Julius-Maximilians-
UNIVERSITÄT
WÜRZBURG

Technische Physik
Universität Würzburg

Master project:

Optimization of piezoelectric actuators to tune the emission energy of a single-photon source.

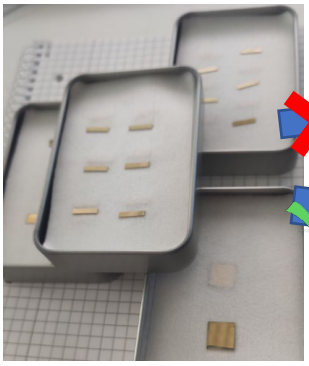
In the Gottfried-Landwehr Laboratory for Nanotechnologies, we produce single-photon emitting devices based on quantum dots (QDs) grown by molecular beam epitaxy (MBE) in III/V semiconductor membranes. One of the necessary functions of these devices is the ability of post-growth tuning of the emission energy. We use the most perspective method for tuning the emission energy using modern piezoelectric materials, transferring stress to a preselected QD. We have previously demonstrated the advantages of this method [1]. This work is focused on optimizing existing technology, obtaining more efficient, simpler devices, as well as a deeper study of their physical properties using optical spectroscopy. The final aim of your project is to prepare at least two piezoelectrically tuned devices for experiments on indistinguishability and test improvements in the processing and construction of the piezoelectric actuators.

[1] see **DOI:** 10.1 021/acsphotonics.9b00481 *and* **DOI:** 10.1021/acsphotonics.0c01465

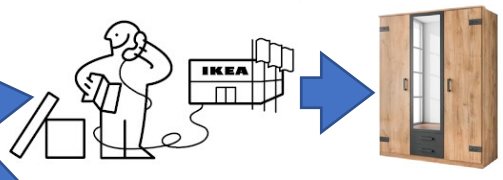
You will get:

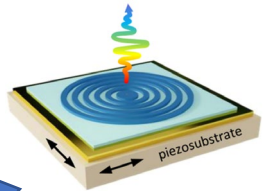
- Participation in a versatile scientific project:
  60% sample preparation, 40% optical spectroscopy
- **Experience in a clean room.** You will gain valuable experience for your future job in the semiconductor industry or/and science. You will be involved in the production cycle of single photon sources and learn how to process semiconductors
- **Experience in optical spectroscopy, single photon spectroscopy, and quantum entanglement.** You have the opportunity to touch on the topic for which the *Nobel Prize was awarded in 2022 (entangled photons)*.
- **Work experience in an international team**

We seek: A motivated student who wants to contribute to a large scientific project, to get valuable results applicable to the Master's thesis and get invaluable experience for their CV. Interest in: Quantum dots, Optics, Strength of materials, Semiconductors, Entanglement generation



Components
of piezo actuators





Device on piezo
actuator

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