Muonium in boron

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Of all the elemental semiconductors, boron has received the least attention in the μSR literature. In studies of muon diffusion and quadrupole level–crossing resonance at and above room temperature [1], no sign of muonium formation was seen. In a new study, a rather shallow paramagnetic centre is found to be formed by some 20% of the implanted muons, but only at cryogenic temperatures. This state disappears between 150 and 250 K with an effective ionization energy of 0.11 $\pm$ 0.03 eV. Given the large dipolar local fields from the boron nuclei, it is no surprise that the triplet muonium precession signal is not detectable. The paramagnetic state is revealed by longitudinal field repolarization, however, when high-T and low-T data sets are subtracted to remove signatures of resonant and non–resonant cross relaxation from the dominant diamagnetic state. Values for the hyperfine and superhyperfine parameters are extracted using appropriate fitting routines [2]; the results are discussed in terms of the likely electronic structure and as a model for monatomic hydrogen defect centres.

1. S.F.J. Cox, S.P. Cottrell, J.S. Lord, C.A. Scott, U.A. Jayasooriya, G.A. Hopkins and N. Suleimanov, *Mag. Res. in Chemistry* **38** (2000) S9–S15.

2. J.S. Lord, *Physica B* **374–5** (2005) 472;
see also http://www.isis.rl.ac.uk/muons/data_analysis