X-BAND BIMODAL MICROWAVE CAVITY FOR EPR SPECTROSCOPY

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Electron paramagnetic resonance (EPR) spectroscopy is a widely used technique for studying paramagnetic centres in materials ranging from solids to proteins [1]. The method is based on the quantum nature of the electron spin, which causes splitting of its energy levels in the magnetic field. The essence of EPR spectroscopy is the excitation of the quantum transitions between these levels and the detection of the microwave absorption using microwave resonators [2].

Here, design and characterization of a microwave resonator with two orthogonal modes, which was modelled and manufactured based on the design proposed in Ref. [3] (see Figure 1) is presented. In such bimodal microwave resonators, one of the modes excites the spins in the sample, while the other mode is used to read out the EPR signal. In addition, this resonator geometry prevents the resonator ringing effect [3-5] and can be used to suppress thermal microwave noise greatly enhancing EPR sensitivity.

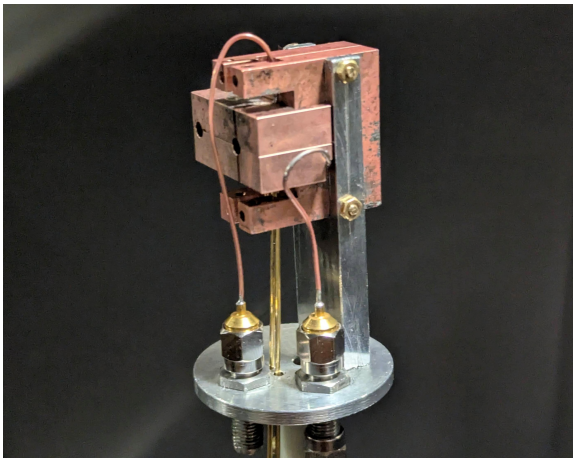

Fig. 1. Manufactured bimodal microwave resonator with tuning screws and microwave antennas.

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