Project Title: Quantum Sensing with Spin Qubits in 2D Semiconductors

Project Overview: Precision measurement underpins science and technology, and novel sensors that push the fundamental limits of accuracy and precision are required for applications ranging from nano-electronics to medical imaging. Colour centres have atom-like electronic transitions that can be probed with optical and microwave techniques (Fig. 1(b)), and thanks to a spatial extension on the scale of the atomic lattice, they can provide an exquisite probe of their local environment. In this project, you will develop an integrated microwave and photonic platform to control and investigate spins in 2D materials (Fig. 1(a)), with the ultimate aim of building a new generation of sensors with the highest possible sensitivity and spatial resolution.

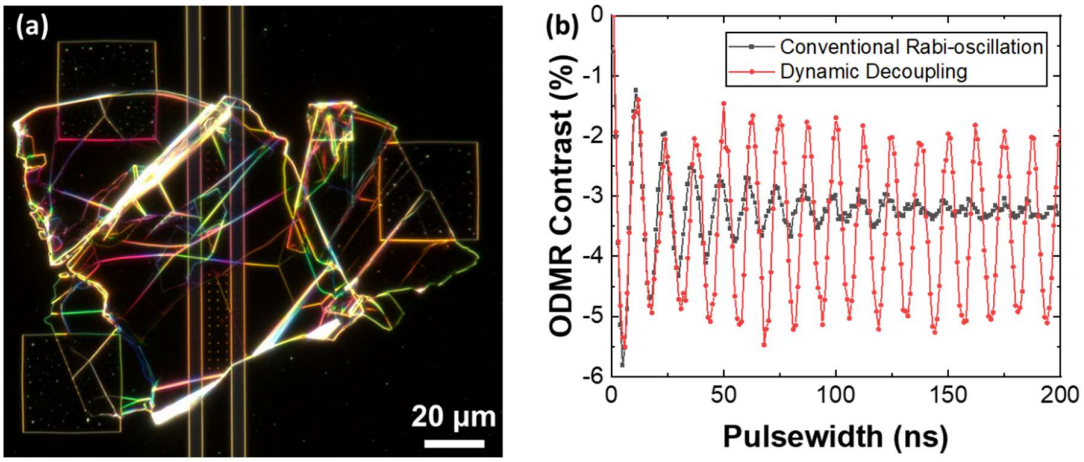

Figure 1. (a) Dark-field optical microscope image of a hexagonal boron nitride flake on a microwave coplanar waveguide. (b) Rabi-oscillations of an ensemble of spin qubit in hexagonal boron, with and without continuous dynamic decoupling, which significantly extends the coherence time.