



The Singapore Bioimaging Consortium (SBIC)
presents a seminar

on

"Singlet NMR"

Speaker: Professor Malcolm Levitt
School of Chemistry
Southampton University
UK
Date : Tuesday, 27 November 2012
Time : 11.00am – 12.00pm
Venue : Creation Theatre
30 Biopolis Street
Level 4, Matrix Building

Abstract

Singlet nuclear spin states are quantum states of a nuclear spin-1/2 pair that are antisymmetric with respect to spin exchange, and which have total spin zero. They are therefore non-magnetic and protected against many important relaxation mechanisms. These states often exhibit long relaxation times which may exceed the normal relaxation time T_1 by an order of magnitude or even more. In the special case of the ^{15}N spin pair in ^{15}N -labelled nitrous oxide, the nuclear singlet lifetime can be as long as 25 minutes. Dr Levitt will discuss the phenomenon of singlet nuclear spin order in a variety of contexts - including gas-phase parahydrogen, small molecules in solution, and also some examples of nuclear singlet states in solids. He will discuss how nuclear singlet spin order may be generated from magnetization, how it is maintained, and how it is converted back into observable magnetization. His latest work in the field includes the generation of hyperpolarized nuclear singlet order using dynamic nuclear polarization. They have been particularly interested in the properties of nearly equivalent spin pairs, where the hyperpolarized singlet order is long-lived in high magnetic field, even without any external intervention. They have designed and demonstrated molecular systems that exhibit ^{13}C singlet lifetimes of more than 10 minutes. Together with many collaborators, they have also studied the nuclear singlet states of parawater molecules trapped inside fullerene cavities, using neutron scattering and infrared spectroscopy.

About the Speaker

Dr Malcolm Levitt was born 1957 in Hull, England. He underwent undergraduate education (Chemistry) at Oxford University, received his BA in 1978), DPhil (1981) on Nuclear Magnetic Resonance with Ray Freeman. He worked as a postdoctoral research at the Weizmann Institute, Israel (with Shimon Vega) and ETH-Zürich (with Richard Ernst). Dr Levitt was a research staff member of the Francis Bitter Magnet

Lab, MIT (1985-1990). He was research fellow in superconductivity research in Cambridge, UK, 1991. Lecturer and became professor at Stockholm University, Sweden (1991-2001). Dr Levitt is a Professor in Physical Chemistry at the University of Southampton since 2001. Honours include the LATSIS prize of the ETH-Zürich (1985), the Göran Gustafsson prize in Chemistry (1996), Fellowship of the Royal Society (2007), and the Laukien prize in Magnetic Resonance (2008).

--- Admission is free and all are welcome ---