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Index of lattice Dirac operators and K-theory

Wednesday, October 30, 2024 3:00 PM (30 minutes)

We mathematically show an equality between the index of a Dirac operator on a flat continuum torus and the η invariant of the Wilson Dirac operator with a negative mass when the lattice spacing is sufficiently small. Unlike the standard approach, our formulation using the K-theory does not require the Ginsparg-Wilson relation or the modified chiral symmetry on the lattice. We prove that a one-parameter family of continuum massive Dirac operators and the corresponding Wilson Dirac operators belong to the same equivalence class of the K^1 group at a finite lattice spacing. Their indices, which are evaluated by the spectral flow or equivalently by the η invariant at finite masses, are proved to be equal.

Primary authors: Dr AOKI, Shoto (U. Tokyo, Komaba); FUKAYA, Hidenori (Osaka Univ.); Prof. FURUTA, Mikio (U. Tokyo, Komaba); Prof. MATSUO, Shinichiroh (Nagoya U.); Prof. ONOGI, Tetsuya (Osaka Univ.); Prof. YAMAGUCHI, Satoshi (Osaka Univ.)

Presenter: FUKAYA, Hidenori (Osaka Univ.)

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