

Photon and Neutral Meson Production in $p\text{Pb}$ Collisions at LHCb

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on behalf of the LHCb Collaboration

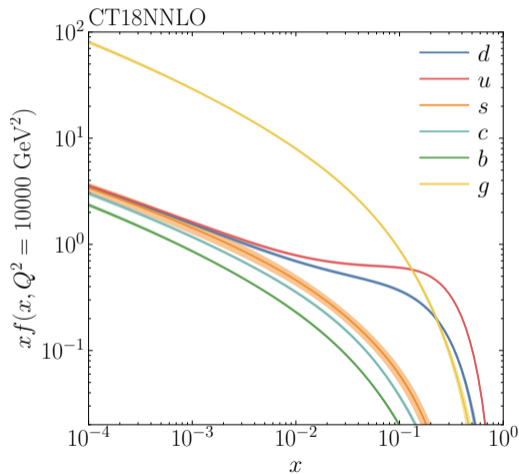
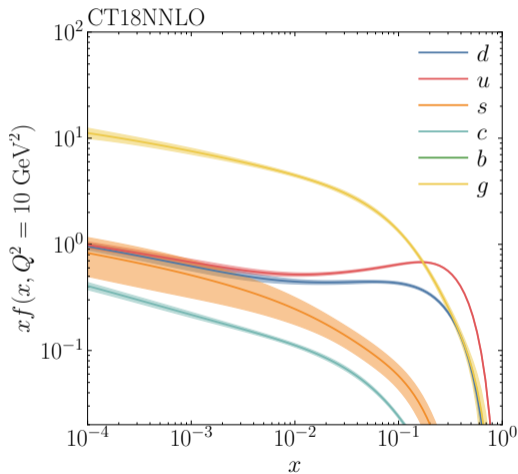
University of Cincinnati

APS April Meeting
April 17, 2021



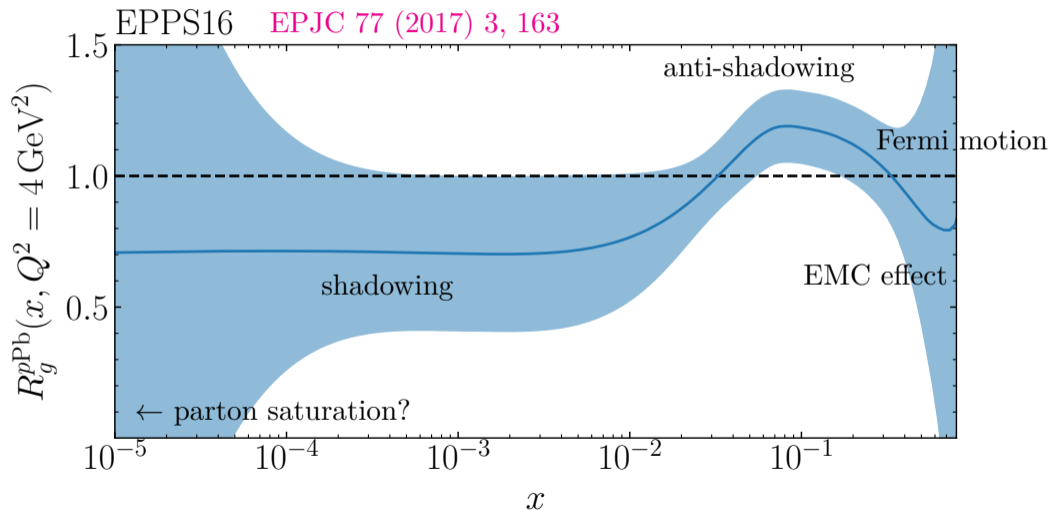
Parton Distribution Functions

Probability of a probe at energy scale Q seeing a parton carrying momentum fraction x

