

Abstract Submitted
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Berry curvature for non-interacting fermions at finite temperature LUKAS WAWER, MICHAEL FLEISCHHAUER, University of Kaiserslautern
— Recently, several attempts were made to generalize the concept of topology to finite-temperatures states of non-interacting fermions. While for one-dimensional systems generalizations of the geometric Berry phase to density matrices based on the Uhlmann construction can be used for this purpose, their application to higher dimensions is faced with difficulties [1]. We show that in contrast the Ensemble Geometric Phase (EGP) introduced in [2], which is based on the many-body polarization, allows one to define a proper Berry curvature for finite-temperature states of 2D lattice fermions. The corresponding Chern number for the mixed-state Berry curvature is shown to be identical to that of the gapped ground state. We illustrate our findings with numerical simulations of the Harper-Hofstadter and the Qi-Wu-Zhang model.

[1] J. C. Budich, and S. Diehl, Phys. Rev. B 91, 165140 (2015)

[2] C. E. Bardyn, L. Wawer, A. Altland, M. Fleischhauer, S. Diehl, PRX 8, 011035 (2018)

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