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Six-dimensional regularization of chiral gauge theories on a lattice I

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We propose a 6-dimensional lattice regularization of chiral gauge theories.

In our formulation, Weyl fermions are localized on the junction of two different domain-walls. One domain-wall naturally exhibits the Stora-Zumino chain of the anomaly descent equations. Another domain-wall mediates a similar inflow of the global anomalies. The anomaly free condition is equivalent to requiring the measure of the 6-dimensional Dirac fermions to cancel the axial $U(1)$ and parity anomalies. “Localizing” the gauge fields on the 4-dimensional junction using the Yang-Mills gradient flow, as proposed by Grabowska and Kaplan, we non-perturbatively define the 4-dimensional path integral of the target chiral gauge theory.

In the first talk, we present the basic idea of our formulation, emphasizing on why the 6-th dimension is needed for the global anomalies.

In the second talk, we explain our lattice set-up in details.

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