



Seminar

Topology and Higher symmetry under decoherence and weak-measurement

Kaixiang Su

The University of California, Santa Barbara

Time: 3:00m, July. 20, 2023 (Thursday)

时间: 2023年7月20日 (周四) 下午3:00

Venue: Room w563, Physics building, Peking University

地点: 北京大学物理楼, 西563会议室

Abstract

Decoherence represents the process that connects the quantum realm and the classical realm. Decoherence can also be viewed as a quantum system being weakly-measured by the environment. In this talk we will investigate the archetypal invertible topological order, the Chern insulator, and its behaviors under decoherence. We demonstrate that the fidelity between the decohered Chern insulator mixed density matrix and a trivial state is mapped to the partition function of a conformal field theory, and the nature of the conformal field theory strongly relies on the decoherence channel, which can be extracted through finite size scaling. We will also investigate the effect of weak-measurement on systems with higher form symmetries. We demonstrate that a state which spontaneously breaks the higher form symmetry can be altered through weak-measurement, which can potentially drive a phase transition that significantly weakens the spontaneous symmetry breaking. Intriguingly, this phase transition also enjoys a line of fixed points with self-duality.

About the speaker

Kaixiang Su is a third-year Ph.D. student studying condensed matter theory. Having obtained his bachelor's degree at Peking University in 2020, he then started pursuing a Ph.D. at the University of California, Santa Barbara, under the guidance of Cenke Xu. He is interested in understanding traditional condensed matter problems using novel approaches and exploring how condensed matter interplay with other fast-developing areas, such as quantum information. He also makes an effort to express the problem in a field theory language or fixed point models where an exact solution is possible.