

Abstract Submitted  
for the MAR13 Meeting of  
The American Physical Society

**Theoretical hyperfine decay functions in triple quantum dots<sup>1</sup>**

THADDEUS LADD, HRL Laboratories, LLC — Coherent oscillations in multiple quantum dots decay due to hyperfine interactions with nuclear spins. The decay functions observed in several double-dot experiments [1] agree well with simple formulae derived using the group  $SU(2)$ , which is defined by exchange and hyperfine interactions in the singlet-triplet system [2]. We show that in triple dots, this theory generalizes to  $SU(3)$ , with convenient representation in the basis of states of the exchange-only qubit in a decoherence-free subsystem [3]. Using some intuition from  $SU(3)$ , we derive analytic formulae for the hyperfine decay functions expected in coherent oscillations in triple dots [4].

[1] B. M. Maune et al., *Nature* **481**, 344 (2012); E. A. Laird et al., *Phys. Rev. B* **82**, 075403 (2012)

[2] W. A. Coish and D. Loss, *Phys. Rev. B* **72**, 125337 (2005)

[3] D. P. DiVincenzo et al., *Nature* **408**, 339 (2000); B. H. Fong and S. M. Wandzura, *Quantum Inf. Comput.* **11**, 1003 (2011)

[4] T. D. Ladd, *Phys. Rev. B* **86**, 125408 (2012).

<sup>1</sup>Sponsored by the United States Department of Defense. The views expressed are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government. Approved for public release, distribution unlimited.

Thaddeus Ladd  
HRL Laboratories, LLC

Date submitted: 08 Nov 2012

Electronic form version 1.4