

# **New laboratory atomic spectroscopic measurements with applications from astrophysics to industrial analytical applications.**

Juliet C. Pickering, M. Ruffoni, A.P. Thorne and F. Liggins

*Blackett Laboratory, Physics Department, Imperial College London, London SW7 2BZ, UK*

**Abstract.** New measurements of atomic and molecular data for applications ranging from astrophysics, atmospheric physics to industrial analytical applications will be represented.

High resolution iron group atomic spectra recorded by Fourier transform spectroscopy (FTS) in the visible-VUV at Imperial College, and IR-visible at NIST have been analysed, and are being combined with level lifetimes collaborating with J Lawler (Wisconsin), to give accurate new transition probabilities in the IR for the APOGEE and GAIA projects, aimed at understanding Galactic Evolution.

Term analysis projects for V II, Mn II, Ni II are giving accurate new energy levels and wavelength data for use in astrophysics applications, such as stellar spectrum synthesis.

UV FTS measurements of isotopologues of SO<sub>2</sub> have been completed resulting in the first accurate photoabsorption cross sections. These accurate measurements are vital for understanding the proxy used for oxygen levels in the early Earth's atmosphere, sulphur mass independent fractionation.

Relative intensities of spectral lines of elements were measured by FTS in studies aimed at understanding the line intensities observed in glow discharge (GD) spectra when trace gases are present. Glow discharge optical emission spectroscopy GD-OES is an analytical technique used in a wide variety of industrial applications, for determination and testing of material composition, for example in steel manufacturing, coatings, and even nano technology. It relies on a database of relative line intensities of elements observed in standard GD operating conditions. However, the presence of trace gases in the source, such as oxygen, changes the line intensities and leads to erroneous analytical results. Our involvement in investigations of the effect of trace gases on GD spectra will be discussed.