CENTRE FOR QUANTUM COMPUTATION & COMMUNICATION TECHNOLOGY
AUSTRALIAN RESEARCH COUNCIL CENTRE OF EXCELLENCE

UNSW SYDNEY

Postdoctoral Fellow Position

STM based optical access to a single spin

Post-doctorate Level B

Project

UNSW Sydney and the Centre for Quantum Computation and Communication Technology (CQC^2T) seek enthusiastic candidates for a Postdoctoral Fellow (level B) position in the field rare-earth ions based on electron-spin resonance and scanning-tunnelling spectroscopy. Rare-earth ions, such as Erbium (Er), are now considered as promising candidates for quantum computation and communication applications due to their extraordinary long spin and optical coherence times at cryogenic temperatures [1]. The Postdoctoral Fellow will undertake the development of optical access to a single rare-earth spin in a scanning tunnelling microscope. The goal of this project is to achieve control over rare-earth ion's position in crystal hosts such as Si as well as rare-earth ion's site, that is, its relative location with respect to the host crystal atoms. This project is a collaboration with the group of Prof Andreas Heinrich at IBS Centre for Quantum Nanoscience (QNS) in Seoul that pioneered STM based electron spin resonance [2].

Your role

You will join a team that is establishing STM based ESR as a local magnetic field sensor at UNSW that will be used to detect the spin state of a single rare-earth atom. The aim is to optically manipulate the spin state of an atom based on resonant resonantly driving its telecom optical. You will carry out clean room nanofabrication, scanning-tunnelling spectroscopy at low temperature in ultra-high vacuum, epitaxial growth, and collaborate with theory groups.

Renumeration

Postdoctoral Fellow (Level B, $112K - $132K plus 17% superannuation)

Environment

You will benefit from the world-recognised expertise on single ion-based quantum devices and quantum-state imaging [3,4]. Furthermore, you will have access to a range of unique methods developed in the centre labs, i.e., an atomic-scale device fabrication, coherent spin control, quantum state imaging of full devices [to appear in Nature Electronics 2023]. You will develop skills on low-temperature optical spectroscopy in combination with scanning probe work. Strong international collaborations are maintained with groups on experimental and theoretical sides. At UNSW, we pride ourselves on being a workplace where the best people come to do their best work and we can offer flexible working conditions.

Criteria

Enthusiastic PhD graduate, or equivalent, with knowledge in semiconductors, optics, quantum mechanics and condensed matter physics. Knowledge of equity and diversity principles.

How to apply

Further information: Professor Sven Rogge s.rogge@unsw.edu.au or visit www.cqc2t.org.
Please apply https://external-careers.jobs.unsw.edu.au/cw/en/job/515056/postdoctoral-fellow

References:

[1] J. R. Everts et. al, Microwave to Optical Photon Conversion via Fully Concentrated Rare-Earth-Ion Crystals, Phys. via Fully Concentrated Rare-Earth-Ion Crystals, Phys. Rev. A 99, 1 (2019).

[2] X. Zhang, C. Wolf, Y. Wang, H. Aubin, T. Bilgeri, P. Willke, A. J. Heinrich, and T. Choi, Electron Spin Resonance of Single Iron Phthalocyanine Molecules and Role of Their Non-Localized Spins in Magnetic Interactions, Nat. Chem. 14, 59 (2022).

[3] J. Salfi, J. A. Mol, R. Rahman, G. Klimeck, M. Y. Simmons, L. C. L. Hollenberg, and S. Rogge, Spatially Resolving Valley Quantum Interference of a Donor in Silicon, Nat. Mater. 13, 605 (2014).

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