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Dislocations and their braiding in topological insulators ANDREJ MESAROS, Department of Physics, Boston College, VLADIMIR JURICIC, JAN ZAANEN, Instituut-Lorentz, Leiden University — We demonstrate the fundamental importance of crystal lattice dislocations in two-dimensional topological insulators. These defects characterize the topological state through the appearance of electronic localized midgap states. The states turn out to be robust even for the class of materials where they are not protected. At the same time, these localized electronic states have interesting quantum properties. We show that adiabatic braiding of dislocations, which can be achieved using lattice shear induced dislocation glide, brings out the quantum statistics of the electronic bound states.

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