



## *Bose Colloquium*

12<sup>th</sup> April, 2019 | 04:00 pm | Fermion Hall

### Speaker

**Prof. David Logan**

University of Oxford, UK and  
Indian Institute of Science, Bangalore

### Title

**Percolation in Fock space and many-body localisation**

### 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.