

Funding Opportunity: NSF and AFRL Release Research in Floquet Engineered Quantum Systems (REFLEQTS) Solicitation

Lewis-Burke Associates LLC – December 12, 2024

The National Science Foundation (NSF) in collaboration with the Air Force Research Laboratory (AFRL) has announced a new solicitation for REsearch in FLOquet Engineered QuanTum Systems (REFLEQTS). The program aims to fund groundbreaking research in Floquet Engineered Quantum Systems with a specific focus on “engineering novel states of matter with enhanced functionalities in quantum systems.” REFLEQTS projects will include research on materials, devices, theory, and systems. REFLEQTS ultimately aims to bridge the fundamental science and technology by “designing materials and devices with specific functionality aimed at quantum sensing.”

REFLEQTS is aligned with the National Quantum Initiative (NQI) which calls for a coordinated effort among federal agencies to accelerate quantum science and technology research in the United States. The overarching goals of the REFLEQTS program are the development of:

- “Novel and scalable quantum systems,
- Cutting-edge spectro-microscopy techniques; micro- and nano-photonic, phononic, millimeter/THz frequencies; and electronic structures and mechanisms,
- Enhancing efficiency in generation and detection, and
- Direct read-out novel states of matter.”

Topics of interest for this solicitation include but are not limited to:

- “Novel and scalable quantum systems that use time-periodic driving forces to deterministically and systematically alter material properties using strong coupling (e.g.: photon-phonon, magnon-photon) under thermodynamic equilibrium with coherent perturbation and the application of these systems to devices/sensors.
- Integration of novel materials such as atomically thin materials, including their twist-controlled (Moiré) heterostructures and artificially engineered structured materials such as meta-atoms novel spintronic material into devices and sensing systems in quantum regime.
- Innovative approaches to engineer novel states of matter with enhanced functionalities in quantum systems (e.g. sensitivity, resolution, speed, stability and energy efficiency) towards their application to devices and/or sensors the quantum regime.
- Cutting-edge spectral-microscopy techniques, micro- and nano-photonic, phononic, millimeter/THz high frequency electronic systems, and mechanisms for direct read-out of novel Floquet engineered states of matter.”
- Of note, this solicitation does not support quantum computing applications.

NSF and AFRL will prioritize proposals that “combine different modalities with quantum systems for unprecedented performance.” Furthermore, NSF and AFRL encourage proposals that extend “the driven-system platform to periodic drives mediated by collective modes (e.g., acoustic and optical phonons, magnons etc.)”

The REFLEQTS solicitation requires that proposals include interdisciplinary teams from multiple institutions of higher education that have a clear management plan. Researchers in these interdisciplinary teams may have expertise in classical and quantum materials, devices, and

integrated systems in photonics and quantum optics. Successful teams will combine these areas of expertise to “access nonequilibrium states for performance metrics unattainable at equilibrium.”

Additional details are included in the full solicitation.

Due Dates: Expressions of Interest (EOI) must be submitted to nsf-afrl-feqs@nsf.gov by **January 24, 2025**. Full proposals are due **March 14, 2025, by 5 p.m.** (the submitting organization's local time).

Total Funding and Award Size: NSF and AFRL will award one proposal for up to \$3 million for three years, which may be extended for an additional two years.

Eligibility: Two- and four-year accredited U.S.-based institutions of higher education are eligible for this solicitation. A minimum of one PI and two co-PIs must participate in each proposal. The PI and Co-PIs must represent at least two different institutions.

Sources and Additional Information:

- The REFLEQTS program page is available at <https://new.nsf.gov/funding/opportunities/nsf-afrl-refleqts-nsf-afrl-research-floquet-engineered-quantum-systems>.
- The REFLEQTS solicitation is available at https://nsf-gov-resources.nsf.gov/files/nsf25520.pdf?VersionId=Drt8Z6J7ZZbrBiHFG16xLXI9Ib_EW.WR.