

University of Miami, Physics Department Colloquium

Date: Monday, Jan 27, 2025
Time: 4:00 pm – 5:00 pm
Location: Wilder Auditorium – Rm 112, Knight Physics Building

Quantum Information Science Enabled by Focused Ion Beams

Dr. Michael Titze

Sandia National Laboratories

Abstract

The widespread application of quantum information sciences (QIS) will require fabrication of quantum systems at scale. Solid-state based color centers are an interesting platform for QIS, with recent demonstrations of the largest quantum network (three nodes) based on nitrogen vacancy color centers in diamond. While scalability may be achieved with color centers due to them being hosted in a solid-state material, an important challenge to overcome is their deterministic fabrication.

In this talk I will present challenges in the deterministic fabrication of color centers and our paths of overcoming these challenges using focused ion beams coupled with in-situ techniques. I will discuss how tailored light irradiation during high-temperature activation annealing can be utilized to dissolve unwanted vacancy clusters to improve the yield of silicon-vacancies (SiV) in diamond. The technique uses sub-bandgap light irradiation to ionize and destabilize unwanted defect clusters while leaving SiV untouched.

Biography



Michael Titze is a Senior Member of the Technical Staff in the Sandia National Laboratories Ion Beam Laboratory. His research focus is the development of in-situ techniques for the fabrication of quantum devices. Prior to joining Sandia, he received his PhD in Physics from Florida International University working on ultrafast spectroscopy and a BSc in Physics from Heinrich Heine Universität Düsseldorf, Germany.