

My research interest in recent years mainly focus on applying field-theoretic methods to study condensed matter systems, such as graphene, topological insulators, Weyl semimetals and strange metals related to type II superconductors. I am also interested in quantum entanglement and non-Hermitian quantum physics which may be used to understand open systems.

Techniques used in study

Perturbative calculation in quantum field theories, Covariant Gaussian Approximation, Analytical and numerical calculation using Mathematica and C language.

Hsien-chung Kao, Professor

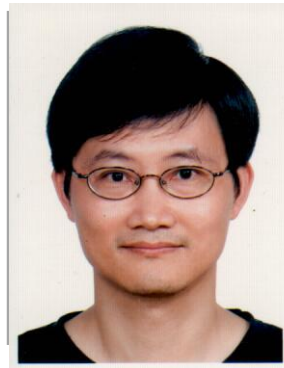
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Background:

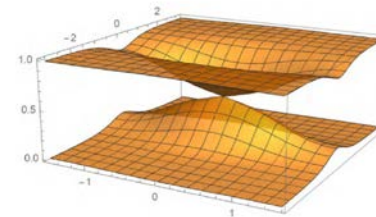
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Funding:

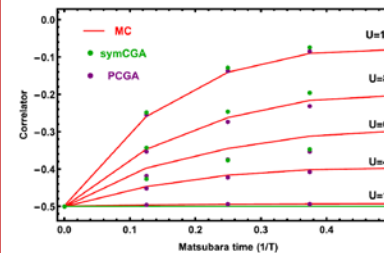
Ministry of Science and Technology
National Taiwan Normal University



Field-theoretic study of condensed matter systems



Bulk entanglement spectrum of a Chern insulator with a chemical potential $\mu = 3$. The fact that the spectrum is gapless is an indication that the system is in the topological phase.



Imaginary part of the Green's function $G(\tau, \mathbf{k})$ of a half filled 2D Hubbard model at $\mathbf{k} = (\pi, 0)$.

Publications

- Dah-Wei Chiou, Hsien-Chung Kao, and Feng-Li Lin, 2016, "Refined characterization of lattice Chern insulators by bulk entanglement spectrum," Phys. Rev. B **94**, 235129 (2016).
- B. Rosenstein, H. C. Kao, and M. Lewkowicz, 2017, "Nonlocal electrodynamics in Weyl semimetals," Phys. Rev. B **95**, 085148 (2017).
- Baruch Rosenstein, Dingping Li, Tianxing Ma, and H. C. Kao, "Mean field theory of short-range order in strongly correlated low dimensional electronic systems," Phys. Rev. B **100**, 125140 (2019).

