



Quantum Photonics Laboratory  
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Microwaves and Antenna Engineering Group  
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## PhD Studentship

### A Spin-Based Quantum Sensor with Microwave Dielectric Resonator

#### Introduction

Quantum sensing exploits a quantum system to measure a physical quantity, with enhanced sensitivity and/or spatial resolution. Quantum sensors based on spins, in particular, have found numerous applications for magnetic field detection and mapping. Conventionally, these sensors are readout optically, but limited fidelity and losses restrict their sensitivity.

The project will explore a spin-based sensor readout through microwave dielectric resonators. Microwave readout by a high-quality factor dielectric resonator is receiving increasing attention since it can circumvent the limitations in optical readout and boost sensitivity. This multi-disciplinary project combines elements of quantum technology with state-of-the-art microwave circuits technology, so the PhD student will be jointly supervised by Dr Cristian Bonato (Heriot-Watt Quantum Photonics Laboratory) and Dr Haijun Fan (Heriot-Watt Microwave Group). By working on this project, the student can acquire skills in quantum technology, magnetic resonance techniques, microwave engineering, photonics, programming, fast electronics and data acquisition.

#### Eligibility

The successful candidate should have a 1st class degree or equivalent degree in Physics, Electrical Engineering, or other relevant subject areas. A Master's degree or practical working experience in relevant areas may be advantageous.

Applicants must meet the following criteria: Be a UK national, **or** Have settled status, **or** Have pre-settled status (meeting residency requirements), **or** Have indefinite leave to remain or enter.

#### Funding

Doctoral Training Partnerships (DTP) offers a tax-free stipend of £15,000 per year and cover tuition fees for between 3 and 3.5 years.

### **How to apply**

To apply, please send an email with CV and a cover letter to: Dr Cristian Bonato ([c.bonato@hw.ac.uk](mailto:c.bonato@hw.ac.uk)) and Dr Haijun Fan ([h.fan@hw.ac.uk](mailto:h.fan@hw.ac.uk)).