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Intrinsic Gas-Phase Spin Relaxation of ^{129}Xe[1] B.C. ANGER, M.S. SOLUM, R.J. PUGMIRE, B. SAAM, University of Utah — Hyperpolarized (HP) ^{129}Xe produced through spin-exchange optical pumping (SEOP) techniques is useful for many NMR and MRI applications. At gas densities typical for SEOP, fluctuations in the spin-rotation and chemical shift anisotropy interactions mediated by the formation and breakup of loosely bound ^{129}Xe-Xe molecules have recently been identified as the primary intrinsic spin relaxation mechanism, with T_1 limits as short as ≈ 5 hours for samples of pure Xe. We have shown that this relaxation mechanism can be suppressed at high magnetic fields, leading to T_1 relaxation times of ≈ 100 h at 14.1 T. Further results showed a near doubling of relaxation times with moderate temperature increases from 293 K to 393 K, implying a maximum intrinsic relaxation time of ≈ 9 h at 393 K. In the field regime practical for SEOP (2.8 mT), we observed ^{129}Xe relaxation times of nearly 5 hours in a 1 amagat Xe sample at 393 K. These results suggest a practical, low-field, non-cryogenic storage system that will provide Xe hold times much longer than those currently available from standard cryogenic storage systems on flow-through Xe polarizers.

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B.C. Anger
University of Utah

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