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**Possible realization of interacting symmetry-protected topological phases in topological crystalline insulators** HIROKI ISOBE, University of Tokyo, LIANG FU, Massachusetts Institute of Technology — The effects of electron-electron interaction in edge states of mirror-symmetry protected topological crystalline insulators (TCI's) are discussed. The analysis is performed by using bosonized Hamiltonian following the Tomonaga-Luttinger liquid theory. When two pairs of helical edge states exist, electron-electron interaction could gap out one edge mode, which is a possible realization of interacting symmetry-protected topological (SPT) phases. This type of SPT phase is closely related to a Luther-Emery liquid in spinful 1D system. We also propose a method of detecting the SPT phases by STM. The other focus of the study is the classification of SPT phases in mirror-symmetry protected TCI's. By adopting the Chern-Simons theory, we find that electron-electron interaction reduces the classification from $Z$ to $Z_4$. It means that the edge states can be gapped out when four pairs of edge states exist. In other cases, the edge modes cannot be fully gapped. Each of these states corresponds to a different SPT phase depending on the relevant interaction process.

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