Postdoctoral Position for AI/ML-Guided X-ray Characterization of Quantum Device

Position: Postdoctoral Researcher
Location: SLAC National Accelerator Laboratory
Start Date: FY2027
Duration: 2 years

Overview: The Stanford Synchrotron Radiation Lightsource (SSRL) at SLAC National Accelerator Laboratory is seeking a Postdoctoral Scholar to participate in a Laboratory Directed Research and Development (LDRD) project focused on understanding defects and buried interfaces in quantum devices. Defects at buried interfaces can strongly affect the performance of superconducting quantum devices, but they are difficult to identify and characterize. This project combines synchrotron X-ray measurements, theoretical and computational modeling, and AI/ML methods to better understand these defects and their effects on device materials.

Main Responsibility: The primary responsibility will be the development of a theory-based AI/ML platform for X-ray characterization of quantum-device materials. The platform will combine theoretical calculations with experimental X-ray data to identify defect-related signatures, interpret measured results, and guide future measurements. The goal is to build a general framework that connects microscopic defect models with X-ray observables and helps determine the most effective measurements for characterizing buried interfaces and defects. The successful candidate will work closely with experimental researchers at SSRL and with the theory team in SLAC's Energy Sciences Directorate (ESD).

Specific Responsibilities include, but are not limited to:

- Develop AI/ML methods and scientific computing workflows to support the goals of the LDRD project.
- Analyze X-ray experimental data and develop data-driven methods for interpreting results and guiding measurements.
- Develop and apply first-principles and other computational materials methods, as needed, to connect microscopic models with X-ray measurements.
- Work closely with experimental and theoretical researchers to translate scientific questions into computational approaches.
- Independently develop, validate, and troubleshoot computational tools and workflows, and learn new methods as needed.
- Communicate research progress through presentations, reports, publications, and team discussions.
- Prepare scientific manuscripts and contribute to future research proposals and follow-on funding opportunities.

Required Qualifications:

- A Ph.D. in physics, materials science, quantum information science, electrical engineering, applied mathematics, computer science, or a closely related field, completed before the start of the appointment.
- Strong computational research experience and scientific programming skills.
- Experience with machine learning, scientific computing, computational physics, data-driven modeling, or related methods.
- Ability to independently develop and troubleshoot computational and data-analysis workflows.

- Ability to work closely with experimental scientists and integrate modeling, experimental data, and computational methods.
- Demonstrated ability to conduct independent research while contributing effectively to an interdisciplinary team.
- Strong written and oral communication skills and a record of scientific achievement.

Application Materials: Applicants should provide a cover letter, a statement of research interests, a concise summary of research accomplishments, a curriculum vitae, a publication list, and the names of three references. Interested candidates are encouraged to contact Dr. Cheng Peng (cpeng18@slac.stanford.edu) and Dr. Paul Corbae (pjcorbae@slac.stanford.edu) to discuss research interests, project goals, and position details.

SLAC/Stanford is an equal opportunity employer, and all qualified applicants will receive consideration without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, disability, veteran status, or any other characteristic protected by law. We encourage all qualified applicants to apply; candidates do not need to meet all preferred qualifications to be considered.