M.Sc. Thesis Defence

Monday August 22, 2011-SCIENCE COMPLEX, RM. 1511
10:00 a.m. – 12:00 noon

Ms. Meaghan Ward
Department of Physics

Title: “Solid-State NMR studies of solvent-accessible fragments of a seven-helical transmembrane protein Proteorhodopsin”

ABSTRACT

High–resolution multidimensional proton-detected NMR was used to study the solvent-exposed regions of a seven-helical integral membrane proton pump proteorhodopsin (PR). Fully deuterated PR samples with protons reintroduced to solvent-accessible sites through back exchange were prepared and found to produce NMR spectra with acceptable proton resolution (~0.2 ppm). Novel three-dimensional proton-detected chemical shift correlation spectroscopy was used for the identification and resonance assignment of the solvent–exposed regions of PR. Though most of the observed residues were located at the membrane interface there were notable exceptions, particularly in helix G. This helix contains the Schiff base-forming Lys231 and many conserved polar residues in the extracellular half. Solvent accessibility of helix G supports the hypothesis that high mobility of the F-G loop could transiently expose a hydrophilic cavity in the extracellular half of PR, and implies that such a cavity may be part of the protein’s proton-conduction pathway.

Advisor: Dr. Vladimir Ladizhansky (Department of Physics)
Co-Advisor: Dr. Leonid Brown (Department of Physics)

Chair: Dr. Hermann Eberl (Department of Mathematics)

Defence committee members:
Dr. John Dutcher (Department of Physics)
Dr. James Davis (Department of Physics)