



Weekly Seminar

Topological excitations in class C nonlinear sigma-model

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Time: 3:00 pm, March 25, 2026 (Wednesday)

时间: 2026年3月25日 (周三) 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

The presence of non-trivial topological excitations dramatically changes the picture of Anderson localization. In two dimensions, integer-valued topological indices are allowed only in three symmetry classes: class A (integer quantum Hall effect), class C (spinquantum Hall effect), and class D (thermal quantum Hall effect). This talk will shed light on such topological excitations in symmetry class C. In the first part of the talk, I will describe how Belavin–Polyakov–Pruisken instantons with topological charge equal to ± 1 can be constructed. Within the nonlinear sigma model (NLSM) formalism, the non-perturbative corrections to the anomalous dimensions of pure power-law scaling local operators, which determine the spectrum of generalized multifractality were computed. Using generalized Kubo formulas for conductivities, a two-parameter scaling diagram can be constructed. I will demonstrate how it helps to understand why the spin quantum Hall effect (SQHE) is a close cousin of the integer quantum Hall effect (IQHE). In the second part of the talk, I will demonstrate how one can realize a crossover between different topological symmetry classes. The main focus of this part will be on transformations of topological excitations across the crossover.

Reference:

Physical Review B 112, L161407 (2025); Physical Review B 110, 165431 (2024).

About the speaker

Dr. Parfenov is a junior researcher in Landau Institute for Theoretical Physics who works with Prof. Igor Burmistrov. He has three first-author publications in Physical Review B about spin Hall quantum insulators. His orcid ID can be found in <https://orcid.org/0000-0002-6731-9433>.