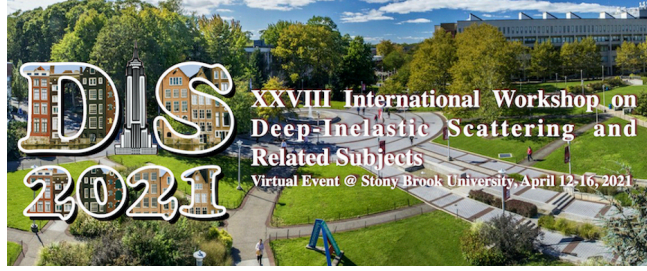


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The Photon PDF within the CT18 global analysis

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Building upon the most recent CT18 global fit, we present a new calculation of the photon content of proton based on an application of the LUXqed formalism. In this work, we explore two principal variations of the LUXqed ansatz. In one approach which we designate CT18lux, the photon PDF is calculated directly using the LUXqed formula for all scales, Q . In an alternative realization, CT18qed, we instead initialize the photon PDF in terms of the LUXqed formulation at a lower scale, $Q \sim Q_0$, and evolve to higher scales with a combined QED kernel at $\mathcal{O}(\alpha)$, $\mathcal{O}(\alpha\alpha_s)$ and $\mathcal{O}(\alpha^2)$.

While we find these two approaches generally agree, especially at intermediate x ($10^{-3} < x < 0.3$), we discuss some moderate discrepancies that can occur toward the end-point regions at very high or low x . We also study effects that follow from variations of the inputs to the LUXqed calculation originating outside the purely DIS region, including from elastic form factors and other contributions to the photon PDF. Finally, we investigate the phenomenological implications of these photon PDFs at the LHC, including high-mass Drell-Yan, vector-boson pair, top-quark pair, and Higgs+vector-boson production.

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