Speaker: **John Timothy CHALKER (University of Oxford, UK)**

Title: **Operator dynamics and spectral correlations in chaotic many-body systems**

We study operator dynamics in many-body quantum systems, focusing on generic features of systems that are ergodic, spatially extended, and lack conserved densities. Quantum circuits of various types provide simple models for such systems. We focus on Floquet quantum circuits, comparing their behaviour with what has been found previously for circuits that are random in time. Floquet circuits, which have discrete time-translation symmetry, represent an intermediate case between circuits that are random in time and lack any symmetry, and systems with a time-independent Hamiltonian and continuous time-translation invariance. We find that ensemble-averaged autocorrelation functions show behaviour that is distinctively different in Floquet systems compared to systems in which successive time-steps are independent. Specifically, while average autocorrelation functions decay on a microscopic timescale for circuits that are random in time, in Floquet systems they have a late-time tail with a duration that grows parametrically with the size of the operator support. The existence of these tails provides a way to understand deviations of the spectral form factor from random matrix behaviour at times shorter than the Thouless time.

Joint work with Takato Yoshimura and Sam Garratt