



ICTS Condensed Matter Seminar

Title : The Ising dual-reflection interface: Z_4 symmetry, Majorana strong zero modes and SPT phases

Speaker : Sergej Moroz (Karlstad University, Sweden)

Date : Wednesday, 29 January 2025

Time : 11:30 AM (IST)

Abstract : I will report on our theoretical investigations of an interface in the transverse field quantum Ising chain connecting an ordered ferromagnetic phase and a disordered paramagnetic phase that are Kramers-Wannier duals of each other. Unlike prior studies focused on non-invertible defects, this interface exhibits a symmetry that combines Kramers-Wannier transformation with spatial reflection. We demonstrated that, under open boundary conditions, this setup gives rise to a discrete Z_4 symmetry, encompassing the conventional Ising parity as a subgroup, while in a closed geometry a non-invertible symmetry emerges. Using the Jordan-Wigner transformation, we mapped the spin chain onto a solvable quadratic Majorana fermion system. In this formulation, we constructed Majorana strong zero modes that retain the Z_4 symmetry, ensure degeneracies of all energy eigenstates, and are robust under generic local symmetry-preserving perturbations of the fermion model, including interactions. In an open geometry of the studied model, we identified two regimes that exhibit different degeneracy patterns. I will discuss whether this is a manifestation of distinct fermion symmetry-protected topological orders protected by the Z_4 symmetry.

Venue : Emmy Noether Seminar Room

Zoom Link: <https://icts-res-in.zoom.us/j/93394092259?pwd=67cILGsDHZXXaWwXfu34rtDBayPnnT.1>

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