvable in the presence of such defects and reveals a crucial role of the emergent gauge field in the physics of Majorana modes.

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