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Long-lived precession of spin gratings in n-doped GaAs SAM CARTER, ZHIGANG CHEN, STEVEN CUNDIFF, JILA and National Institute of Standards and Technology — Transient grating experiments have been performed in lightly n-doped GaAs to measure population and spin dynamics. In the presence of a magnetic field perpendicular to the optical axis (Voigt geometry), the spin grating precesses, leading to a diffracted probe signal that oscillates at twice the precession frequency. In contrast to previous experiments in undoped [1] and heavily doped [2] samples, the spin gratings last up to $\sim$1 ns at low temperatures, much longer than the lifetime of the photo-excited carriers. These results indicate that a spin grating is formed in the itinerant electrons, which decays due to spin relaxation and diffusion. By measuring changes in the grating decay rate with the grating period, the spin and population diffusion rates have been determined. Attempts to generate a spin grating without generating photo-excited carriers using Raman excitation will also be discussed. [1] A. R. Cameron, P. Riblet, and A. Miller, *Phys. Rev. Lett.* **76**, 4793 (1996). [2] C. P. Weber, N. Gedik, J. E. Moore, J. Orenstein, J. Stephens, and D. D. Awschalom, *Nature* **437**, 1330 (2005).

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