



Joint Quantum Sciences Seminar
Wednesday, November 30, 4:00 pm
Jefferson 250

Immanuel Bloch

*Max Planck Institute of Quantum Optics
Ludwig-Maximilians University*

“Probing Hidden Non-local Antiferromagnetism & Many-Body Localisation Using Ultracold Atoms”

Recent experiments with quantum gas microscopes allow for an unprecedented view and control of quantum matter in new parameter regimes and with new probes. In our fermionic quantum gas microscope, we can detect both charge and spin degrees of freedom simultaneously, thereby gaining maximum information about undoped or strongly doped fermionic Hubbard systems. The doped 1D systems are characterised by a hidden non-local antiferromagnetic (AFM) order that can be revealed using non-local string correlators, very similar to the non-local topological order in Spin-1 Haldane chains. The hidden AFM order probed in our experiments is the foundation of spin-charge separation in one-dimensional fermionic systems.

Finally, I will discuss our recent experiments on novel *many-body localised (MBL) states of matter* that challenge our understanding of the connection between statistical physics and quantum mechanics at a fundamental level. I will also discuss very recent experiments, in which he have observed evidence for Griffith type anomalous slow transport on the ergodic side of the MBL transitions.

Student Presentation by Matthew Rispoli will begin at 4:00 PM
Guest Presentation will begin at 4:30 PM
Refreshments will be provided