

Prof. Dr. D. Hunger

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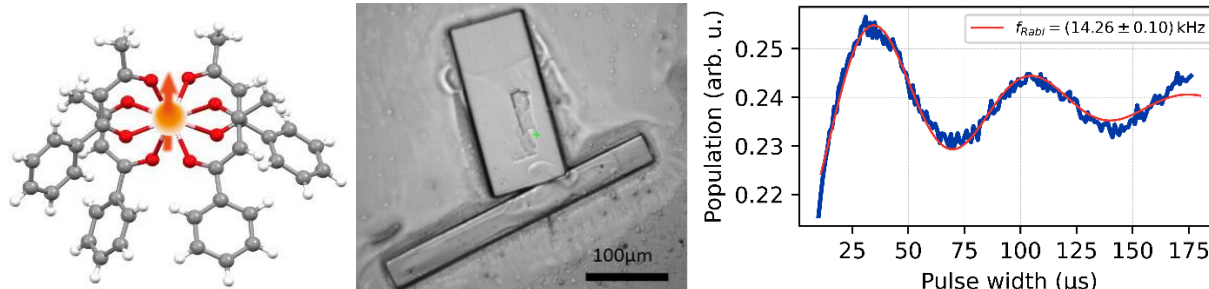
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PhD Thesis: Quantum control of rare-earth-based molecular complexes

Rare-earth ions doped into solids are a promising candidate in the development of quantum technologies due to the exceptional coherence times of their optical transitions and spin states.

In the group of Prof. Hunger, we are investigating rare-earth-based organic molecular complexes for their coherence properties and developing methods for integrating these molecules into microcavities to enhance light-matter interactions. Molecular complexes can be engineered to provide the desired optical and spin properties, and also have the ability to self-assemble into high-quality crystals.

This project targets to establish optically addressable molecular rare earth ions as a scalable qubit material for quantum communication and distributed quantum computing.



Left: Structure of a molecular complex. Centre: Image of a molecular crystal. Right: optically detected Rabi oscillations.

You will gain hands on experience in conducting experiments in a running optics lab, with a large range of aspects to explore, including optics setups, electronics & RF, programming, data analysis, and modelling.

Further reading: Serrano, D. et al. Ultra-narrow optical linewidths in rare-earth molecular crystals. Nature 603, 241–246 (2022), DOI: 10.1038/s41586-021-04316-2.

We're looking for a creative and motivated PhD student for this project!

If you'd like to be a part of this project, send your application (or questions), to:
Prof. David Hunger (david.hunger@kit.edu)

Applications should include your curriculum vitae and academic records.