Professor Anthony Parker

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My major areas of interest are in photo-chemistry and photo-biology and using time-resolved spectroscopy to study the fundamental relationship between structure and function. In 2009 I completed the project management of the STFC & BBSRC jointly funded project ULTRA (£2M). The ULTRA laser (a dual barrelled femtosecond and picosecond 10W, 10kHz, system covering UV to mid-IR) project represents my deep devotion for developing laser based technology for time-resolved spectroscopy to lead multi-discipline research by making it accessible to the general science community. Prior to joining the Rutherford Appleton Laboratory, where I am presently on sabbatical leave from heading the Lasers for Science Facility, I worked in industry developing one of the first multi-channel scanning Raman microscopes. This led to my developing time-resolved Raman spectroscopy in the UK across twenty years and ultimately resulted in inventing novel Raman instrumentation to diagnose disease, with colleague Pavel Matousek. This work was recognised by two Meggers awards from USA Society of Applied Spectroscopy in 2002 and 2006. I hold honorary chairs at University of Salford, University of London and Associate Editor for *Journal of Raman Spectroscopy* and for 3 years (2000) was technical director for *LaserThor*, a company using lasers to clean railway lines. South Africa has always been special to me since my first visit just over a decade ago when I was asked to support and advise setting-up the NLC in Pretoria and the African Laser Centre.

Plenary Lecture: The Photochemistry and Photophysics of DNA

Our DNA is constantly being subjected to chemical and physical changes. Understanding the molecular dynamics of this biological stress and how it leads to mutation and the onset of cancer represents a key scientific challenge. During evolution cells have evolved an enormous array of weaponry to minimise the risks of mutation, however, under certain conditions things can go badly wrong. A primary example is the over exposure of sunlight to skin. The initial photophysical processes that take place following from the initial absorption of a photon to chemical reaction occur in the ultrafast (femtoseconds to picoseconds) time domain. As such studying these reactions falls into the world of ultrafast laser spectroscopy and both linear (pump and probe) and non-linear (2D-IR, stimulated fluorescence) methods are utilised. The major factor of the components that make up DNA, the four nucleic acid bases, that gives them exceptional photo-stability is the fact that they posses exceptional short lifetimes (ps). The presentation will introduce DNA photochemistry and photophysics, the technology used to investigate them and emphasise how time-resolved infrared spectroscopy can be applied to gain insights into structural changes occurring in the ultrafast molecular time frame.