



Institut für  
Angewandte Physik



Physikalisches  
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RHEINISCHE  
FRIEDRICH-WILHELMS-UNI-  
VERSITÄT BONN

## COLLOQUIUM „OPTICS AND CONDENSED MATTER“

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### **Optical control of nonequilibrium states in low-dimensional materials**

The physical properties of low-dimensional materials are often governed by enhanced couplings and correlations between coexisting electronic, lattice or magnetic orders. Active and selective optical control over decisive degrees of freedom of such systems could provide access to entirely new functionalities, for example, by steering electronic and nuclear motion far from equilibrium into metastable or ‘hidden’ states.

In this talk I will discuss how ultrafast low-energy electron diffraction (ULEED) and all-optical pump-probe spectroscopy in combination with tailored optical excitations can be harnessed to investigate and control such nonequilibrium states in low-dimensional materials. More specifically, I will present recent results on the coherent and valley-selective control of the Peierls transition in quasi-1D atomic indium wires, and the optical generation of functional metastable states in 2D transition metal dichalcogenides.

These and other findings in the field demonstrate how light, with its key properties of intensity, polarization, and wavelength, can serve as a precision tool for the controlled manipulation of matter.

**July 9th, starting with discussion at 17:00 h, talk at 17:15 h, live IAP lecture hall or via Zoom**

<https://uni-bonn.zoom.us/j/98441612025?pwd=a01SSjlkY1Q3SDFhL09JQk1qc1V6dz09>

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