Investigating the Measurement of Photon Polarization via the Glasgow Pair Polarimeter Detector

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The A2 Collaboration at the Institute for Nuclear Physics in Mainz, Germany, specializes in medium-energy subatomic experimental physics; specifically, shooting real photons at nuclei and reconstructing the reactions to probe various properties of protons and neutrons. Two of the most important properties of the incoming photon in such experiments are that of its energy and polarization, both measured via a detector called the Tagger. However, as detectors and other systems within the experimental setup improve, current methods of measuring photon polarization become the limiting factor in precision in many experiments. Thus, a team led by the University of Glasgow has been investigating the implementation of a new detector, called the Pair Polarimeter, for measuring photon polarization to a lower systematic uncertainty. In May 2019, data was taken in testing this new detector in the A2 hall, requiring the completion of two major tasks: a) calibrating the Tagger's timing and b) determining which photons are producing which hits in the Pair Polarimeter. With the conclusion of these tasks, the Glasgow team is well on its way to measuring photon polarization with the Pair Polarimeter, hopefully leading to lower systematic uncertainties at the A2 and similar facilities.