Towards Single Spin detection using microwaves

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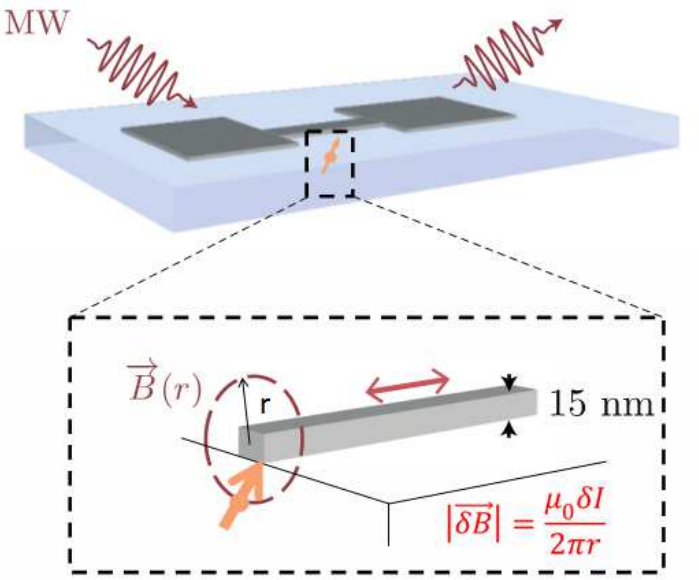

Figure.1: Sketch of our method

Our project aims at detecting a single spin using magnetic resonance techniques by coupling it to a high quality factor superconducting resonator. The electron spins of choice are shallow (~15 nm) implanted single Nitrogen-vacancy (NV) centers in an ultrapure isotopically-enriched C12 diamond layer. After characterization at room temperature using a confocal microscopy, an Aluminium microwave resonator is fabricated on top with a nanometric constriction (width ~40 nm) carefully aligned to a pre-selected NV center.

The constriction enhances the magnetic field generated by the microwave frequency current, and therefore allows to increase the spin-resonator coupling strength to a range of 1 – 5 kHz. Microwave-only measurements in a dilution refrigerator at 20mK should then allow to observe a spin-echo signal from a single spin.