

Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Uhlmann Measure in Topological Insulators and Superconductors at Finite Temperature OSCAR VIYUELA, ANGEL RIVAS, MIGUEL ANGEL MARTIN-DELGADO, Univ Complutense — I will introduce the Uhlmann geometric phase as a tool to characterise density matrices of 1D and 2D topological insulators and superconductors. We achieve this goal by constructing new topological invariants called Topological Uhlmann numbers. Since this phase is formulated for general mixed quantum states, it provides a way to extend topological properties to finite temperature situations. New effects appear such as the existence of critical temperatures, novel thermal-topological transitions in models with high Chern numbers, breakdown of the usual bulk-edge correspondence, etc. Moreover, as the Uhlmann phase is an observable itself, we analyse potential measurement schemes that could be applicable to current experimental setups like cold atoms in optical lattices.

[1] 2D Density-Matrix Topological Fermionic Phases: Topological Uhlmann Numbers, O. Viyuela, A. Rivas, M.A. Martín-Delgado, Phys. Rev. Lett 113, 076408 (2014).

[2] Uhlmann Phase as a Topological Measure for One-Dimensional Fermion Systems, O. Viyuela, A. Rivas, M.A. Martín-Delgado, Phys. Rev. Lett 112, 130401 (2014).

Oscar Viyuela
Univ Complutense

Date submitted: 17 Sep 2014

Electronic form version 1.4