Contribution ID: **23** Type: **not specified**

What condensed matter physics and statistical physics teach us about the limits of unitary time evolution

Thursday 20 June 2019 16:10 (40 minutes)

The Schrödinger equation for a macroscopic number of particles is linear in the wave function, deterministic, and invariant under time reversal. In contrast, the concepts used and calculations done in statistical physics and condensed matter physics involve stochasticity, nonlinearities, irreversibility, top-down effects, and elements from classical physics. The problems posed by reconciling these approaches to unitary quantum mechanics are of a similar type as the quantum measurement problem. My talk will argue that rather than aiming at reconciling these contrasts one should use them to identify the limits of quantum mechanics. For the simplest macroscopic system, a gas in thermal equilibrium, the length and time scale beyond which unitary time evolution and linear superposition break down are the thermal
wavelength and the thermal time. The reasons for this breakdown are ascribed to the irreversible emission of photons into space and to the uncontrollability of the microscopic state.

Presenter: DROSSEL, Barbara (Technische Universitaet Darmstadt)

Session Classification: Quantum and/or Classical Worlds?