

## **Announcing the Final Examination of Daniel Reinhart for the degree of Master of Science in Physics**

**Date:** July 12, 2019

**Time:** 3:00 p.m.

**Room:** MSB 318

**Thesis Title:** The Relativistic Harmonic Oscillator and the Generalization of Lewis' Invariant

### **Abstract:**

In this thesis, we determine an asymptotic solution for the one dimensional relativistic harmonic oscillator using multiple scale analysis and relate the resulting invariant to the classical Lewis' invariant. We then generalize the equations leading to Lewis' invariant so they are relativistically correct. Next attempt to find an asymptotic solution for the general equations by making simplifying assumptions on the parameter characterizing the adiabatic nature of the system. The first term in the series for Lewis' invariant corresponds to the adiabatic invariant for systems whose frequency varies slowly. For the relativistic case we find a new conserved quantity and seek to explore its interpretation.

### **Outline of Studies:**

Major: Physics

Educational Career:

B. S. The Ohio State University, 2015

Committee in Charge:

Dr. Bhimsen Shivamoggi (Chair)

Dr. Adrienne Dove

Dr. Viatcheslav Kokoouline

Approved for distribution by Dr. Bhimsen Shivamoggi, Committee Chair, on July 10, 2019.

The public is welcome to attend.