



University
of Victoria

PHYSICS AND ASTRONOMY COLLOQUIUM (Online)

Dr. Eden Figueroa
Stony Brook University

“Building a Long-distance Quantum Repeater Network Using Atomic Quantum Interconnects”

Abstract

“The goal of quantum communication is to transmit quantum states between distant sites. The key aspect to achieve this goal is the generation of entangled states over long distances. Such states can then be used to faithfully transfer classical and quantum states via quantum teleportation. The big challenge, however, is that the entanglement rates generated between two distant sites decreases exponentially with the length of the connecting channel. To overcome this difficulty, the new concepts of entanglement swapping, and quantum repeater operation are needed.

In this talk we will show our progress towards building a quantum network of many quantum devices capable of distributing entanglement over long distances connecting Stony Brook University, the Brookhaven National Laboratory and other locations on Long Island, New York. We will show how to produce and communicate photonic quantum entanglement over a 140 km fiber network connecting three independent quantum nodes. Additionally, we will show our recent experiments in which two atomic quantum memories are interconnected over a 158 km network with the aim of creating long-distance matter-matter entanglement. Lastly, we will discuss our progress towards building a memory-assisted quantum repeater network connecting five nodes over 250 km of fiber.”

Wednesday, March 6th, 2024

3:30 p.m. PST

BWC A104

Zoom link available on Uvic Event Calendar