

M.Sc. Defense
William Brown-Bury
DATE: Monday July 12, 2010
TIME: 10:00a.m.
PLACE: MacNaughton Room 222
University of Guelph

THESIS TITLE:
'EXTENSION OF THE COMPTON-RAYLEIGH SCATTER METHOD FOR ANALYSIS
OF MARTIAN ROCKS AND SOILS'

ABSTRACT:

The Mars Exploration Rovers (MER) and the Mars Science Laboratory (MSL) missions use an Alpha Particle X-Ray Spectrometer (APXS) to obtain elemental concentrations of rocks and soils on the Martian surface, with the objective of finding evidence of past and present water. Compton and Rayleigh scatter peaks are used to detect the presence of light elements ($Z < 11$, water) via their ratio (C/R value). This is accomplished by comparing the C/R value from APXS spectra, fitted using the program GUAPX, and the C/R value produced by the Monte Carlo simulation program, marsgeom. The marsgeom program was expanded to incorporate the presence of multiple layers and an atmosphere in order to accommodate more diverse environmental situations. A new function was found to fit the Compton profile in order to increase the consistency and accuracy of the fit in GUAPX. These improvements were tested and show excellent agreement with expected results in most cases.

EXAMINING COMMITTEE:

Chair: Dr. Robert Wickham

Advisor: Dr. Iain Campbell

Co-Advisor: Dr. Joanne O'Meara

Advisory Committee Member(s): Dr. Ralf Gellert, Dr. Paul Garrett