Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Resistively Detected NMR and phonon-assisted dynamical nuclear polarization GERSON J. FERREIRA, J. CARLOS EGUES, IFSC, USP, Brazil, W.A. COISH, McGill University, Canada — The resistively detected NMR (RDNMR) is used to detect the nuclear spin polarization and relaxation rates via magnetotransport in the quantum Hall regime. The diagonal term of the hyperfine coupling act on the electrons as an effective magnetic field Bn (Overhauser effect) proportional to the nuclear spin polarization. An oscillatory magnetic field with RF frequency in resonance with the nuclear spin splitting destroys the nuclear spin polarization, and thus the effective magnetic Bn. This induces a measurable change in the longitudinal resistance. Here we show that a finite current dynamically enhances the nuclear spin polarization via two processes: (i) near Landau level crossings a first order hyperfine spin-flip dominates, while (ii) away from crossings a second order phonon-assisted hyperfine spin-flip dominates. Our model show quantitative agreement with recent experiments [Zhang et al., PRL 98, 246802 (2007); Dean et. al., PRB, 80, 153301 (2009); Guo et al., PRB 81, 041306 (2010)]. See also [Ferreira et al., PRL 104, 066803 (2010)].

Gerson J. Ferreira
IFSC, USP, Brazil

Date submitted: 27 Dec 2011 Electronic form version 1.4