

Fachbereich Physik

Institut für Physik Kondensierter Materie Prof. Dr. Benno Liebchen

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Physikalisches Kolloquium

| Title: | Coarse-graining and the microscopic origin thermodynamic irreversibility | of |
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| Speaker: | Prof. Dr. Michael te Vrugt, Johannes Gutenberg-Universität Mainz | |
| Date & time: | Friday 25.04.2025, 2 pm | |
| Location: Host: | ZKS-Uhrturmhörsaal, S2 08, R. 171, Hochschulstraße 4 Prof. Dr. Barbara Drossel | |
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Abstract:

Macroscopic thermodynamics has a clear arrow of time - entropy always increases in one direction and decreases in another one.

This stands in marked contrast to the microscopic laws of physics, which have no preferred direction of time. The question how to resolve this (apparent?) contradiction has led to intense discussions in the both physics and philosophy.

In this talk, I will give an introduction to this debate and use the Mori-Zwanzig formalism - a popular coarse-graining technique from



nonequilibrium statistical mechanics - to discuss possible routes for addressing this problem.

Moreover, I will show how the insights gained here can be used to address problems of more practical relevance, such as the derivation of hydrodynamic models for thin liquid films or active soft matter.