Condensed Matter Theory Center Seminar

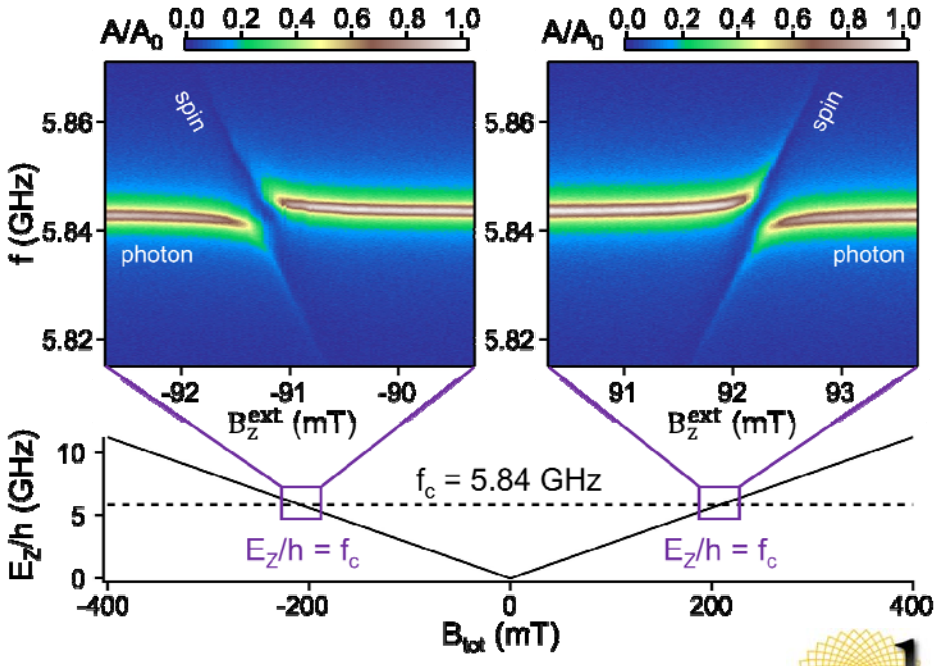
Tuesday, October 10
11:00 am – 12:15 pm
2205 John S. Toll Physics Building

Jason Petta

Princeton

"Coherent Coupling of a Single Spin to a Single Photon in Silicon"

Abstract: Electron spins in silicon quantum dots are attractive quantum bits (qubits) due to their long coherence times and the promise of rapid scaling using semiconductor fabrication techniques. While nearest neighbor exchange coupling has been recently demonstrated in Si, the interaction of spins via microwave frequency photons could enable long distance spin-spin coupling and "all-to-all" qubit connectivity. I will describe experiments where we couple a single spin in silicon to a single microwave frequency photon. The coupling mechanism is based on spin-charge hybridization in the presence of a strong magnetic field gradient. Spin-cavity coupling rates $g_s/2\pi > 10$ MHz are achieved and vacuum Rabi splitting is observed in the cavity transmission, indicating single spin-photon strong coupling. These results open a direct path toward entangling single spins at a distance using microwave frequency photons.



Host: Robert Throckmorton
Web: http://www.physics.umd.edu/cmtc/seminars.html

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