

Inaugural Brebis Bleaney Memorial Lecture

Electron Paramagnetic Resonance: Past, Present and Future



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3.30pm on 22 February 2019
Martin Wood Lecture Theatre, Clarendon Laboratory

This annual lecture commemorating Professor Brebis Bleaney (1915-2006) was endowed by Bleaney's pupil Professor Michael Baker (1930-2017)

Electron paramagnetic resonance (EPR) or electron spin resonance (ESR) spectroscopy as it is also known is a method for studying systems with unpaired electrons. The basic concepts of EPR are analogous to those of nuclear magnetic resonance (NMR), but it is electron spins that are excited instead of the spins of atomic nuclei. EPR was first observed in Kazan State University by Soviet physicist Yevgeny Zavoisky in 1944 and was developed independently at the same time by Brebis Bleaney at the University of Oxford.

In the 75 years that have followed EPR has found many applications in physics, chemistry, biology, medicine, geology and archaeology. In this talk I will endeavour to describe some of the key events in the discovery and development EPR but spend most of the time focusing on applications of the technique and its many derivatives. EPR is very much an evolving technique, with detection of single electron spins now routine in some systems, such that we can optimistically look for applications ranging from studies of single molecules, to enhanced sensitivity and spatial resolution in magnetic resonance imaging.

About the speaker:

Prof. Newton's research at the University of Warwick centres on three different themes. One involves studying the extreme properties of diamond focussed on understanding and determining the electronic properties and lattice structures of defects, as well as the diffusion of impurities and activation of dopants in diamond. The second is based on the development of new technologies, techniques and methodologies for Electron Paramagnetic Resonance (EPR), Dynamic Nuclear Polarisation (DNP) and optical spectroscopies. The third centres on boron doped diamond. This is presently the subject of considerable interest as an electrode material. This is a consequence of its very wide potential window in aqueous solution, low background currents, and corrosion stability in aggressive media. Mark was a graduate student and researcher at Oxford under the supervision of Prof. Michael Baker before moving to his position at Warwick.

Followed by tea/coffee in the Clarendon Laboratory Common Room