Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

**Disorder-induced density of states on the surface of a spherical topological insulator** ADAM DURST, Hofstra Univ — We consider a topological insulator of spherical geometry and numerically investigate the influence of disorder on the density of surface states. To the clean Hamiltonian we add a surface disorder potential of the most general Hermitian form, $V = V^0(\theta, \phi) + \mathbf{V}(\theta, \phi) \cdot \sigma$. We expand these four disorder functions in spherical harmonics and draw the expansion coefficients randomly from a 4D Gaussian distribution. For each disorder instantiation, we solve for the energy spectrum via exact diagonalization. Then we compute the disorder-averaged density of states by averaging over 200,000 different instantiations. Disorder broadens the Landau-level delta functions of the clean density of states into peaks that decay and merge together. Increasing disorder strength pushes states closer to zero energy, resulting in a low-energy density of states that becomes nonzero for sufficient disorder, typically approaching an energy-independent saturation value. But for purely spin-dependent disorder with $\mathbf{V}$ either entirely out-of-surface or entirely in-surface, we identify intriguing disorder-induced features in the vicinity of the Dirac point. These are explained in terms of the breaking (or not) of two chiral symmetries of the clean Hamiltonian.

Adam Durst
Hofstra Univ

Date submitted: 08 Nov 2016 Electronic form version 1.4