Job Description
Doctoral Position

DC9: Multiphysics inverse design of reconfigurable metasurface.

Doctoral position at the Institute of Nanotechnology at the Karlsruhe Institute of Technology, in Karlsruhe, Germany.

Main supervisor: Prof. Carsten Rockstuhl [KIT]

Co-supervisors/mentors: Prof. Rasmus E. Christiansen [DTU], and Prof. Isabelle Staude [FSU]

Objectives:

- Development of advanced computational frameworks to design externally reconfigurable photonic metasurfaces. The work focuses on a self-consistent, coupled treatment of the underlying physical mechanisms that enable reconfigurability and the resulting optical response under external illumination, on the other hand.
- The focus is on time-varying photonic metasurfaces made from scattering structures. Modifying the properties of the materials from which the metasurface is made as a function of time by an external stimulus allows for a reconfigurable spatial and spectral steering. The project builds on and extends a multiple-scattering formalism to model experimentally realizable metasurfaces and to provide quantitatively predictive descriptions suitable for experimental validation.
- Inverse design of metasurfaces using adjoint-based methods and automatic differentiation of the electrodynamic and physical solvers. Parameters to be optimized are the temporal profiles of the time-varying properties and the physical mechanism that causes the temporal modulation for the widest possible range of modified steering properties.

This position is part of the MetaTune Doctoral Network "Reconfigurability using inversely designed metasurfaces", which has been funded under the Horizon Europe Marie Skłodowska-Curie Actions (MSCA) program.

Acquire knowledge: During the development of the thesis, the candidate will acquire in-depth knowledge of theoretical and computational approaches to describe reconfigurable metasurfaces within a scattering formalism, specifically adapted to time-varying photonic materials. Furthermore, profound insights into multiple inverse design techniques are obtained.

Design	Materials	Fabrication	Characterization
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→ Go to the project webpage for more information

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What METATUNE Offers:

- Gross salary from 3.700€/month (44.400€/year), with potential for additional funding depending on your family status.
- Work contract at the KIT for 36 months funded through the MSCA network, with the additional benefits for employees (public and universal health system, free schools, etc.).
- Two research stays, one 4-month at Danmarks Tekniske Universitet and one 3-month Friedrich-Schiller-Universität Jena are foreseen in the research plan.
- Opportunity to pursue a PhD degree at a leading European university within a collaborative, international network.
- Training program including research-specific and transferable skills courses.
- Active participation in workshops, conferences, and network-wide events to build professional and scientific connections.
- Stimulating, multidisciplinary, and international research environment within a prestigious European training network.

Starting date: September-November 2026.

Deadline for online application: May 31, 2026 (but candidates are encouraged to apply as soon as possible).

Mandatory Requirements:

- You must have a **master's degree** in either Physics or Optics and Photonics or a closely related topic.
- You should **not have a doctoral degree** at the time of recruitment.
- You must not have resided or carried out your main activity (work, studies, etc.) in Germany for more than **12 months in the 36 months** immediately before the recruitment (this is a requirement from the funding authority).
- Strong skills in the **English** language.
- Background knowledge in scattering theory is a must, and additionally, knowledge on time-varying photonic materials would be great.

→ Apply Now!