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Field dependence of single phonon electron spin lattice relaxation[1] JOHAN VAN TOL, XIAOLING WANG, Florida State University, National High Magnetic Field Laboratory — Longitudinal and transverse electron spin relaxation processes are of importance for a variety of applications, for example quantum information processing, quantum memory, spin cooling, and dynamic nuclear polarization. We measured the temperature- and field-dependence of electron spin relaxation in a variety of spin systems directly in the time domain with high frequency pulsed electron spin resonance at various fields in the 0.3-12 T range . Here we will focus on the direct single-phonon spin lattice relaxation rates, which are found to have a strong field dependence (B^2-B^4) in the high frequency/field and low temperature regime. A comparison is made between transition metal impurities in crystals, donor bound electrons in semiconductors, and other systems of interest to quantum information processing. The spin lattice relaxation time (T_1) of organic radicals in frozen solutions also show a marked field dependence. This is of importance to dissolution- and solid state dynamical nuclear polarization (DNP) for NMR and MRI studies. The experimental results are compared with existing theoretical models.

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