

ICTS Statistical Physics and Condensed Matter Seminar

Title : Some model «anticommuting» quantum spin liquids with residual ground state entropy

Speaker : Sumiran Pujari (Indian Institute of Technology Bombay)

Date : Wednesday, 02 April 2025

Time : 11:30 AM (IST)

Abstract : We discuss aspects of a lattice $S = \frac{1}{2}$ quantum Hamiltonian with bond-dependent couplings and related variants with quantum spin liquidity introduced recently by the author. These models have a mutually «anticommuting» algebra of extensively many local Z_2 conserved charges -- the adjective in the title for these quantum spin liquids. This mutual algebra is like the algebra of quantum spin- $\frac{1}{2}$ local degrees of freedom however arising in the structure of the *local conserved charges*. As provable consequences, these models have finite residual entropy density in the ground state with a simple but non-trivial degeneracy counting and concomitant quantum spin liquidity, as elaborated in Ref.~[1]. The spin liquidity relies also on a geometrically site-interlinked character that is natural for «anticommuting» local conserved charges composed of spin- $\frac{1}{2}$ operators or Paulis, in contrast to e.g. the bond-interlinked character of the local Z_2 conserved plaquette charges of the Kitaev honeycomb spin- $\frac{1}{2}$ model which leads to a mutually commuting algebra. We will discuss the connections and differences of this kind of quantum spin liquidity in relation to many-body topological order found in some gapped quantum spin liquids -- the canonical example being the Kitaev toric code which belongs to the more general class of Levin-Wen or string net constructions with mutually commuting algebras of conserved charges. If time permits, we will make several new exact statements on the many-body order present in this class of «anticommuting» quantum spin liquids and some conjectures pertaining to them.

[1] A theorem on extensive ground state entropy, spin liquidity and some related models, S. Pujari,

https://scipost.org/submissions/scipost_202502_00016v1/

Venue : Emmy Noether Seminar Room

Zoom Link: <https://icts-res-in.zoom.us/j/95245019461?pwd=J12bWNVDuSsRRJo52gViNHdrYuNJbv.1>

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