Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Angular dependant micro-ESR characterization of a locally doped Gd^{3+}:Al_2O_3 hybrid system for quantum applications I. S WISBY, NPL, UK Royal Holloway, UK, S.E DE GRAAF, NPL, UK, R. GWILLIAM, ATI, University of Surrey, UK, A. ADAMYAN, Chalmers University of Technology, S. E. KUBATKIN, Chalmers University of Technology, Sweden, P. J. MEESON, Royal Holloway, UK, A. YA. TZALENCHUK, NPL, UK Royal Holloway, UK, T. LINDSTROM, NPL, UK — Rare-earth doped crystals interfaced with superconducting quantum circuitry are an attractive platform for quantum memory and transducer applications. Here we present a detailed characterization of a locally implanted Gd^{3+} in Al_2O_3 system coupled to a superconducting micro-resonator, by performing angular dependent micro-electron-spin-resonance (micro-ESR) measurements at mK temperatures. The device is fabricated using a hard Si_3N_4 mask to facilitate a local ion-implantation technique for precision control of the dopant location. The technique is found not to degrade the internal quality factor of the resonators which remains above 10^5 (1). We find the measured angular dependence of the micro-ESR spectra to be in excellent agreement with the modelled Hamiltonian, supporting the conclusion that the dopant ions are successfully integrated into their relevant lattice sites whilst maintaining crystalline symmetries. Furthermore, we observe clear contributions from individual microwave field components of our micro-resonator, emphasising the need for controllable local implantation. 1) Wisby et al. Appl. Phys. Lett. **105**, 102601 (2014)

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Date submitted: 06 Nov 2015 Electronic form version 1.4