

PHYSIKALISCHES KOLLOQUIUM

Wintersemester 2026/27

Das Kolloquium findet (soweit nicht anders angegeben) **jeweils montags um 14:15 Uhr im Röntgen-Hörsaal** des Physikalischen Instituts, Hubland Campus Süd, Universität Würzburg **und online via Zoom** statt.

Zugangsdaten siehe <https://www.physik.uni-wuerzburg.de/aktuelles/veranstaltungen-aus-der-physik/physikalisches-kolloquium/>

02.11.2026

Prof. Dr. Roderich Tumulka
Eberhard-Karls-Universität Tübingen, Fachbereich Mathematik

Thermalization and Entropy Increase in Closed Macroscopic Quantum Systems

Abstract

In the 20th century, it was a common idea that thermal equilibrium and entropy in quantum statistical mechanics would have to refer to mixed states, and thus to ensembles or open systems. In the 21st century, a number of researchers have explored a different approach: that thermodynamic behavior can also occur in a single, closed, macroscopic quantum system in a pure state. This approach is particularly connected with the "eigenstate thermalization hypothesis." I will discuss this approach and this hypothesis, what is meant here by thermalization, and some recent developments. I will also consider an extension of the concept of Boltzmann entropy (logarithm of the number of micro states consistent with a macro state) to such a system by setting $S(\nu) = \log \dim H_\nu$, where H_ν is the subspace of the system's Hilbert space H comprising the wave functions compatible with macro state ν . Since a general wave function in H is a superposition of contributions from different H_ν 's, it is not obvious what could even be meant by saying that this kind of entropy increases with time. I will propose such a meaning and explore the question under which conditions this increase occurs.

Für die Dozentinnen bzw. Dozenten der Fakultät

Prof. Dr. Trauzettel, Dr. Ünzelmann, Hr. Müller