



LUDWIG-
MAXIMILIANS-
UNIVERSITÄT
MÜNCHEN

ARNOLD SOMMERFELD
CENTER FOR THEORETICAL PHYSICS



Sommerfeld Theory Colloquium

Prof. A. Winter

University of Bristol and
National University of Singapore

Entanglement and the Foundations of Statistical Mechanics

We consider an alternative approach to the foundations of statistical mechanics, in which subjective randomness, ensemble-averaging or time-averaging are not required. Instead, the complete physical system (i.e. the subsystem of interest together with a sufficiently large environment) is in a quantum pure state subject to a global constraint, and thermalisation results from entanglement between system and environment.

In the "kinematic" setting of statistical mechanics, we formulate and prove a "General Canonical Principle", which states that the system will be thermalised for almost all pure states of the universe, and provide rigorous quantitative bounds using Levy's Lemma. In the second part of our work, we go on to consider a full dynamical model of equilibration in a setting of closed system Hamiltonian dynamics. We find conditions under which initial states equilibrate, and under which the equilibrium state has the character of a canonical state.

Wednesday, 20th May 09, 10:30 h, Room 348 / 349, Theresienstr. 37 / III