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Hyperpolarization of ^{29}Si by Resonant Nuclear Spin Transfer from Optically Hyperpolarized ^{31}P Donors PHILLIP DLUHY, JEFF SALVAIL, KAMYAR SAEEDI, MIKE THEWALT, Simon Fraser University, STEPHANIE SIMMONS, Oxford University — Recent developments in nanomedicine have allowed nanoparticles of silicon containing hyperpolarized ^{29}Si to be imaged in vivo using magnetic resonance imaging. The extremely long relaxation times and isotropy of the Si lattice make polarized ^{29}Si isotopes ideal for these sorts of imaging methods. However, one of the major difficulties standing in the path of widespread adoption of these techniques is the slow rate at which the ^{29}Si is hyperpolarized and the limited maximum hyperpolarization achievable. In this talk, I will describe an effective method for hyperpolarization of the ^{29}Si isotopes using resonant optical pumping of the donor bound exciton transitions to polarize the ^{31}P donor nuclei, and a choice of static magnetic field that conserves energy during spin flip flops between donor nuclear and ^{29}Si spins to facilitate diffusion of this polarization. Using this method, we are able to polarize greater than 10% of the ^{29}Si centers in 64 hours without seeing saturation of the ^{29}Si polarization.

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