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POS-47 - Dynamic Nuclear Polarization Designed for Nano-MRI Imaging

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We propose a dynamic nuclear polarization technique at high field and at cryogenic condition in order to highly polarize a nano-meter ensemble of protons with high efficiency. The proposed experiment is particularly designed as an initialization step for ultra-sensitive magnetic resonance imaging (MRI) and spectroscopy using silicon nanowire mechanical oscillator in order to enhance the image resolution of nanoscale samples. This DNP technique consists of an adiabatic half passage pulse followed by an adiabatic linear sweep of electron Rabi frequency, which can be considered as an adiabatic nuclear orientation via electron spin locking (adiabatic-NOVEL). We study the process of polarization transfer between a parametric center and its nearby nuclei both numerically and analytically to show that the adiabatic-NOVEL is highly efficient and is very robust against field inhomogeneity. We discuss the experimental implementation of the proposed DNP technique using the nanoscale architecture designed for nano-MRI.

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