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Precision knowledge of the photon beam linear polarization is critical for the success of all Hall D experiments. The coherent bremsstrahlung spectral analysis technique (CBSA) provides a QED-based estimate of that polarization utilizing an analysis of the tagger counter hit pattern during the photon run and the electron beam-diamond-collimation geometry. However, quantifying and understanding systematic uncertainties can be challenging for that post-data-collection technique. Thus, a second, near-real-time precision measurement of the photon beam polarization will be invaluable. The measurement method being used in Hall D takes advantage of the triplet photoproduction process, wherein the polarized photon beam interacts with an atomic electron within a suitable target material, resulting in the production of an electron-positron pair, with the atomic electron recoiling from the atom. An accurate determination of the azimuthal angular distribution of the recoil electron yields a precise QED-based measurement of the beam polarization. For polarized photons, the triplet cross section can be written as $\sigma_t = \sigma_0\,[1 + P\Sigma\cos(2\phi)]$, where σ_0 is the unpolarized cross section, P is the photon beam polarization, Σ is the beam asymmetry, and ϕ is the azimuthal angle of the recoil electron. Since QED is a very well understood theory, QED calculation of the beam asymmetry Σ serves as the analyzing power of the reaction.

For GlueX, the photoproduced e^+e^- pair in triplet photoproduction is detected in the pair spectrometer downstream of a specially-constructed triplet polarimeter. The azimuthal distribution of the recoil electrons from triplet photoproduction is recorded simultaneously during normal data collection. The triplet photoproduction target subtends the entire photon beam, but is relatively thin, so that nearly all photons pass through the foil; those photons that do result in triplet photoproduction thus sample the polarization of the entire photon beam. The resulting recoil electron distribution is fit to the function $A\,[1 + B\cos(2\phi)]$, where the variables A and B are parameters of the fit. Once B has been extracted from the data, the polarization P of the photon beam can be calculated as $P = B/\Sigma$.

The polarimeter constructed for Hall D uses a double-sided silicon strip detector manufactured by Micron Semiconductor (specifically, their S3 product). This detector measures energy deposition, provides timing information, and records the azimuthal distribution of recoil electrons coming from the atomic electron in the triplet photoproduction process. The detector has 32 azimuthal sectors on the ohmic side and 24 concentric rings on the junction side. The detector has an outer active diameter of 70 mm and an inner active diameter of 22 mm. This detector is placed in the beamline within a vacuum chamber located in the collimator cave just upstream of the pair spectrometer. A thin beryllium foil serves as the triplet production target; several targets of different thicknesses are available for use, with selection based on photon beam intensity and desired polarimeter event rate.

Data presented in this document are from two runs from the Spring 2015 commissioning data. One of the runs was of four hours and had an amorphous radiator creating unpolarized photons, while the other run had a duration of two hours and had an oriented diamond radiator which produced polarized photons. Thus, it is important to realize that the results presented here are for a mere *two hours* of polarized data collection. For the analysis in this document, only triplet events that are associated with a pair-hit in the pair spectrometer are of interest. Furthermore, in order to remove data that represents a lack of a sector hit, hits seen in the fADC were ignored if the maximum difference in fADC counts was less than 45.

For this initial analysis, a timed hit was defined as having a difference in time between a coincidence in the pair spectrometer and a hit in the polarimeter (ΔT) within $\pm$ 40 ns, and an out-of-time hit was defined as having ΔT between 60 ns and 220 ns. Initial energy calibrations for each sector of the polarimeter were performed at ASU using a ^{210}Po α source. The sensitivity was found to be sector-dependent and ranged from 92.5 to 106.4 mV/MeV. The following cuts were applied to the data: (1) a single sector hit seen in the polarimeter, (2) energy deposition in the sector-hit of the triplet polarimeter greater than 250 keV, (3) a single e^+e^- pair coincidence in the pair spectrometer, and (4) course left- and right-paddle numbers of the pair spectrometer must add together to be between 11 and 13 (corresponding to the e^+e^- pair having an energy between 2.4 and 3.1 GeV and a maximum energy difference between each of the detected leptons to be 730 MeV).

The azimuthal distribution of the events seen on the triplet polarimeter that survived the cuts listed above were weighted such that timed-hits were weighted as unity and out-of-time hits where weighted by -0.5. The function fit to the distributions was $A\,[1 + B\cos(2\phi)]$, with A and B being parameters of the fit. The analyzing power for the reaction was the expected beam asymmetry (Σ_e) after the generated triplet events were processed through the Monte Carlo simulation using the same cuts as were used for real data; for this particular configuration, Σ_e had the value 0.197. To obtain the preliminary beam polarization estimate, the value of B, obtained from fitting the azimuthal distribution to $A\,[1 + B\cos(2\phi)]$), was divided by Σ_e.

The results for the beam polarization P for the four-hour amorphous run using a 10^{-4} radiation-length tagger radiator was $P = 0.38 \pm 0.36$, within 1.06 standard deviations from the desired result of zero. The value of P for the two-hour 50-μ-oriented diamond run was $P = 0.72 \pm 0.19$. With *only two hours* of polarized beam, the value of P obtained already has an absolute uncertainty of less than $\pm$0.2, a highly-promising proof-of-principle run. Having polarization determinations in parallel from both the CBSA and triplet polarization methods - two entirely different QED-based techniques - will permit a very accurate value for the polarization and tightly constrain estimates of systematic uncertainties.