

**Application Title:** Facility for Quantum Measurements

**Lead contact for RDF Application:**

**Name** Vladislav Yakovlev  
**Department** Biomedical Engineering  
**Email address** yakovlev@tamu.edu  
**Phone number** 979-458-2326

**Key Participating Units:** College of Engineering (PI: Yakovlev (Biomedical Engineering), co-PI: Hemmer (Electrical and Computer Engineering)), College of Science (co-PIs: Sokolov (Physics and Astronomy), Sheldon (Chemistry)), College of Agriculture and Life Sciences (co-PIs: Agarwal (Biological and Agricultural Engineering), Kurouski (Biophysics and Biochemistry))

**Anticipated Request Amount (\$): 1,940,620.50**

**Executive summary of this application to utilize Research Development Funds:**

The House of Representatives passed the National Quantum Initiative Act last month. When signed into law, the bill will outline a 10-year plan to push forward applications using quantum science and technology. The major objective of this application is to establish at Texas A&M University a unique (one of a kind) quantum measurements facility, which can promptly place our university at the forefront of quantum science and technology research by providing the most advanced equipment to perform quantum measurements, quantum computations, quantum communication, quantum sensing and quantum imaging.

The Institute for Quantum Science and Engineering (IQSE) is well known around the world for the ground-breaking work in the field of theoretical quantum optics. While there are more than 50 faculty members on campus involved in different aspects of optical research, no specialized facility related to quantum optics exist. This proposal requests funding to establish a state-of-the-art quantum measurements facility, which will be located in the Interdisciplinary Life Sciences Building and will be a part of Microscopy and Imaging Center. Initially, three university units (College of Engineering, College of Science and College of Agriculture and Life Sciences) will be involved; however, with anticipated development of methods of quantum measurements, broader participation of other colleges, such as Geosciences (applications of *quantum metrology*), Medicine (applications of *quantum imaging*; *quantum communication* and *quantum computing* for data processing), and Veterinary Medicine and Biomedical Sciences (applications of *quantum imaging* and *quantum sensing*), is expected.

Such a facility, which, to the best of our knowledge, doesn't have any other equivalent sets of equipment in the US or anywhere around the world will serve several purposes. (1) It will provide a significant number of researchers at Texas A&M University working in the area of quantum science and engineering with a competitive advantage for performing quantum measurements related to their work. (2) It will serve a catalyzer of interdisciplinary activities. (3) It will attract other researchers from NASA, NIST, DOE, DOD, government laboratories and other academic institutions to College Station to increase visibility of Texas A&M University and to provide with strong partners for Center-level grants in the areas of quantum science and engineering. (4) It will provide a central lab for education and training of a new generation of scientists and engineers, as it is described in the National Quantum Initiative Act.

The major outcomes are expected in the form (1) a Science and Technology Center grant application to NSF (PI: Agarwal; program announcement to appear soon) and a Quantum Sensing Center grant application to DOD (PI: Yakovlev; program announcement to appear soon); (2) improved interdisciplinary collaborative environment at Texas A&M University; (3) improved collaborations with outside institutions; and (4) improved research competitiveness.