

Condensed Matter Theory Center Seminar



Tuesday, November 14
11:00 am – 12:15 pm
2205 John S. Toll Physics Building

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“Dynamics and Coherence of a Driven Spin Qubit”

Abstract: Research on physical implementation of quantum computing has made dramatic progress over the past decade, spearheaded by superconducting qubits and trapped ion qubits. Studies of semiconductor spin qubits, which have often been considered one of the most promising in terms of scalability, have lagged behind, still struggling with high-fidelity single- and especially two-qubit gates. In this talk I will first present a general discussion of the current status of spin qubits, make comparisons between semiconducting and superconducting qubits, and try to identify the most important bottlenecks for spin qubits. I will then discuss some of our recent efforts in understanding spin dynamics and decoherence. One example is a study of implementing an adiabatic protocol of spin rotation non-adiabatically, and obtaining high fidelity resonantly [1]. Another example is a study of Doppler effect in the spin-lattice relaxation when a spin qubit is being transported [2], where we demonstrate how spin relaxation is modified by the interplay between Doppler shift, quantum confinement, and phonon density of state.

References:

- [1] S. Ou, X. Hu, F. Nori, and S. Kais, *Sci. Rep.* 6, 20824 (2016).
- [2] X. Zhao, P. Huang, and X. Hu, *Sci. Rep.* 6, 23169 (2016).

Host: Robert Throckmorton
Web: <http://www.physics.umd.edu/cmte/seminars.html>

