



UNIVERSITY
OF COLOGNE

Faculty of Mathematics and Natural Sciences



Photo: Simon Wegener

PhD position in research on multi-terminal Josephson junction with tunnel probes (f/m/x)

at the Physics Institute II

We are one of the largest and oldest universities in Europe and one of the most important employers in our region. Our broad range of subjects, the dynamic development of our main research areas and our central location in Cologne make us attractive for students and researchers from around the world. We offer a wide range of career opportunities in science, technology, and administration.

The group of Professor Yoichi Ando in the Physics Institute II of the University of Cologne is attempting to elucidate the non-Abelian nature of the Majorana zero modes generated in a topological insulator (TI) platform and to build a Majorana qubit. The successful candidate will work on TI-superconductor hybrid devices, specifically multi-terminal Josephson junction with tunnel probes, to understand the mesoscopic topological superconductivity realized in such a platform, to detect and manipulate the emergent Majorana zero modes, and to elucidate the results of the manipulation.

YOUR TASKS

- » Nanofabrication of multi-terminal Josephson junction devices (including SQUID) combining superconductor and TI with gates
- » Fabrication of tunnel contacts on the junction
- » Ultra-low-temperature experiments to understand the proximity-induced mesoscopic superconductivity and the Andreev bound states in such devices

YOUR PROFILE

You must hold a master's degree in experimental solid-state physics or nanoscience and must have hands-on experience in at least four of the following:

- » Nanofabrication of devices using electron-beam lithography
- » Ultra-low-noise transport measurements
- » Ultra-low-temperature experiments in a dilution refrigerator
- » Fabrication and operation of SQUID devices
- » Quantum transport experiments in mesoscopic systems such as quantum wires, quantum dots, or quantum Hall systems

WE OFFER

- » Opportunity to pursue a doctorate within the described research area
- » Access to state-of-the-art facilities and equipment
- » A diverse working environment with equal opportunities
- » Support in balancing work and family life
- » Flexible working time models
- » Extensive advanced training opportunities
- » Occupational health management offers

The University of Cologne promotes equal opportunities and diversity. Women will be considered preferentially in accordance with the Equal Opportunities Act of North Rhine-Westphalia (Landesgleichstellungsgesetz – LGG NRW). We also expressly welcome applications from all suitable candidates regardless of their gender, nationality, ethnic and social origin, religion, disability, age, sexual orientation and identity.

The position is available from 15 October 2025 on a part-time basis. Hours of work will be 19,92 hours per week (50%) for the 1st year, and thereafter 29,87 hours per week (75%). The contract is limited to 3 years. If the applicant meets the relevant wage requirements and personal qualifications, the salary will be based on remuneration group 13 TV-L of the pay scale for the German public sector.

Please apply online with proof of the required qualifications (letter of motivation, CV, list of publications, copies of certificates) without a photo under: <https://jobportal.uni-koeln.de>. The reference number is Wiss2508-09. The application deadline is 31 August 2025.

For further inquiries, please contact Dr Harald Kierspel (kierspel@ph2.uni-koeln.de) and take a look at our [FAQs](#).