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Probing nPDF and fully coherent radiation through electromagnetic signals at the LHC

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Prompt photon production in pA collisions has long been suggested as a sensitive probe of the nuclear gluon density. In this study, we present recent results on another cold nuclear matter effect: fully coherent radiation induced by parton multiple scattering, which may affect the nuclear dependence of prompt photon production. Medium-induced radiation effects, implemented in leading-order direct photon processes, are computed for pPb collisions at the LHC. At backward rapidity, photons are sensitive to fully coherent energy loss (FCEL) effects, while at forward rapidity, fully coherent energy gain (FCEG) plays a crucial role due to the dominance of the $qg \to q\gamma$ scattering channel. In the case of virtual photon production, the effects of fully coherent radiation become marginal, making the Drell-Yan process one of the best for probing nuclear PDFs. The power of the DY process is demonstrated through the reweighting of nPDF sets at next-to-leading order (NLO) using realistic pseudo-data from LHC Run 3.

Secondary track

T05 - QCD and Hadronic Physics

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