GRADUATE COLLEGE
DEFENSE NOTICE

Please Post

The following thesis (or dissertation) presentation is open to those in the University community.

Emanuel Casiano-Diaz

Advisor: Dr. Adrian Del Maestro

Master of Science

Physics

March 28, 2019

10:00am

Lafayette Hall L307

Quantum Entanglement of One Dimensional Spinless Fermions

Abstract

The constituents of a quantum many-body system can be inextricably linked, a phenomenon known as quantum entanglement. Entanglement can be used as a resource for quantum computing, quantum communication and detecting phase transitions, among others. The amount of entanglement can be quantified via the von Neumann and Rényi entropies, which have their origins in information theory.

In this work, the quantum entanglement between subsystems of a one-dimensional lattice model of fermions is quantified. The von Neumann and Rényi entropies were calculated for two types of subsystems. In the first study, the subsystems were treated as two subsets of particles, and in the second, as two spatial subregions. Finally, by considering particle superselection rules, the amount of entanglement that can actually be accessed as a resource was calculated. In all cases, the quantum entanglement served to detect phase transitions in the model.