Integer characterization of 2D topological insulators at finite temperature ZHOUSHEN HUANG, DANIEL AROVAS, UC San Diego — 2D band topological insulators (TI) are characterized by the TKNN number and its variants. However, this only works for zero temperature as the TKNN number is no longer quantized for $T > 0$. We show that using Uhlmann's parallel transport for density matrices, TI at finite temperature can still be characterized by an integer, which (1) reduces to the corresponding TKNN number at $T = 0$, and (2) exhibits a phase transition, i.e. drops to zero, at a critical temperature. Prototypical models such as Haldane's honeycomb lattice model and the Bernevig-Hughs-Zhang model will be discussed.

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