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Electron Spin Resonance on a Single Carbon Nanotube CHRISTOPHER RUTHERGLEN, U.C. Irvine, PETER BURKE, U.C. Irvine — Little is known about the spin properties of carbon nanotubes (CNT) such as their spin-coherence time. We are in process of directly determining the electron spin coherence time of a single walled carbon nanotube by measuring the microwave reflection (S11) off a single CNT in a magnetic field at 0.3K. We expect to observe resonant microwave absorption at the Zeeman frequency, which is 27GHz/Tesla. The linewidth of these absorption peaks will provide a direct measurement of the spin-coherence time of the CNT electrons which is currently lacking in the research literature. Absorption peaks associated with the Coulomb energy, the quantum energy level separation, the energy mismatch between bands are also expected to be measured. A homodyne reflectometer has been constructed in our lab that can resolve S11 changes of 1 part in 10^5. We expect that our technique of measuring the microwave reflection off of a single nanostructure will be a power spectroscopic tool to investigate a wide variety of quantum excitations in nanostructures, an important prerequisite for powerful quantum information processing based on integrated nanosystems.

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