

Abstract Submitted  
for the DAMOP07 Meeting of  
The American Physical Society

**Efficient NMR manipulation of single electron-nuclear spin registers** PAOLA CAPPELLARO, ITAMP, LIANG JIANG, MIKHAIL LUKIN, Department of Physics, Harvard University — Motivated by recent experiments with single nitrogen-vacancy centers in diamond, we consider a few-qubit quantum system composed of a single electron and proximal nuclear spins. Initialization and read-out of such a quantum register is accomplished optically via the electron spin. Due to the large hyperfine coupling, the nuclear spins can be addressed individually. We describe NMR-based techniques for efficient initialization and coherent manipulation of such registers composed of multiple nuclear spins. We analyze feasible performances and practical limitations of this approach in a realistic setting. This hybrid approach combines ideas from quantum optics, mesoscopic physics and NMR to yield a robust, potentially scalable quantum information system.

Paola Cappellaro  
ITAMP

Date submitted: 05 Feb 2007

Electronic form version 1.4