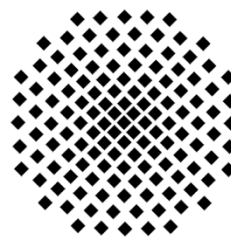


Stuttgarter Physikalisches Kolloquium

Fachbereich Physik, Universität Stuttgart
Max-Planck-Institut für Festkörperforschung
Max-Planck-Institut für Intelligente Systeme

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16:15 Uhr

V57.02

Universität Stuttgart, Pfaffenwaldring 57, 70569 Stuttgart-Vaihingen

Gastgeber: Prof. Dr. Maria Daghofer, Universität Stuttgart, Telefon: 0711 - 685-65255

Imaging Electronic and Atomic Motion in Molecules

Manish Garg
MPI Stuttgart

Abstract

The capability to capture electronic and atomic motions at their natural length (Ångstrom-scale) and time-scales (attoseconds to femtoseconds) is a long-standing goal in modern science. In my talk, I will show you how electron dynamics in molecules can be locally probed with angstrom-scale spatial resolution and 300 attosecond temporal resolution simultaneously, at the single orbital-level with the help of a scanning tunnelling microscope (STM), defying the previously established fundamental space-time limits [1-4]. Atomic motions in a single molecule can be directly imaged by realizing coherent anti-Stokes Raman spectroscopy in an STM [5-7]. These recent developments pave the way towards direct real space-time imaging of chemical reactions and phase transformations in two-dimensional materials.

1. Garg et al. Nature 359-363, 538 (2016).
2. Gutzler, Garg et al. Nature Reviews Physics 3, 441-453 (2021).
3. Garg et al., Nature Photonics, 16, 196-202 (2022).
4. Garg and Kern. Science 367 (6476), 411-415 (2020).
5. Luo et al. Nano Letters 22 (13), 5100-5106 (2022).
6. Luo et al. Nature Communications 14, 3484 (2023).
7. Luo, Sheng, et al. In preparation (2024)