TJNAF Experiment E99-114
Exclusive Compton Scattering on the Proton

E99-114 (formerly E97-108) will measure Real photon Compton Scattering (RCS) from the proton over a wide range of s and t, where the dominant reaction mechanism is one that leads to a factorization into a hard scattering subprocess and a soft wave function. One goal of the program is to test the predictions of various proposed models for the hard subprocess. Another is to compare the information obtained about the soft wave function with complementary information obtained from other processes, such as elastic form factors and deep inelastic scattering. Part of the experimental program involves a measurement of the components of the recoil proton polarization after scattering by a longitudinally polarized photon beam. The polarization transfer expected to be large and has different sign in competing mechanisms of RCS - hard gluons exchange and soft wave function overlap.

The experiment will take place in Hall A. A high intensity beam of electrons impinges in a Cu radiator located just upstream of the LH_2 target. Scattered photons are detected in coincidence with the recoil protons for events in the vicinity of the bremsstrahlung endpoint. One of the HRS spectrometers is used for the recoil detection, including the focal plane polarimeter for the polarization part of the experiment. The photon spectrometer is being constructed for this experiment. The primary component is a large-area, highly segmented calorimeter of lead-glass, which is arranged spatially to match approximately the acceptance of the HRS. Because the LH_2 target is exposed to both electrons and photons, a spatially segmented veto detector of UVT Lucite will be placed in front of the calorimeter to identify ep elastic events. The latter serves as a convenient calibration and normalization reaction. A deflection magnet located between the target and photon spectrometer also aids in the identification of ep elastic events. An essential feature of the experiment is to use the excellent angular reconstruction of the combined two-spectrometer system (HRS and calorimeter) to reduce significantly the background from coherent neutral pion photoproduction.

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