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**Experimental Proposal to Detect Topological Ground State Degeneracy** MAISSAM BARKESHLI, Station Q, Microsoft Research, YUVAL OREG, Weizmann Institute of Science, XIAO-LIANG QI, Stanford University — One of the most profound features of topologically ordered states of matter, such as the fractional quantum Hall (FQH) states, is that they possess topology-dependent ground state degeneracies that are robust to all local perturbations. Here we present the first proposal to directly detect these topological degeneracies in an experimentally accessible setup. The detection scheme uses nonlinear electrical conductance measurements in a double layer FQH system, with appropriately patterned top and bottom gates. We propose two experimental platforms; in the first, the detection of topologically degenerate states coincides with the detection of ZN parafermion zero modes. We map the relevant physics to a single-channel ZN quantum impurity model, providing a novel generalization of the Kondo model. Our proposal can also be adapted to detect the ZN parafermion zero modes recently discovered in FQH line junctions proximitized with superconductivity.

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