



## Informatik-Kolloquium

Der Fachbereich Informatik der Johannes Kepler Universität Linz<sup>1</sup> lädt in Zusammenarbeit mit der Österreichischen Gesellschaft für Informatik (ÖGI) zu folgendem Vortrag ein:

Topic:Quantum states at equilibrium:<br/>thermal states, tensor networks and area lawsPresenter:Dr. Álvaro Alhambra<br/>Max Planck Institute of Quantum Optics, GermanyDate:Wednesday, September 22th 2021, 14:00

Location: https://jku.zoom.us/j/99046981277?pwd=d3Q5Uks2dU5wZjJCM2lQa3l1a3h3Zz09

## Abstract:

The thermal or Gibbs state is one of the most ubiquitous states of quantum matter, which appears when quantum systems come to equilibrium with their surrounding environment. Beyond its wide interest for physics, it also notably appears in the study of computational complexity and algorithms.

The most interesting and complex of these occur when the system at hand is composed of a large number of particles, such as in a regular lattice. In this talk, we will show that these states can be described classically, most notably through tensor network methods. Their effectiveness is related to how correlations are distributed in these systems. We also describe these through the so-called area law, which states that correlations are localized within the system at hand. In doing so, we illustrate one of the more successful ways of efficiently describing quantum states with classical algorithms.

## Short Bio:

Álvaro Alhambra is a postdoctoral researcher and Humboldt Fellow at Max Planck Institute for Quantum Optics. Previously, he was a postdoctoral researcher at Perimeter Institute for Theoretical Physics in Waterloo (Canada), where he arrived after finishing his PhD studies at University College London. His research lies at the interface of quantum information theory and quantum many-body physics, with a particular interest in the physics at finite temperature, both at equilibrium and away from it, and on how these can be described through classical and quantum algorithms.

Einladende: Assist.-Prof. Dr. Richard Küng, Univ.-Prof. Dr. Robert Wille Institut für Integrierte Schaltungen Abteilung Integrierter Schaltungs- und Systementwurf

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