

A2 – Nonlinear metasurfaces for photon-pair state generation **Control the quantum properties of light**

Join an international research team developing next-generation optical metasurfaces that can dynamically manipulate light. This PhD project combines nanophotonics, nonlinear optics, quantum optics, and advanced optical characterization to enable the generation of non-classical quantum states of light.

The position is hosted at the **Institute of Applied Physics, Friedrich Schiller University Jena (Germany)** and is part of the International Research Training Group **Meta-Active – Tailored Metasurfaces and Metasystems for Active Light Control**, funded by DFG.

Your Research Project

In this project, you will explore novel concepts for nonlinear metasurfaces and nanostructures that can generate entangled pairs of photons by spontaneous parametric down-conversion.

Key research topics include:

- Design of metasurfaces for photon-pair generation
- Theoretical description of spontaneous parametric down conversion
- Optimization of photon-pair generation efficiency
- Completely controlling the quantum state of the generated pairs
- Experimental characterization of generated quantum states using photon counting and correlation techniques

What You Will Gain

During your PhD, you will develop expertise in:

- Nanophotonic design and simulation
- Quantum photonics
- Quantum-state characterization
- Optical characterization and data analysis
- Scientific communication and international collaboration

Supervisory Team

Main Supervisor

Dr. Frank Setzpfandt (Friedrich Schiller University Jena)

Co-Supervisors / Collaborators

Prof. Andrey Sukhorukov (Australian National University)

Prof. Yuerui Lu (Australian National University)

Prof. Falk Eilenberger (Friedrich Schiller University Jena)

Prof. Isabelle Staude (Friedrich Schiller University Jena)

What We Offer

- Fully funded 3-year PhD position
- Salary according to TV-L E13 (75%)
- Joint supervision by leading researchers in Germany and Australia
- Minimum 12-month research stay at the Australian National University (Canberra)
- Access to world-class nanofabrication and optical characterization facilities
- International training workshops and networking opportunities
- Participation in a highly interdisciplinary and collaborative research environment
- A jointly supervised international PhD experience

Who Should Apply?

We welcome applications from candidates with a Master's degree in Physics, Photonics, Electrical Engineering, Materials Science, Optical Engineering or related disciplines.

Experience in optics, nanophotonics, numerical simulations, micro- and nanofabrication, or experimental physics is advantageous but not required.

Diversity and Inclusion

Meta-Active and Friedrich Schiller University Jena are committed to equal opportunities and fostering an inclusive and family-friendly research environment. We particularly encourage applications from women and other underrepresented groups in science.

Application Information

Start Date: July 2026 or as soon as possible thereafter.

Application Deadline: 20 July 2026

For detailed information about the research project, eligibility requirements, and the application procedure, please visit:

<https://www.meta-active.uni-jena.de/apply>

Ready to Apply?

Join an international team at the forefront of quantum nanophotonics and help develop the next generation of quantum light sources.