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Electron spin coherence and electron nuclear double resonance of Bi donors in natural Si JOHN MORTON, STEPHANIE SIMMONS, RICHARD GEORGE, Oxford University, WAYNE WITZEL, Sandia National Labs, H. RIEMANN, NIKOLAI ABROSIMOV, N. NOTZEL, Institute for Crystal Growth, Berlin, MIKE THEWALT, Simon Fraser University — We have shown that the electron spin coherence times of Si:Bi donors in natural silicon are limited by the same mechanism of spectral diffusion as seen in Si:P, though the smaller Bohr radius of the Bi donor leads to $\sim 30\%$ longer T_2 times (up to 0.8 ms). We have mapped out the 36 ENDOR transitions observable at X-band arising from the $I = 9/2$ nuclear spin of ^{209}Bi, going up to 1.3 GHz. We also demonstrate the transfer of electron spin coherence to and from the ^{209}Bi nuclear spin with a fidelity of $\sim 63\%$. Using pulsed ESR at W-band (100 GHz), we observe optically-induced dynamic nuclear polarisation, consistent with the mechanism of exciton capture proposed in by T. Sekiguchi *et al.*. Finally, we explore the zero-field splitting of 7.5 GHz in this system, within the context of coupling to superconducting resonators.

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