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Reformulation of anomaly inflow on the lattice and construction of lattice chiral gauge theories

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This research aims to analyze the integrability condition of the chiral determinant of 4D overlap fermions and construct lattice chiral gauge theories.

We formulate the integrability condition with 5D and 6D lattice domain wall fermions. Our formulation parallels the recent cobordism classification of the global 't Hooft anomaly using the η-invariant based on the Dai-Freed theorem and the Atiya-Patodi-Singer index theorem in the continuum theory.

The necessary and sufficient condition for constructing a lattice chiral gauge theory comes down to the statement that "$\exp(2\pi i\eta) = 1$ for any gauge configurations satisfying the admissibility condition in 5D lattice space.", where $\exp(2\pi i\eta)$ is defined as the phase of the partition function of the 5D domain wall fermion.

Primary authors: PEDERSEN, Juan William (The University of Tokyo);   Prof.   KIKUKAWA, Yoshio (The University of Tokyo)

Presenter: PEDERSEN, Juan William (The University of Tokyo)

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