LDOS Multifractal Hunter's Guide to Dirty Topological Insulators MATTHEW FOSTER, Rutgers, the State University of New Jersey — We compute the multifractal spectra associated to local density of states (LDOS) fluctuations due to weak quenched disorder, for a single Dirac fermion in two spatial dimensions. Our results are relevant to the surfaces of Z_2 topological insulators such as Bi_2Se_3 and Bi_2Te_3, where LDOS modulations can be directly probed via scanning tunneling microscopy. We find a qualitative difference in spectra obtained for magnetic versus non-magnetic disorder. Randomly polarized magnetic impurities induce quadratic multifractality at first order in the impurity density; by contrast, no operator exhibits multifractal scaling at this order for a non-magnetic impurity profile. For the time-reversal invariant case, we compute the first non-trivial multifractal correction, which appears at two loops (impurity density squared). We discuss spectral enhancement approaching the Dirac point due to renormalization, and we survey known results for the opposite limit of strong disorder.

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