

Facility Description

1 Major Equipment

Advanced laser sources available at the laboratory of Dr. Zheltikov at Texas A&M University will be used to accomplish the tasks of this proposal. These laser sources include a ND:YAG 532 nm CW laser, a HeNe 632 nm CW laser, and a solid-state ytterbium fiber supercontinuum source which will provide ultrashort pulses in the visible and mid infrared. In addition to laser sources and optical modulators, the laboratory contains electronic equipment that allows for the generation and modulation of microwave sources. This equipment includes a pulse generator, microwave amplifier, microwave source, and lock-in amplifier. Additionally, the laboratory is equipped with CPUs with PCI digital/analog converters which allow for data collection as well as control. A large collection of bulk and micron scale nitrogen vacancy diamonds with varying NV density, a key component of the proposed work, is contained within the laboratory. Furthermore, a diverse suite of photonic crystal fibers as well as single and multimode fibers are available for any application that may arise. A liquid helium cryostat with built in scanning confocal microscope is also available in the lab, accompanied by all necessary control components, pumps and pump hardware, and software. A plasma sputtering thin film deposition system and annealing oven is available in the lab, as well as all necessary control components, pumps, pump hardware, and control software. A direct write laser lithography setup with control software and a fully stocked chemistry suite with working fume hood is also available for use at any time. Further equipment is accessible through Dr. Zheltikov and his lab at the Russian Quantum Center. Advanced methods and technologies needed to integrate NV diamond sensors with optical fibers, as well as optical fibers with microwave transmission lines will be used for the success of this project. Additional lab space, as well as adequate office space are available at Texas A&M University.

2 Other Resources

The Texas A&M Physics Department secretarial, machine shop, and electronics shop support are fully available, and a full software license suite which will support the experiment work in both data collection and data analysis. The work will be conducted in a creative research environment, which is ideally suited for the successful accomplishment of the proposed project. Regular discussions with high-profile experts in the field of the project and related areas are planned.