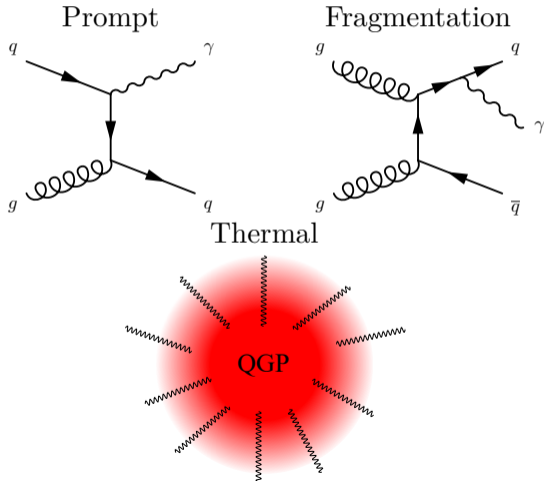


PRD 103, 014013 (2021)

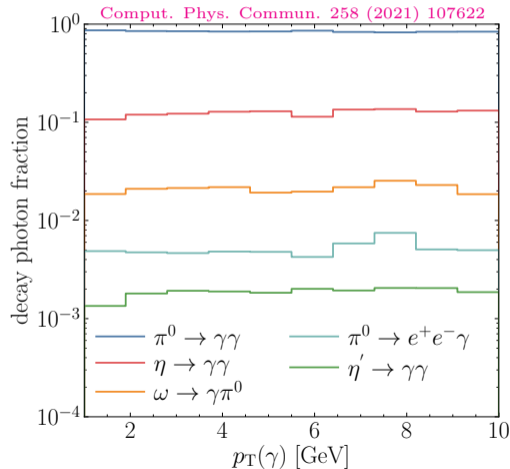
Nuclei aren't just collections of nucleons



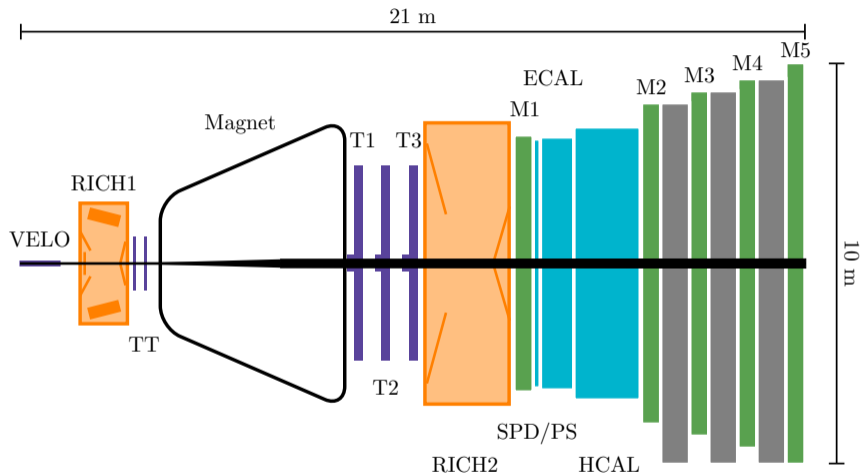
Direct Photons



Decay Photons



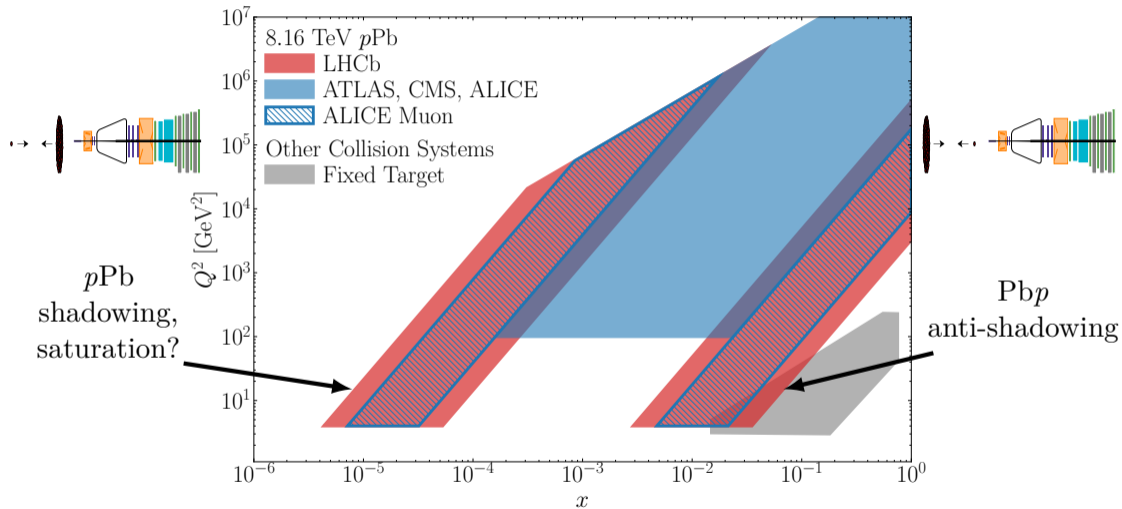
The LHCb Detector (*Int. J. Mod. Phys. A* 30, 1530022 (2015))



