Zertifikat seit 2008
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TECHNISCHE UNIVERSITÄT BERLIN

Reference number: IV-359/26 **Published:** 04.09.2026 **Start date (earliest):** Earliest possible, for 5 years
Salary: Salary grade 13 TV-L Berliner Hochschulen
Full/Part-time: full-time; part-time employment may be possible **Application deadline:** 02.10.2026

Research Associate (PostDoc) - 2nd qualification period (for the initial appointment to a full professorship)

Faculty IV - Electrical Engineering and Computer Science, Institute of High-Frequency and Semiconductor System Technologies / Semiconductor components and microelectronic systems

About us

Are you excited about discovering entirely new quantum defects and materials from first principles? Do you want to combine quantum materials simulation and artificial intelligence to build tools for designing next-generation quantum sensors?
The Semiconductors and Microelectronic Systems group at TU Berlin invites applications for a postdoctoral position at the intersection of computational materials science, artificial intelligence, quantum sensing and biomedical sensing.

Project Details:
We are seeking an outstanding postdoctoral researcher to help build a computational quantum-defect discovery program aimed at identifying and engineering quantum sensors that outperform today's state-of-the-art platforms.

Quantum spin defects in semiconductors, such as nitrogen-vacancy (NV) centers in diamond, can detect magnetic fields with extraordinary sensitivity and spatial resolution, enabling transformative applications in biotechnology, neuroscience, semiconductor metrology and quantum technologies.

The performance of these sensors is governed by material properties such as spin coherence (T_2), spin-lattice relaxation (T_1), optical readout contrast (C), charge-state stability and defect density. Despite remarkable progress, existing platforms operate well below the theoretical limits achievable for their material class.

A central goal of the project is the development of a next-generation computational discovery platform capable of predicting quantum-sensor performance directly from atomic-scale structure. The platform will combine first-principles simulation and machine learning into an automated workflow for predicting quantum-sensor performance, accelerating materials screening and designing new host–defect systems.

Using this platform, the postdoctoral researcher will explore and optimize quantum defects across diamond, silicon carbide, boron nitride, molecular spin systems and other emerging

materials, while also identifying entirely new host–defect combinations with the potential to establish new classes of quantum sensors.

Your responsibility

- Develop and validate a first-principles and AI-enabled computational platform for predicting quantum-sensor performance from atomic-scale defect structure.
- Develop workflows that connect defect-level materials properties to experimentally relevant sensor performance metrics.
- Create machine-learning methods for accelerated exploration of large quantum-material design spaces.
- Perform high-throughput screening and optimization of host–defect systems for quantum sensing.
- Apply the platform to biomedical and quantum-technology sensing challenges.
- Collaborate closely with experimental researchers in materials growth, device fabrication, quantum characterization and biomedical sensing.
- Publish high-impact research and present results at leading international conferences.
- Participation in teaching, advising students

Your profile

- Successfully completed university degree (Master, Diplom or equivalent) and PhD, or equivalent, in Materials Science, Applied Physics, Electrical Engineering, Condensed Matter Physics, Physical Chemistry, Computational Physics or a related field.
- Strong background in first-principles computational materials science including DFT simulations using tools such as Quantum ESPRESSO, VASP, GPAW, CP2K or related packages.
- Research experience in at least two of the following areas:
  a) Spin physics of point defects in semiconductors, including spin-phonon coupling, zero-field splitting, hyperfine interactions or spin relaxation and coherence.
  b) Multi-scale simulation methods such as DFPT, EPW, molecular dynamics, cluster correlation expansion (CCE), constrained DFT, DMFT, QMC or related approaches.
  c) Quantum chemistry methods (CASSCF, multi-reference CI) for excited-state calculations of point defects.
  d) Machine learning for scientific discovery, materials informatics or AI-assisted materials design.
- Evidence of independent, high-quality research and publication.
- Strong programming skills (Python, Fortran, C/C++ or related languages).
- The ability to teach in German and/or in English is required; willingness to acquire the respective missing language skills.
- Experience with high-performance computing and workflow automation is desirable.
- Strong communication, leadership and collaborative skills is desirable.

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What we offer

- A young, ambitious and highly international research team with a collaborative culture.
- Freedom to shape an emerging research direction at the intersection of quantum sensing, computational materials discovery and scientific AI.
- Opportunity to build a computational platform with broad impact across quantum sensing and quantum technologies.
- Access to state-of-the-art high-performance computing resources.
- Close collaborations with leading research groups at Berlin Quantum Group, TU Delft, Institute of Neuroinformatics Zurich, EPFL Lausanne, UC Berkeley and Lawrence Berkeley National Laboratory.
- Exposure to a multidisciplinary program spanning quantum sensing, materials discovery, biomedical technology and scientific AI.

How to apply

Please submit the following application materials **with the reference number only by email** (bundled in one PDF document, max. 5 MB) to: **personal@tmp.tu-berlin.de**

- A cover letter in English describing your motivation and fit for this position.
- Curriculum vitae in English, including a publication list, if applicable and names of
- Academic diplomas in English or German for the relevant degrees.
- Grade transcripts in English or German, including an official description of the grading scale, if available.
- 1 to 3 letters of recommendation, or alternatively, the contact information of 1 to 3 references who can provide said letters of recommendation.

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/.

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. Applications from people of all nationalities and with a migration background are very welcome.

Data protection:

Full job posting: