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Modular Anomalies in the Topological Classification of 2+1D and 3+1D Edge Theories[1] MOON JIP PARK, Univ of Illinois - Urbana, CHEN FANG, B. ANDREI BERNEVIG, Princeton Univ, MATTHEW GILBERT, Univ of Illinois - Urbana — Classification of topological phases of matter in the presence of interactions is an area of intense interest. While much progress has been made on classification of interacting bosonic systems, the classification of fermionic systems is less established. One possible means of classification is via studying the partition function under modular transforms, as the presence of an anomalous phase arising in the edge theory of a D-dimensional system under modular transforms, or modular anomaly, signals the presence of a (D+1)-dimensional nontrivial bulk. In this work, we discuss the modular transforms of conformal field theories along a (2+1)-D and (3+1)-D edge. By both analytical and numerical methods, free chiral complex fermions in (2+1)-D and (3+1)-D are shown to be modular invariant, however, we show in (3+1)-D that a background U(1) gauge field results in the presence of a modular anomaly that is the manifestation of a quantum Hall effect in a (4+1)-D bulk.

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Moon Jip Park
Univ of Illinois - Urbana

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