# Stony Brook University
# The Graduate School

Doctoral Defense Announcement

## Abstract

## Topics in Statistical Physics: Protein Stability, Non-Equilibrium Thermodynamics and Bibliometrics

**Michael Hazoglou**

This dissertation will cover three distinct topics of protein stability, non-equilibrium thermodynamics and scientometrics.

In senescent organisms aging is correlated with oxidative damage of proteins. The damage done to proteins destabilizes them inhibiting their function. I will discuss the implications of a simplified model based on side-chain modification of charged residues using Debye-Hückel theory. Sort length and highly charged proteins are susceptible to destabilization from oxidative damage. Among these proteins already studied in aging several proteins fit this description of being short and highly charged. There is a noticeable enrichment of short-highly-charged proteins in categories of proteins known to be important in aging.

Maximum Caliber (MaxCal) is a potential theory of non-equilibrium statistical mechanics. I will show how MaxCal is used to derive the Onsager reciprocal relations, Green-Kubo relations and Prigogine's Principle and extend these relations beyond the near-equilibrium regime.

The last topic will discuss the citation and publication trends of papers and authors, respectively. I will discuss how pure-birth processes can be applied to understanding citation trends and how birth-processes can reproduce well known results and extend them such that Bayesian methods can easily be applied to model citation trends.

**Date**: November 14, 2016
**Time**: 11:30 am
**Place**: Laufer Center, 101

**Program**: Physics
**Dissertation Advisor**: Ken A. Dill