

PhD Position: Dynamic Nuclear Polarization using Electron-Nuclear Double Resonance

Nuclear magnetic resonance is an amazingly powerful technique for studying everything from drug molecules to working human brains. However, many NMR experiments are limited by the small fraction of nuclei which are spin polarized. Electrons are more easily polarized but electron paramagnetic resonance (EPR) is only useful for studying materials with unpaired electron spins. We are developing the equipment and techniques to efficiently transfer electron spin polarization to nuclear spins, allowing a wide range of exciting NMR measurements that would not otherwise be possible.

Dynamic nuclear polarization (DNP) is currently of great interest to industry as well as academia and our equipment uses higher magnetic fields, up to 14.1 T, than other efforts worldwide. This higher field means better NMR resolution but introduces problems for the EPR instrumentation. We have demonstrated prototype solutions to these EPR problems by making use of insights from the field of quantum computing. In particular we will develop the equipment for, and measure the electron-nuclear double resonance (ENDOR) of $N@C_{60}$ molecules to demonstrate ENDOR-DNP. Applying this to useful NMR experiments would be an important breakthrough.

In the course of this work, you will acquire skills in magnetic resonance technology and cryogenic experiments as well as an understanding of quantum spin physics.

We are looking for highly motivated people with a strong background in physical sciences, a love of technology and the desire to work in teams. We offer you a lab with extraordinary equipment and the chance to follow up on your own ideas.

For further information contact Gavin Morley (gavin.morley@warwick.ac.uk) or iMR.CDT@warwick.ac.uk.

The Centre for Doctoral Training in Integrated Magnetic Resonance (*iMR*) is a collaboration between researchers at the Universities of Warwick, St Andrews, Southampton, Aberdeen and Nottingham.