Design and Simulation of a Polarized Pure Photon Source for Compton Scattering from Solid Polarized Targets

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Wide angle compton scattering from polarized protons holds great promise: access to the generalized parton distribution functions $\widetilde{\mathcal{H}}$ and $\mathcal{E}$ with different weighting and moments than in other hard exclusive processes, emphasizing the u-quarks and the valence region. Previously, experiments were proposed using bremsstrahlung from polarized electrons striking a radiator. Unfortunately the mixed electron-γ beam limits the polarized target performance due to radiation damage and restricted luminosity owing to the heat load. We have designed a pure photon beam line by placing a dipole magnet after the radiator which deflects the electrons away from the target and into a beam dump. This approach has many benefits which include an order of magnitude increase in the photon luminosity and unrestricted use of transversely polarized targets while preserving robust target performance. We will discuss the physics motivation, the design (of two different options) as well as the G4beamline simulation results of the source.