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**Dynamical nuclear polarization and nuclear magnetic fields in semiconductor nanostructures** IONEL TIFREA, MICHAEL E. FLATTÉ, University of Iowa — We investigate the dynamical nuclear polarization effect due to the hyperfine interaction between electronic and nuclear spins in low dimensional semiconductor nanostructures. We derive the time and position dependence of the induced nuclear spin polarization and the resulting hyperfine and dipolar magnetic fields. The determining parameters are the local electronic density of states and the additional nuclear spin relaxation times due to iteractions other that the hyperfine interaction [1,2]. In GaAs/AlGaAs parabolic quantum wells the nuclear spin polarization can be as high as 80% and the induced nuclear magnetic fields can approach a few kilogauss (the hyperfine field) and few gauss respectively (the dipolar field) when the electronic system is 100% spin polarized. These fields and shifts can be tuned using small electric fields. We discuss the implications of such control for optical nuclear magnetic resonance experiments in low-dimensional semiconductors [3].
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Ionel Tifrea
University of Iowa

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