Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Dipolar Decoupling in Magnetic Resonance Force Microscopy using Optimal Control Pulses WILLIAM ROSE, University of Illinois at Urbana-Champaign, HOLGER HAAS, University of Waterloo, RAFFI BUDAKIAN, University of Illinois at Urbana-Champaign — We present data showing how a modified gradient ascent pulse engineering method can be used to design nuclear magnetic resonance pulses that perform a single unitary transformation over a large range of maximum Rabi field strengths (B_1), while decoupling the secular dipolar interactions between spins. We designed dipolar-decoupling π-pulses that perform well over spins feeling maximum B_1 fields from $131 - 274G$. By combining these π-pulses into a simple multiple pulse sequence, with fields produced by a silver microwire, we have increased $T2^*$ in a polystyrene sample attached to the tip of a silicon nanowire from $11\mu s$ to $\sim 250ms$. This dipolar decoupling could be used to improve the spatial resolution of nano-MRI experiments and to allow spectroscopy of chemical shifts in nanoscale samples.

William Rose
University of Illinois at Urbana-Champaign

Date submitted: 06 Nov 2015 Electronic form version 1.4