

Seminar

Friday, 12th February 2010

11 am - Room 701

Professor John Hearnshaw

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Auguste Comte's blunder: An account of the first century of stellar spectroscopy and how it took one hundred years to prove that Comte was wrong!

In 1835 the French philosopher Auguste Comte predicted that we would never know anything about the chemical composition of stars. In this talk I will give a broad overview of the development of stellar spectroscopy, especially from about 1860. Developments in stellar spectroscopy segregated quite clearly into three main fields of endeavour: spectral classification, radial velocities and spectral analysis. After introducing the main players, I will concentrate mainly on spectral analysis, or how stellar spectroscopy one hundred years after Comte showed that quantitative information on the composition of stars was possible. The journey on the way was quite arduous, as it required numerous developments in theoretical physics and in laboratory spectroscopy first to take place, which in turn allowed stellar spectral analysis successfully to be undertaken by the mid-20th century.

The key developments in physics that first had to be understood were in quantum and atomic theory, ionization theory, the concept of the Planck function, local thermodynamic equilibrium, the first stellar model atmospheres, line formation theory, turbulence, collisional broadening of spectral lines and the theory of radiative transfer and of the curve of growth. My talk will emphasize these close links between stellar spectroscopy and theoretical physics. In addition laboratory physics was also an essential precursor, to measure line wavelengths and oscillator strengths.

Comte may have been an influential philosopher of science in the nineteenth century. Perhaps his one small transgression was not to have read the works of Joseph Fraunhofer, which in the early 19th century already contained the first small clues that Comte's assertion might be wrong.

All Welcome

Contact Details

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