

Physikalisches Kolloquium
Einladung**Physics Colloquium**
Invitation

Monday, 15 December 2025

Lecture Hall N24/H13, at 16:15

Coffee and cookies will be served in front of the lecture hall from 16:00

**Molecules in fields and solids: topology, control,
and many-body physics****Prof. Dr. Mikhail Lemeshko**Institute of Science and Technology Austria (ISTA)
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I am going to tell you about new physical phenomena emerging in molecules interacting with fields, with one another, and with a solid-state environment.

First, I will show how topological physics can emerge even in a single diatomic molecule periodically driven by a laser pulse [1]. This paves the way to studying controllable topological physics in gas-phase experiments with small molecules as well as to classifying dynamical molecular states by their topological invariants.

Second, I will present our recent progress on interaction of molecules and clusters with light carrying orbital angular momentum [2], with applications to precision spectroscopy, rotational control and chiral discrimination of molecules.

Finally, I will present our recent attempts develop simple models to describe soft semiconductors containing rotating molecules, such as lead-halide perovskites known for their outstanding photovoltaic properties [3]. Turns out, a lot of physics observed in such complex materials can already be captured by very simple lattice models.

[1] V. Karle, A. Ghazaryan, M. Lemeshko, Phys. Rev. Lett. 130, 103202 (2023)

[2] M. Maslov, G. M. Koutentakis, M. Hrast, O. H. Heckl, M. Lemeshko, Phys. Rev. Research 6, 033277 (2024)

[3] F. Kluibenschedl, G. M. Koutentakis, R. Alhyder, M. Lemeshko Phys. Rev. Lett. 134, 096302 (2025)