

Paul-Drude-Institut für Festkörperelektronik (PDI) in Berlin, Germany, invites applications for the following position:

PhD Student Position (m/f/d)(Full-time)

About the position

PhD Student Position for the topic:
"High-frequency SAW resonators for applications in quantum technology"

Atomic color centers in solids (single vacancies, antisite defects, impurities, etc.) are very attractive for applications in quantum technologies. In addition to optical and microwave techniques (photons), elastic vibrations (phonons) provide a complementary approach for spin manipulation in such centers. The main goal of this project is to realize optically addressed on-chip quantum memories and sensors controlled by coherent acoustic phonons. Specifically, we will use the dynamic strain of piezoelectrically generated surface acoustic waves (SAWs) to manipulate spin qubits consisting of color centers in SiC substrates. Due to the weak piezoelectricity of SiC, the efficient excitation of high-frequency SAWs requires the integration of strong piezoelectric films with high crystalline quality between SAW transducers and the SiC substrate.

The position is part of the Marie Skłodowska-Curie Doctoral Network "Hybrid INtegration of Alkaline niobate - tantalate films for advanced photonic and piezoelectric devices (HINA)". The HINA Doctoral Network proposes to consider the hybrid integration of alkaline niobate-tantalate thin films, $(K,Na)(Nb,Ta)O_3$ (KNTN, materials with the highest known experimentally measured electro-optic, nonlinear, piezoelectric, elasto-optic coefficients) in photonic and acoustic devices for advanced semiconductor photonics platforms. HINA links world-leading research groups at Academia and Industry to give a combined, integrated approach of synthesis/fabrication, characterization, modeling/theory linked to concepts for materials integration in devices and systems. More information can be found at <https://euraxess.ec.europa.eu/jobs/243636>.

Your responsibilities:

- Design and fabrication of interdigital transducers on KNTN/SiC hybrid systems for the efficient excitation of high-frequency SAWs (up to 6 GHz) operating over wide temperature ranges (4 K – RT)
- Characterization of highly confined SAWs with beam widths of a few micrometres propagating in such KNTN/SiC hybrid systems
- SAW-driven manipulation of spin centres located in the SiC substrate
- Demonstration of optically addressed spin-qubits controlled by high-frequency SAWs

Your profile:

Skills/Qualifications

- Master degree in physics or materials science
- Background in solid state physics
- Skills in clean-room technology and optical spectroscopy
- Fluent oral and written English (C1 or equivalent)
- Excellent IT and data analysis skills
- High motivation, excellent interpersonal and project management skills

Eligibility:

To be eligible, the applicant has to fulfil the following trans-national mobility criterion:

- not have resided or carried out their main activity (work, studies, etc.) in Germany for more than 12 months in the 36 months immediately before the recruitment date (unless as part of a compulsory national service or a procedure for obtaining refugee status under the Geneva Convention), and
- the applicant has to be (at the date of recruitment) a doctoral candidate (i.e. not already in possession of a doctoral degree). Researchers who have successfully defended their doctoral thesis but who have not yet formally been awarded the doctoral degree will not be considered eligible.

Position and salary:

This is a full-time position (39 hours per week) with 3 years duration and a tentative start date of 01.09.2025 or earlier.

For the salary of the Marie Skłodowska-Curie PhDs in Germany the European Commission provides a monthly Living Allowance of 3,342.20 € plus a monthly Mobility Allowance of 600 €. Researchers who have or acquire family obligations during their employment are also awarded a monthly Family Allowance of 660 €. Please note that the combined amounts form the monthly gross employer salary, which is subject to deductions and taxes as per national law. The monthly gross salary varies, depending on the personal circumstances, and

amounts to approximately 3,250 €/3,800 € (without family allowance/with family allowance). Family is defined as persons linked to the researcher by (i) marriage, or (ii) a relationship with equivalent status to a marriage recognised by the legislation of the country or region where this relationship was formalised, or (iii) dependent children who are actually being maintained by the researcher. A Special Needs Allowance might be awarded to recruited researchers with disabilities whose long-term physical, mental, intellectual or sensory impairments are certified by a competent national authority and of such nature that their participation in the action would not be possible without the special needs items or services.

What we offer:

- Job security and a good work-life balance
- International and culturally diverse community
- Mobile work
- Modern office located in the heart of Berlin with excellent public transport connections and a subsidized travel ticket
- Possibility to participate in professional development programs

About PDI

The Paul Drude Institute is part of the Forschungsverbund Berlin e.V. and a member of the Leibniz Association. The institute carries out basic and applied research at the nexus of materials science, condensed matter physics, and device engineering.

Inclusive & equal opportunity employer

With approximately 100 employees and more than 15 nationalities, PDI is committed to building a talented, inclusive, and culturally diverse workforce. We understand that our shared future is guided by basic principles of fairness and mutual respect. Among equally qualified applicants, preference will be given to candidates from marginalized groups. As an equal opportunity and family-friendly employer, we offer highly flexible employment conditions, such as flexible working hours, parental leave, and home office, and we strive to create a family- and life-conscious working environment.

How to apply

Applications must be submitted electronically via email to the HINA project manager at liza.basyrova@femto-st.fr by April 25, 2025, stating in the subject line that you are applying for the DC13 project.

The application must include:

- a dedicated cover letter (1 page)
- CV (2 pages)
- diploma (copy) of Master degree or equivalent degree which formally entitle to embark on a doctorate, including annexes with marks/classifications
- diploma (copy) of Bachelor degree or equivalent degree including annexes with marks/classifications
- names and contact details of two referees, who agreed to provide recommendation letters