

Fakultät 1
Institut für Physik

Invitation to Physics Colloquium

Lecturer:

Herr Dr. Arik Malte Beck
Karlsruher Institut für Technologie (KIT)

Topic:

"Spatial Precision in Catalysis Characterization: From Averaged to Local"

Nanoparticles supported on porous carrier materials represent one of the most prevalent forms of heterogeneous catalysts today. However, the chemical processes occurring during catalytic reactions on these materials remain widely debated. A central challenge is the lack of spatially resolved insight – most commonly used tools, such as X-ray spectroscopy, provide only averaged information over large sample volumes, obscuring local phenomena.

In contrast, spatially resolved data enables a much deeper understanding of catalytic mechanisms, including the transport of active species across catalyst surfaces and structural transformations of the catalyst itself. In this talk, I will present approaches to introduce (quasi)spatial resolution into the in-situ monitoring of catalytic processes, with time resolution.

These methods span:

- Spatially defined model sample synthesis(1),
- In-situ electron microscopy(2,3), on powder catalysts,
- In-situ ptychographic X-ray computed nanotomography(4) on hierarchical catalyst pellets.

The techniques will be illustrated through studies of catalysts undergoing hydrogen reduction and redox reactions. Ultimately, the talk will provide mechanistic insights into phenomena that remain inaccessible without spatial resolution.

For References and biographical information, see below.

Date: Thursday, 04.12.2025
Time: 03:30 p.m.
Location: ZHG, room SR1

Im Auftrag von Prof. Flege - Stefanie Jannasch

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