



QUBIC

The Australian Research Council Centre of
Excellence in Quantum Biotechnology

Title

Institution	
Project details	Project Title Development of a Portable Nitrogen-Vacancy Centre Magnetometer for Outreach and Education Project Description This project will produce a portable imaging magnetometer based on nitrogen-vacancy (NV) colour centres in diamond, to be used as a QUBIC outreach demonstration. The intern will learn the principles of NV-centre physics and continuous-wave (CW) optically detected magnetic resonance (ODMR), then build a widefield fluorescence microscope — integrating laser excitation optics, a microwave source, a pulse generator, and a camera into a compact platform. On the software side, the intern will develop control and acquisition code in Python or LabVIEW, building on the group's existing codebase, to automate ODMR sweeps and extract magnetic-field maps. The completed magnetometer will serve as a QUBIC outreach activity – presenting live magnetic imaging with quantum tech, with the first demonstration planned to image magnetic sand samples from New Zealand – environmental sample, and with a vision of developing a bio sample sensing demo. Expected Aims and Outcomes Aim 1: Assemble a widefield NV-fluorescence microscope with laser excitation, filtering, and camera detection in a portable enclosure. Aim 2: Integrate microwave delivery and pulse-generation hardware for CW-ODMR measurements. Aim 3: Develop software (Python or LabVIEW) for instrument control, data acquisition, and magnetic-field mapping, leveraging existing group code. Aim 4: Validate the system by imaging a magnetic sample (e.g., magnetic sand from New Zealand), delivering a functional portable magnetometer ready for QUBIC outreach events.
Who can apply	The ideal candidate will be an undergraduate student in physics, engineering physics, or a related discipline who has completed coursework in Quantum Mechanics, Condensed Matter Physics (or Solid State Physics), and Waves and Optics. Basic programming skills in Python or LabVIEW are advantageous, and familiarity with CAD software is preferable. An enthusiasm for quantum science and science communication is highly valued.
Contact / Project supervisors	CI : A/Prof David Simpson; simd@unimelb.edu.au Postdoc: Dr. Galya Haim; g.haim@mail.huji.ac.il



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