SEMPARIS – Séminaires en région parisienne

http ://string.lpthe.jussieu.fr/semparis/

LPENS Particle physics phenomenology and cosmology

Mercredi 17 Septembre 2025, 14 :00
LPENS, L378
Domaines : hep-th

Titre : *Novel topological phases with non-invertible symmetries, boundary quantum field theories and magic*

Orateur : **Ayan Mukhopadhyay (PUCV)**

Résumé : *I will discuss novel phases with topological ground state degeneracy in two dimensional lattices which can be realized by local Hamiltonians with non- invertible symmetries. These phases defy the entanglement bootstrap axioms which gapped phases in two-dimensions are expected to satisfy exactly after application of a finite depth quantum circuit. A class of such phases can be described in terms of generalized free field theories on the lattice which have no well defined continuum limit. The excitations of such phases follow associative, non-commutative and non-Abelian fusion rules given by a non-unital category capturing the feature that confined quasi-local (fractonic) excitations profoundly affect the nature of deconfined anyonic excitations. Some of these phases have non-local magic reflected by the following feature that to create a pair of deconfined electric/magnetic excitations it requires a large sum of operators that are products of local quantum operations such that the number of these operators appearing in the sum grows exponentially with the distance between the two excitations.*

The entanglement spectrum of a bi-partition of these phases can be described by novel local boundary QFTs although the generalized free field theory describing the bulk has no well defined continuum limit. Such boundary QFTs have novel anyonic excitations which cannot be mutually braided with each other. We propose that the classification of topological phases in two-dimensional lattices should involve the understanding of the entanglement spectrum and associated boundary quantum field theories.