ΓΕΝΙΚΟ ΣΕΜΙΝΑΡΙΟ ΤΜΗΜΑΤΟΣ ΦΥΣΙΚΗΣ

PHYSICS COLLOQUIUM

Thursday, 12 May 2016

17:00 -18:00

3rd Floor Seminar Room

"Quantum thermodynamics: a case study for emergent behavior"

Prof. Günter Mahler

Institute of Theoretical Physics 1
University of Stuttgart

Abstract

Any attempt to provide a foundation of thermodynamics faces this central question: how come that a qualitatively different type of behavior emerges from the underlying physical substrate? Quantum thermodynamics is able to show that the partitioning of a closed quantum system into a smaller and a significantly larger part typically gives rise to thermal properties of the former, even though the system as a whole continues to exhibit unitary motion. Being based on entanglement, this feature may show up already in rather small total quantum systems, the dynamics of which can still be solved exactly. This allows for nano-thermodynamics, an entirely self-contradictory concept in the classical regime. Measurements of the thermal parameters have to be included as perturbations. In doing so, repetitive information retrieval will eventually result in a kind of operational quantum thermodynamics, which establishes an intuitive link between the new quantum and the old classical description.