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Electrically detected nuclear magnetic resonance in GaAs/AlGaAs-based quantum point contacts ZACHARY KEANE, MATTHEW GODFREY, ADAM BURKE, JASON CHEN, SEBASTIAN FRICKE, OLEH KLOCHAN, ADAM MICOLICH, University of New South Wales, HARVEY BEERE, DAVE RITCHIE, University of Cambridge, KIRILL TRUNOV, DIRK REUTER, ANDREAS WIECK, Ruhr Universitaet Bochum, ALEX HAMILTON, University of New South Wales — Nuclear magnetic resonance (NMR) is a well-known technique with widespread applications in physics, chemistry and medicine. Conventional NMR studies use inductive coils to detect the magnetic field produced by precessing nuclear spins; this approach requires on the order of 10^{12} spins for detection. Recently, resistive detection of NMR through the hyperfine interaction has been demonstrated with electrons in mesoscopic 2- and 1-dimensional devices based on high-quality GaAs/AlGaAs heterostructures. These studies are typically sensitive to 10^8 spins, enabling NMR on much smaller sample volumes. Holes are predicted to have much weaker nuclear spin coupling than electrons, which could be relevant to the emerging fields of spintronics and quantum information processing. We present a preliminary comparison between the magnitude of the NMR signal in electron and hole quantum point contacts.

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