Influence of optical excitation on the diamagnetic muonium states in Ge

I. Fan¹, K.H. Chow¹, B. Hitti², R. Scheuermann³, A.I. Ahmad¹, W.A. MacFarlane⁴, B.E. Schultz¹, M. Egilmez¹, J. Jung¹, R.L. Lichti⁵

¹Department of Physics, University of Alberta, Edmonton, AB, Canada T6G 2G7
²TRIUMF, 4004 Wesbrook Mall, Vancouver, BC, Canada V6T 2A3
³Paul Scherrer Institute, CH-5232 Villigen, PSI Switzerland
⁴Department of Chemistry, University of British Columbia, Vancouver, BC, Canada V6T 1Z1
⁵Department of Physics, Texas Tech University, Lubbock, Texas, USA 79409-1051

The influence of optical excitation on the precession signal corresponding to the diamagnetic muonium states in various doped Ge samples was studied. There are at least two distinct diamagnetic centers that can be identified in all samples. A typical TF-μSR spectrum is shown in Fig. 1. The relaxation rate of one of the diamagnetic states is found to be highly dependent on the concentration of optically generated carriers, while the other signal is not significantly influenced by the light. The nature of these two diamagnetic states are discussed.

Fig. 1: Typical TF-μSR spectra of diamagnetic muonium in Ge with (a) light off and (b) 75 W light on conditions at 277 K.