

**SCHOOL OF PHYSICS**

**UNIVERSITY OF NEW SOUTH WALES**



# COLLOQUIUM

*4-5 p.m., Tuesday, 10 November, 2009*

School of Physics Common Room

Room 64, Old Main Building

**Dr Michael T. Murphy**

**QEII Research Fellow**

**Centre for Astrophysics & Supercomputing, Swinburne University**

## **“Precision Optical Spectroscopy in Astrophysics”**

The invention of charge coupled devices (CCDs) - for which (part of) this year's Nobel Prize in physics was awarded – revolutionized optical astronomy. The accuracy and reproducibility CCDs imply has enabled new observations, some of which have pushed astrophysical spectroscopy to previously unthinkable precision. For example, extra-solar planets are now discovered routinely by detecting relative changes with time in the Doppler velocity of their host stars. Less routinely, small shifts between different transitions of metal ions or hydrogen molecules in the spectra of distant quasars can be used to measure (or limit) cosmological variations in some fundamental constants of nature - fundamental physics with astrophysical spectroscopy! I will discuss how these endeavours might benefit from another recent Nobel Prize winning technology, femtosecond laser frequency combs. These combs may also enable previously (and perhaps still) unthinkable astrophysical measurements, for example a direct, real-time observation of the acceleration in the Universe's expansion rate. I will describe preparations for just such a measurement, including the first tests of frequency combs in calibrating astronomical spectrographs.

The audience is invited to meet the speaker beforehand at 3.45 p.m. over coffee and biscuits in the Common Room.

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