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TATA INSTITUTE OF FUNDAMENTAL RESEARCH

ICTS Seminar

- Title : Percolation in Fock space and many-body localisation
- Speaker : David Logan, University of Oxford & Indian Institute of Science, Bangalore
- Date : Tuesday, May 14, 2019
- Time : 3:00 PM
- Venue : Feynman Lecture Hall, ICTS Campus, Bangalore
- Abstract : Classical percolation models in Fock space are constructed and studied, as proxies for the quantum many-body localisation transition. Percolation rules are defined for two models of disordered quantum spin-chains, using their microscopic quantum Hamiltonians and the topologies of the associated Fock-space graphs. The existence of the percolation transition, and its critical properties, are deduced in several ways: exact solution for the critical disorder and correlation length exponent, systematic numerical study of the statistics and scaling of Fock-space clusters, and physical arguments based on freezing of local real-space segments of spins. Local observables averaged over Fock-space clusters are also shown to carry signatures of the transition, with their behaviour in direct analogy to that of corresponding eigenstate expectation values across the MBL transition. Fock-space clusters can likewise be explored under a mapping to kinetically constrained models; dynamics within this framework also show the ergodicity-breaking transition, and permit access to system sizes some two orders of magnitude larger than those possible for exact enumeration.