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Nuclear Effects on Electron Spin Resonance in Gallium Arsenide¹ AARON JONES, JOHN COLTON, BENJAMIN HEATON, DANIEL JENSON, MICHAEL JOHNSON, Brigham Young University — Electron spin properties in gallium arsenide (GaAs) are investigated by electron spin resonance (ESR), the signal being detected via optical Kerr rotation. Experiments in ESR have shown broadened and shifted resonance peaks due to the hyperfine nuclear interaction. Simultaneous nuclear magnetic resonance (NMR) reduces the nuclear effects by preventing the nuclei from responding to the changing electron polarization. However, low NMR power still permits the electron spins to have a great effect on the nuclei, which then affect the electrons in return. We have developed a tunable, impedance-matched, lumped-element rf circuit which increases the output power at the resonant frequencies of the three nuclei (75 As, 69 Ga, and 71 Ga). Improved ESR data resulting from stronger NMR is presented.

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