

Fakultät 1
Institut für Physik

Invitation to Physics Colloquium

Lecturer:

Prof. Friedrich Esch
Technical University of Munich

Topic:

"Dynamics of catalytically active clusters under the (fast) scanning tunneling microscope"

In our group, we investigate the dynamics of catalytically active atoms and clusters at the atomic scale under harsh conditions – elevated temperatures, reactive gas environments, and electrolytes under potential control. As a local probe, we employ scanning tunneling microscopy (STM), which has been upgraded with sophisticated fast tools for movie acquisition, cluster tracking, and high-speed measurements. We complement this structural characterization with integral pulsed valve molecular beam "sniffer" activity measurements at the solid-gas interface, as well as chronoamperometry at the solid-liquid interface, utilizing atomically precise clusters on highly ordered supports.

I will apply this approach to discuss three examples:

- (i) Exploring the encapsulation of sub-nm clusters by a reducible oxide support and its impact on cluster stabilization and catalytic activity: Pt₅≤n≤20/Fe₃O₄(001)
- (ii) Investigating a reducible oxide support that is able to reversibly form and redisperse supported clusters. With Pt₂₀/CeO₂(111) samples, we demonstrate how cluster dimensionality can be controlled through the surface oxidation state of the support.
- (iii) Studying electrocatalytic activity on the single atom: We present first results on the oxygen reduction reaction (ORR) on iron octaethylporphyrin molecules under the fast EC-STM

Date: Thursday, 09.07.2026
Time: 03:30 p.m.
Location: ZHG, room SR1

Im Auftrag von Prof. Flege - Stefanie Jannasch

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