Abstract Submitted
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Nuclear Spin-Lattice Relaxation in Silicon Nanoparticles[1] MEN YOUNG LEE, Department of Physics, Harvard University, MAJA C. CASSIDY, School of Engineering and Applied Sciences, and Department of Physics, Harvard University, CHARLES M. MARCUS, Department of Physics, Harvard University — Measurements of ^{29}Si nuclear spin-lattice relaxation times (T_1) of silicon nanoparticles as a function of size, fabrication method, doping, magnetic field, and optical illumination are presented. The decay of nuclear polarization is found to have components both dependent and independent of magnetic field. Optical illumination is found to reduce T_1 in small nanoparticles, but has no effect in larger particles. These results indicate the competing roles of paramagnetic impurities and nuclear spin diffusion as relaxation mechanisms in silicon nanoparticles. This work is motivated by the application of silicon nanoparticles to hyperpolarized magnetic resonance imaging [1]. We conclude that silicon nanoparticles should be able to hold large nuclear polarizations for long time periods under varying magnetic environments.

[1] J. W. Aptekar et al., ACS Nano, (in press, 2009), arXiv:0902.0269.

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