**Physics Seminar**

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*“The Electron is Not Round: Electron Shape, Size and GPDs in QED”*

**Abstract**

The shape of the electron is studied using lowest-order perturbation theory. Quantities used to probe the structure of the proton: form factors, generalized parton distributions, transverse densities, Wigner distributions and the angular momentum content are computed for the electron-photon component of the electron wave function. We find that the size of the electron (as defined by the slope of its Dirac form factor) bound in a hydrogen atom is found to be about four times larger than when the electron is scattered by a target. The shape of the electron, as determined from the transverse density and generalized parton distributions is shown to not be round, and the scattered electron is shown to be far less round than the bound electron. An electron distribution function (analogous to the quark distribution function) is defined, and that of the bound electron is shown to be suppressed compared to that of the free electron. If the relative transverse momentum of the virtual electron and photon is large compared with the electron mass, the virtual electron and photon each carry nearly the total angular momentum of the physical electron (1/2), with the orbital angular momentum being nearly (-1/2). Furthermore we find that  end-point contributions to form factors are suppressed. Implications for proton structure and color transparency are discussed.

**Friday, February 20, 2015**

**11:00 am**

**CEBAF Auditorium**