Experimental Physicist

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Science and Technology on a Mission!

For more than 60 years, the Lawrence Livermore National Laboratory (LLNL) has applied science and technology to make the world a safer place.

We have an opening for an experimental physicist in the Quantum Coherent Device Physics Group in the field of open quantum system dynamics, quantum information, and quantum emulation with superconducting Josephson junction based circuits. You will work with device design characterization and classical simulation of open quantum system dynamics to realize novel applications of existing quantum technologies. This position is in the Condensed Matter Section of the Physics Division.

Essential Duties

- Lead and oversee the efforts (design, simulation, fabrication, characterization and control) of quantum coherent superconducting devices with applications in quantum emulation and quantum sensing.

- Maintain and install low-noise cryogenic and high vacuum environments for experiments with quantum coherent devices.

- Collaborate with a multi-disciplinary team of scientists such as computational scientists (chemists, materials, HEP/QCD), computer scientists, and engineers to develop next generation advanced applications of quantum devices.

- Publish research results in external peer-reviewed scientific journals and participate in domestic/international conferences.

- Develop research proposals complementary to ongoing efforts to DOE and external sponsors.

- Lead independent, complementary, research efforts and interact with a broad spectrum of scientists internally and externally.

- Mentor students, and postdoctoral researchers.

- Perform other duties as assigned.

Qualifications

- PhD in physics, quantum optics, quantum information or the equivalent combination of education and related experience.

- Advanced knowledge in the following areas (both theory and experiment): circuit quantum electrodynamics, quantum optimal control theory, bath engineering, and continuous variable quantum mechanics.

- Significant experience with the design, characterization, and implementation of ultra-low loss devices in the quantum regime, with an emphasis on high purity, aluminum, waveguide microwave resonators and additive manufactured waveguide microwave resonators of a variety of materials.

- Significant experience in the life cycle development of quantum hardware, from initial concept to modeling device performance in open source platforms such as QuTIP, to leveraging classical electrodynamics modeling

software such as ANSYS or COMSOL, to extract Hamiltonian parameters, to the verification and validation of Hamiltonian parameters through precision microwave characterization, including device utility/concept.

- Significant experience with the operation and maintenance of cryogen free dilution refrigerators, as well as the ability to create ultra-low noise environments for quantum hardware development such as resistive attenuation, low-pass filtering, high-frequency absorptive filtering, nonreciprocal outputs either with isolators or circulators, sub-milliGauss magnetic shielding protection, and signal amplification with cryogenic HEMT amplifiers.

- Significant experience with the theoretical underpinnings and experimental use of quantum limited amplifiers such as Josephson parametric circulators (JPC), Josephson Parametric Amplifiers (JPA), and/or traveling wave kinetic inductance amplifiers (KIT/TWPA).

- Significant experience in the methods and toolsets for aluminum Josephson based circuits such as in-situ tip-tilt electron beam evaporation with the Dolan or Bridge free techniques, as well as electron beam lithography of nanoscale sized circuits.

- Advanced verbal and written communication skills necessary to collaborate effectively in a team environment and develop and present scientific and technical research proposals and reports, as well as demonstrated ability to perform independent research.

Desired Qualifications

- Experience with computer coding in languages such as C++, python, and the Quantum Toolbox in Python (QuTIP).

- Understanding of the role quantum hardware in the context of the Laboratory mission in the scope of DOE and national interests.

- Experience in identifying, designing, and developing novel applications for existing/future quantum hardware.

Pre-Employment Drug Test: External applicant(s) selected for this position will be required to pass a post-offer, pre-employment drug test.

Anticipated Clearance Level: Q (Position will be cleared to this level). Applicants selected will be subject to a Federal background investigation and must meet eligibility requirements for access to classified information or matter. In addition, all L or Q cleared employees are subject to random drug testing. If you hold multiple citizenships (U.S. and another country), you may be required to renounce your non-U.S. citizenship before a DOE L or Q clearance will be processed/granted.

Note: This is a Career Indefinite position. Lab employees and external candidates may be considered for this position.

About Us

Lawrence Livermore National Laboratory (LLNL), located in the San Francisco Bay Area (East Bay), is a premier applied science laboratory that is part of the National Nuclear Security Administration (NNSA) within the Department of Energy (DOE). LLNL's mission is strengthening national security by developing and applying cutting-edge science, technology, and engineering that respond with vision, quality, integrity, and technical excellence to scientific issues of national importance. The Laboratory has a current annual budget of about $1.5 billion, employing approximately 6,000 employees.

LLNL is an affirmative action/ equal opportunity employer. All qualified applicants will receive consideration for employment without regard to race, color, religion, marital status, national origin, ancestry, sex, sexual orientation, gender identity, disability, medical condition, protected veteran status, age, citizenship, or any other characteristic protected by law.