M.Sc. Defense

GREG DEMAND

DATE: Tuesday, April 14, 2009
TIME: 1:00
PLACE: MacNaughton Room 222
University of Guelph

THESIS TITLE:

DEVELOPMENT OF A NOVEL ALGORITHM FOR NUCLEAR LEVEL SCHEME DETERMINATION

ABSTRACT: Modern γ-ray spectrometers are capable of performing experiments involving the collection of high-statistics data sets containing information on hundreds of transitions. The information extracted from the data sets are usually presented in the form of level schemes. However, the process of constructing nuclear level schemes can take months to years, greatly inhibiting the progress of nuclear physics - especially when investigating trends amongst nuclei. In this thesis an analytical formula that directly relates nuclear level schemes to experimental data, and a transition-centric level scheme representation are developed. The analytical formula was successfully tested on simulated directed data including irresolvable doublets, and a self-consistent approach to undirected data was investigated. Furthermore, a variety of computer automated methods involving the analytical formula, the transition centric representation, and evolutionary computation are investigated. Simulated doublet-free level schemes with up to 150 transitions and 60 levels were determined using these methods.

EXAMINING COMMITTEE:

Chair:	**D.E. Sullivan**
Advisor:	**P.E. Garrett**
	D. Ashlock (Math & Stats)