

## Generalized Freed-Witten anomalies

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The 't Hooft anomaly of a global symmetry can be defined as a nontrivial phase acquired by the partition function as we move along some path in the moduli space of gauge fields. It measures the obstruction to lift the partition function to a (trivial) section of a line bundle over the space of gauge fields modulo gauge transformations, i.e. the symmetry cannot be gauged. On the contrary, there exist "rigid" gauge transformations which act as nontrivial automorphisms of the gauge field, such that we simply sit at a fixed basepoint in the space of gauge fields. We show that even in this scenario, one may obtain a nontrivial phase for the partition function after performing such a gauge transformation, implying that the partition function must be vanishing at this basepoint. These cases typically correspond to when we activate a nontrivial cohomology class for the gauge field, and in the context of D-branes, the condition for the partition function to be non-vanishing is precisely the Freed-Witten anomaly cancellation condition. We illustrate with examples how the aforementioned phase can be computed by an evaluation of the anomaly theory on the mapping torus. As an important application, we determine the analogue of the Freed-Witten anomaly for the M5-brane, and also that for the D3-brane on S-folds through a dimensional reduction.