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A physicist-friendly reformulation of the mod-two Atiyah-Patodi-Singer index

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Gauge anomaly in 4-dimensions can be viewed as a current inflow into an extra-dimension, where the total phase of the fermion partition function is given in a gauge invariant way by the Atiyah-Patodi-Singer(APS) eta-invariant of a 5-dimensional Dirac operator. However, this formalism requires a non-local boundary condition, which makes the physical roles of edge/bulk modes unclear and the causality of the total theory doubtful. In this talk, we consider a special case where the Dirac operator is in a real representation and its eta invariant becomes the mod-two type APS index. We propose a physicist-friendly reformulation of the mod-two index using domain-wall fermion formalism, which naturally describes how the global anomaly is canceled between edge and bulk.

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