SEMPARIS – Séminaires en région parisienne

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

Balades Quantiques de le LPENS

Mercredi 20 Novembre 2024, 12 :45
LPENS, CdF (3 Rue d'Ulm)
Domaines : cond-mat.stat-mech

Titre : *On the Propagation of Disorder-Order Interfaces over SSB Ground States in Quantum Spin Chains*

Orateur : **Maurizio Fagotti (LPTMS)**

Résumé : *I explore the dynamics of translationally invariant quantum spin-1/2 chains with local interactions and discrete symmetries spontaneously broken at zero temperature. Starting from a setup where couplings between two parts of the system are switched off, each part is prepared in independent equilibrium states, with one side settling into a symmetry-breaking ground state. Upon reintroducing the couplings, time evolution generates a front separating the ordered region. In integrable systems, this front recedes at the maximal velocity of quasiparticle excitations over the ground state. I show that, generically, order parameters vary on a subdiffusive scale of order* $t^{1/3}$, *with fluctuations exhibiting the same scaling. Thus, the interfacial region is characterized by full-range correlations without cluster decomposition properties. Using the transverse-field Ising chain as a case study, I show that all order parameters follow the same universal scaling functions. Additionally, I present data on Rényi entanglement asymmetries and a prediction valid also in the von Neumann limit. I introduce the Wigner-Yanase skew information to identify quantum contributions to the variance of extensive observables. I reveal that the breakdown of cluster decomposition includes a quantum contribution : subsystems within the interface, of extent comparable to the region, exist in macroscopic quantum states. Finally, I outline a semiclassical approximation that proves particularly effective near the edge of the lightcone.*