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Initial Electron Beam Polarization Measurement in $e\text{-}\gamma$ Collisions

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Abstract: The future high energy $e\text{-}e$ colliders, together with the complementary $\gamma\text{-}\gamma$ option, will offer possibilities for both discovery and precision physics. The uncertainty on the initial beam polarizations contributes to the systematic errors in each case. Therefore, it is crucial to obtain the precise beam polarizations by independent measurements. The $e\text{-}\gamma \rightarrow \mu\text{-}W$ process in the $e\text{-}\gamma$ mode can be used to experimentally determine the polarization of the initial e beam. This note addresses the feasibility of making such a measurement with a relative statistical error of one percent. Generator and detector level MC tools are used to obtain a realistic simulation of the signal and background processes at the future CLIC test facility running at $\sqrt{s} = 150$ GeV. We estimate about 8 months of data collection time by combining the muon and electron channels.

Key Words: Linear Collider, Laser backscattering, Beam polarization, Simulation, CLIC

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