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Confinement and Diffusion Effects in Dynamical Nuclear Polarization in Low Dimensional Nanostructures DAN HENRIKSEN, IONEL TIFREA, California State University, Fullerton — We investigate the dynamic nuclear polarization as it results from the hyperfine coupling between nonequilibrium electronic spins and nuclear spins in semiconductor nanostructures. The natural confinement provided by low dimensional nanostructures is responsible for an efficient nuclear spin - electron spin hyperfine coupling [1] and for a reduced value of the nuclear spin diffusion constant [2]. In the case of optical pumping, the induced nuclear spin polarization is position dependent even in the presence of nuclear spin diffusion. This effect should be measurable via optically induced nuclear magnetic resonance or time-resolved Faraday rotation experiments. We discuss the implications of our calculations for the case of GaAs quantum well structures.

[1] I. Tifrea and M. E. Flatté, Phys. Rev. B 84, 155319 (2011).
[2] A. Malinowski and R. T. Harley, Solid State Commun. 114, 419 (2000).

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