

B3 – All-optical tuning of nonlinear chiral emission from monolithic metasurfaces based on layered materials

Shape the future of active light control

Join an international research team at the cutting edge of nanophotonics, developing the next generation of ultrafast chiral light sources. This PhD project combines nonlinear optics, chirality, layered 2D materials, nanofabrication, and ultrafast optical spectroscopy to create active chiral nanophotonic light sources.

The position is hosted at the **Institute of Solid State 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 develop ultrafast, active nanophotonic sources of chiral light by combining all-optical tuning of time-reversal symmetry in layered materials with resonant enhancement in high-Q isotropic metasurfaces.

Key research topics include:

- All-optical tuning of nonlinear circular dichroism via time-reversal symmetry breaking in TMDs and layered materials
- Design, fabrication, and characterization of isotropic high-Q monolithic metasurfaces based on 3R-MoS₂ and 2H-TMDs
- Ultrafast pump-probe spectroscopy of second- and third-harmonic generation in layered materials
- Nanofabrication and integration of van der Waals heterostructures with dielectric metasurfaces
- Nonlinear optical characterization using SHG/THG microscopy, circular dichroism spectroscopy, and ultrafast laser systems

What You Will Gain

During your PhD, you will develop expertise in:

- Nonlinear optics and ultrafast laser spectroscopy
- Metasurface design and characterization
- Nanofabrication and 2D material device integration
- Chiroptical spectroscopy and circular dichroism measurement
- Nonlinear optical data analysis and experimental physics
- Scientific communication and international collaboration

Supervisory Team

Main Supervisor

Prof. Giancarlo Soavi (Friedrich Schiller University Jena)

Co-Supervisors / Collaborators

Prof. Dragomir Neshev (Australian National University)

Prof. Yuerui Lu (Australian National University)

Prof. Isabelle Staude (Friedrich Schiller University Jena)

Dr. Jan Wilhelm (University of Regensburg)

Dr. Omid Ghaebi (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 nonlinear chiral nanophotonics and help build the next generation of ultrafast active light sources.