

**Technische Universität Berlin**

Technische Universität Berlin offers an open position:

## **Research Associate (PostDoc) - salary grade 13 TV-L Berliner Hochschulen - 2nd qualification phase (for taking up a full professorship for the first time)**

part-time employment may be possible

**Faculty IV - Institute of High-Frequency and Semiconductor System Technologies / Semiconductor components and microelectronic systems**

**Reference number:** IV-458/24 (starting at the earliest possible / for 5 years / closing date for applications 18/10/24)

### **Working field:**

#### **Quantum Sensing for Brain Scanning (Computational + Experimental)**

Are you excited about designing quantum technology with the goal of solving important societal challenges? Are you interested in developing quantum magnetometers that can sense miniscule magnetic fields and non-invasively scan the human brain, helping solve fundamental mysteries of neuroscience? Are you a passionate, self-motivated and creative researcher who is curious about how the human brain works?

If so, then the newly formed Semiconductors and Microelectronic systems (SAM) group at TU Berlin has an exciting postdoctoral opportunity at the interface between quantum sensing, nanoelectronics, computational materials science and neuroscience.

#### **Project Details:**

Quantum sensors utilize the quantum mechanical properties of a system to detect physical variables such as electric fields, magnetic fields, temperature, strain etc. with unprecedented accuracy. Due to their exceptional sensitivity, spatial resolution, and accuracy, quantum sensors can have far-reaching impact in the fields of biotechnology and neuroscience. In particular, quantum sensors can help obtain high-resolution, non-invasive scans of the living brain in previously inaccessible detail. Miniaturized, chip-scale quantum sensors could be used to build wearable brain scanners to measure brain activity in day-to-day life. Such high-accuracy, high-fidelity scans of the brain obtained in the wild can lead to fundamental breakthroughs in neuroscience by providing a thorough understanding of brain functioning and helping develop effective treatments for neurological and psychological diseases.

This project aims to help realize this transformative potential of quantum sensing for brain scanning by addressing some key challenges faced by the field. This project will focus on developing quantum systems such as nitrogen-vacancy (NV) diamond centers and/or point defects in 2D materials. The project will have both computational and experimental aspects.

#### **Your tasks:**

- Conduct computational materials design for enhanced quantum sensing.
- Computationally design, experimentally fabricate and optimize quantum sensor devices for improved performance.
- Work on improving the sensitivity, wide-field imaging capabilities, miniaturization and read-out fidelity of quantum biosensors.
- Collaborate with an international, multi-disciplinary team to achieve our collective research agenda. Work in a tight feedback loop with experts in materials growth, characterization, circuits design and neuroscience to accelerate the development of next-generation quantum sensors.
- Produce high-quality publications and publicly disseminate research results through conferences.
- Contribute to the university through undergraduate and graduate teaching and mentoring.
- Serve the academic community at large through peer review, conference organization etc.

#### **What you can expect from us:**

- Participation in a young, energetic, growing, highly motivated and international team with a cordial and supportive culture.
- The opportunity to conduct parts of your project at the University of California, Berkeley and Lawrence Berkeley National Laboratory, USA.
- Benefit from close collaborations with world-renowned research groups at Berlin Quantum Group, Germany, TU Delft, Netherlands, Institute of Neuroinformatics, Zurich, EPFL, Lausanne, and UC Berkeley, USA.
- Exposure to a multidisciplinary research program that spans quantum sensing, quantum information, materials science and neuroscience.

#### **Requirements:**

- Successful completion of a university degree (Master, Diplom or equivalent) and PhD in Applied Physics, Electrical Engineering, Material Science, Biophysics or a related field.
- Knowledge and experience in at least two of the following topics:
  - Computational materials science (including tools such as Quantum ATK or VASP etc.).
  - Computational design of quantum devices or quantum sensors.

- o Experimental quantum sensing.
- o Experience with quantum device fabrication and characterization.
- A demonstrated ability to conduct independent and high-quality research.
- The ability to work and teach in English is required.

**Desirable qualifications:**

- Deep interest in quantum sensing and curiosity about the workings of the brain.
- Academic excellence, creativity, scientific passion and strong motivation to succeed.
- Strong communication, interpersonal, and organizational skills.
- Important skills such as leadership, ideation, problem-solving, and initiative-taking.
- The ability to work and teach in German or the willingness to acquire missing language skills.
- Experience with characterization of micro- and nano-structures.
- Experience with low-noise measurements and design of new sensing schemes.
- Ability to keep and maintain an ordered and safe work environment.
- Independent working style and the ability to work in diverse teams.
- Demonstrated achievements in the field of quantum sensing or quantum information.
- Extensive experience with nanoscale devices, especially on semiconductors or 2D materials.
- Experience in numerical data analysis and customization of control software (Labview/Matlab/Python).

Please send your application **with the reference number only by email** (single pdf file) to **personal@tmp.tu-berlin.de** with the following application materials:

- A cover letter in English, describing your motivation in applying for this position.
- Curriculum vitae in English, including a list of publications, if any.
- Academic Diplomas in English or German, of your relevant degrees.
- If possible, grade transcripts in English or German, including official description of the grading scale.

By submitting your application via email you consent to having your data electronically processed and saved. Please note that we do not provide a guaranty for the protection of your personal data when submitted as unprotected file. Please find our data protection notice acc. DSGVO (General Data Protection Regulation) at the TU staff department homepage: [https://www.abt2-t.tu-berlin.de/menue/themen\\_a\\_z/datenschutzerklaerung/](https://www.abt2-t.tu-berlin.de/menue/themen_a_z/datenschutzerklaerung/) .

To ensure equal opportunities between women and men, applications by women with the required qualifications are explicitly desired. Qualified individuals with disabilities will be favored. The TU Berlin values the diversity of its members and is committed to the goals of equal opportunities.

Technische Universität Berlin - Die Präsidentin - Fakultät IV, Institut für Hochfrequenz- und Halbleiter-Systemtechnologien, FG Halbleiterbauelemente und Mikroelektroniksysteme, Prof. Dr. Jadaun, Sekr. TIB 4/2-1, Gustav-Meyer-Allee 24, 13355 Berlin

The vacancy is also available on the internet at <https://www.personalabteilung.tu-berlin.de/menue/jobs/>

