Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Space group constraints on weak indices in topological crystalline insulators DANIEL VARJAS, FERNANDO DE JUAN, Univ of California - Berkeley, YUAN-MING LU, The Ohio State University — In this work we derive constraints on weak indices of topological insulators and superconductors coming from space group symmetry. Weak indices are topological invariants of lower dimensional slices of the Brillouin zone, notable examples are the Chern numbers in class A and weak Z_2 indices in class AII in 3D. The components of the weak indices form a momentum space vector that transforms in a simple fashion under space group symmetries, using results of momentum space crystallography we find the allowed values for each Bravais lattice. Nonsymmorphic symmetries, such as screw axes and glide planes pose additional constraints. Accounting for both of these we find that most space groups experience some restriction, to the extent that some cannot support nontrivial weak topological insulators and superconductors at all. This result puts a strong constraint on candidates in the experimental and numerical search for topological materials based on the lattice structure alone.

Daniel Varjas
Univ of California - Berkeley

Date submitted: 03 Nov 2015 Electronic form version 1.4