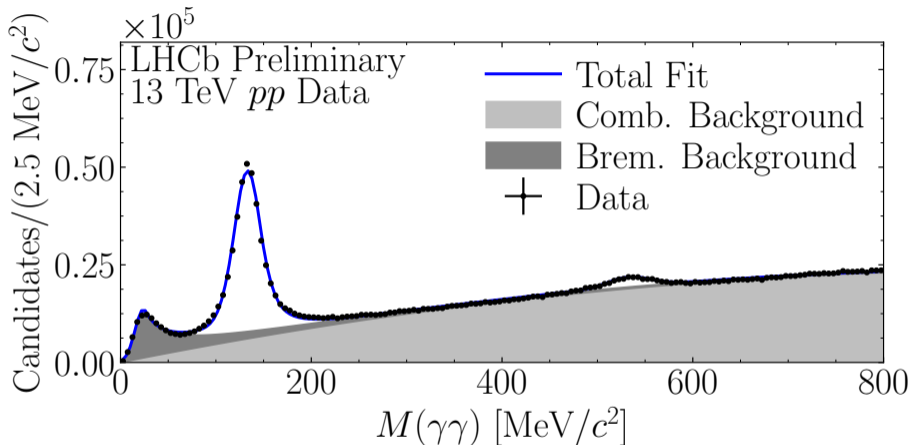
Forward spectrometer: $2 < \eta < 5$

tracking, calorimetry, RICH, muon systems

LHCb kinematic coverage



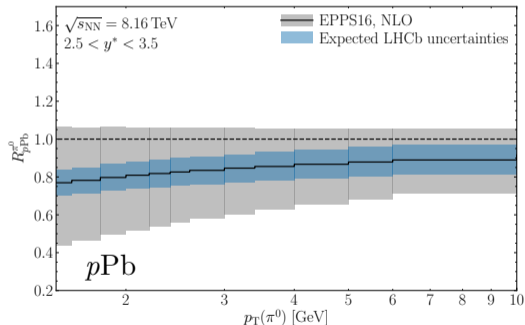
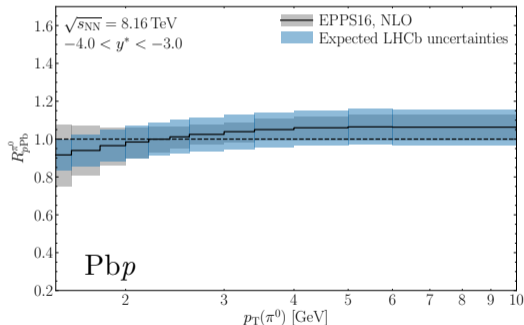
Photon and π^0 reconstruction



- Reconstruct photons that convert in the detector material
- Combine converted photons with ECAL photons to reconstruct π^0 candidates
- Extract yields using fits to the diphoton mass spectra

Expected results

$$R_{p\text{Pb}}^{\pi^0}(p_T) = \frac{1}{208} \frac{d\sigma_{p\text{Pb}}^{\pi^0}/dp_T}{d\sigma_{pp}^{\pi^0}/dp_T}$$



- Theory predictions from [JHEP 09 \(2014\) 138](#)
- Expected LHCb uncertainties dominated by photon reconstruction efficiency

- LHCb has an active program of π^0 and photon production measurements
- Sensitive to the gluon PDF at high- and low- x
- Measurement of π^0 nuclear modification factor at LHCb will provide strong constraints on the low- x gluon PDF

Thank You!