Cascade group meeting

# CASCADE news

- work ongoing for WW→ Z
- DESY group has first EW pdfs and TMDs
  - Already existing: photon TMDs and PDFs from PB approach (Jung, H., Monfared, S. T., and Wening, T. Determination of collinear and TMD photon densities using the Parton Branching method, Physics Letters B, 817(2021), 136299, arXiv2102.01494
  - Extend this approach to Z0,W+,W- bosons
  - no intrinsic distribution, all is generated perturbatively.
  - Splitting functions: as for photon
  - Coupling:

$$\text{for } W^{\pm} \; \alpha \quad \rightarrow \quad \frac{1}{8} \frac{\alpha}{\sin^2 \theta_W}$$

$$\text{for } Z_0 \; \alpha \quad \rightarrow \quad \frac{1}{4} \frac{\alpha}{\sin \theta_W \cos \theta_W}$$
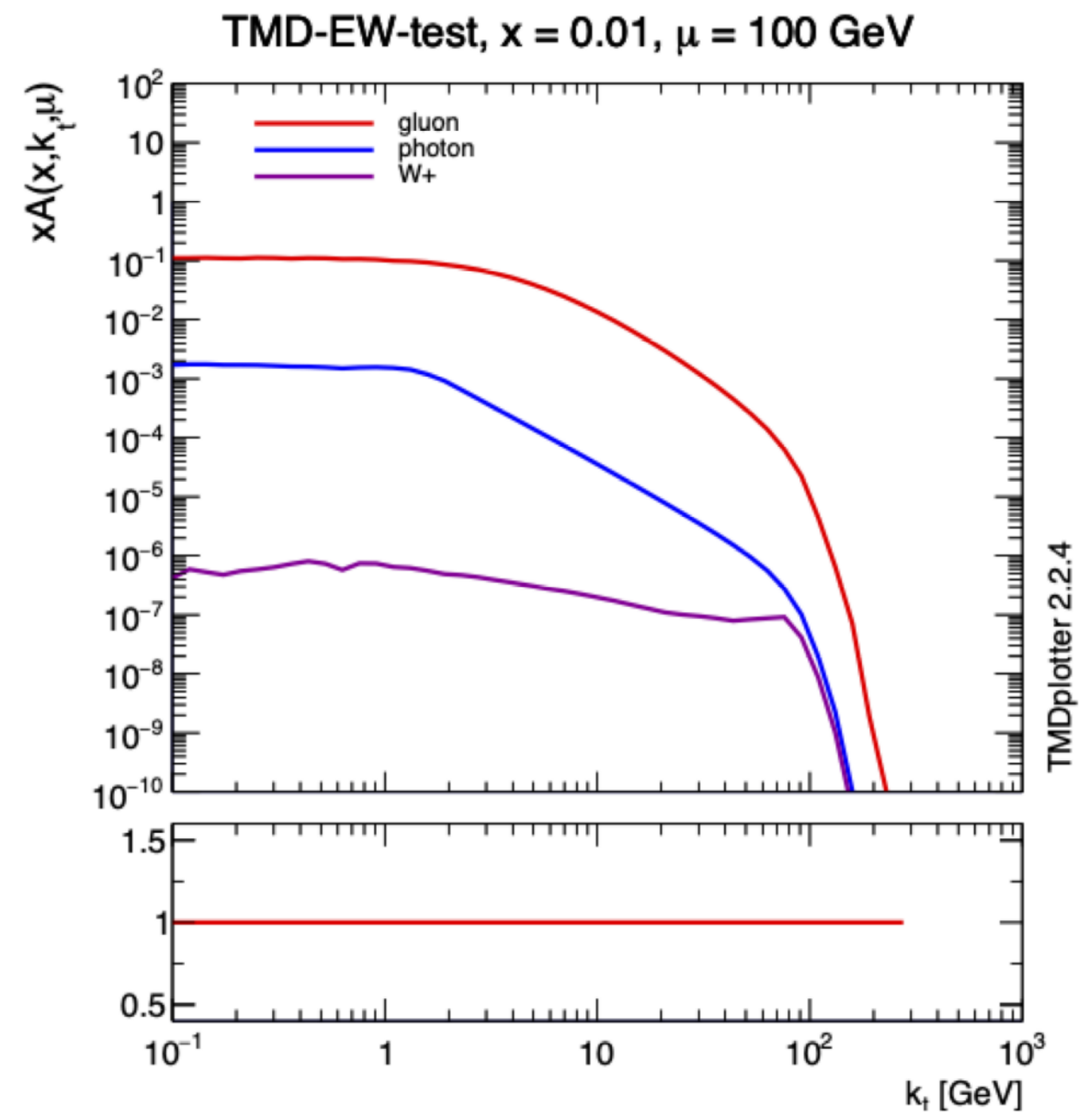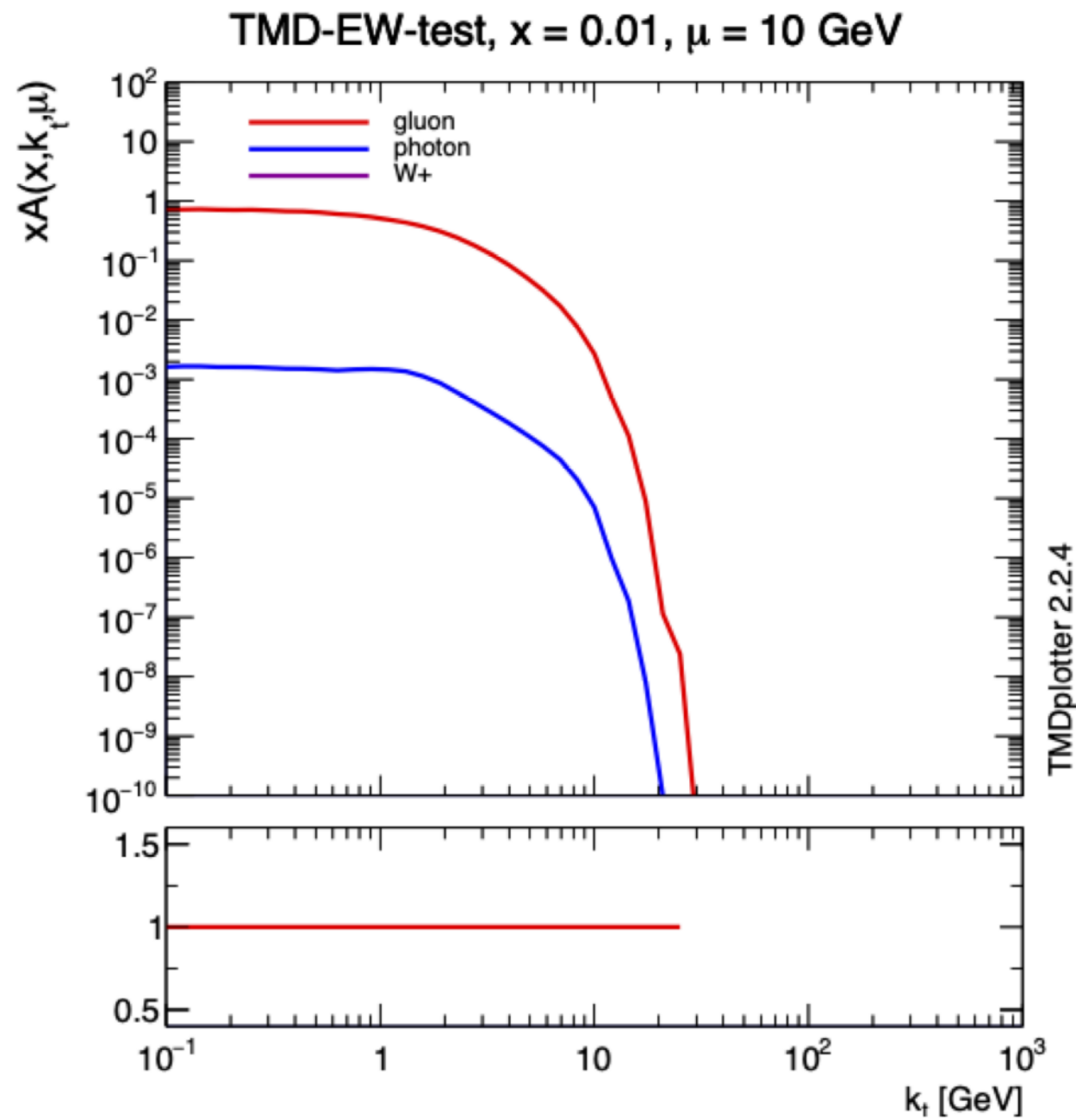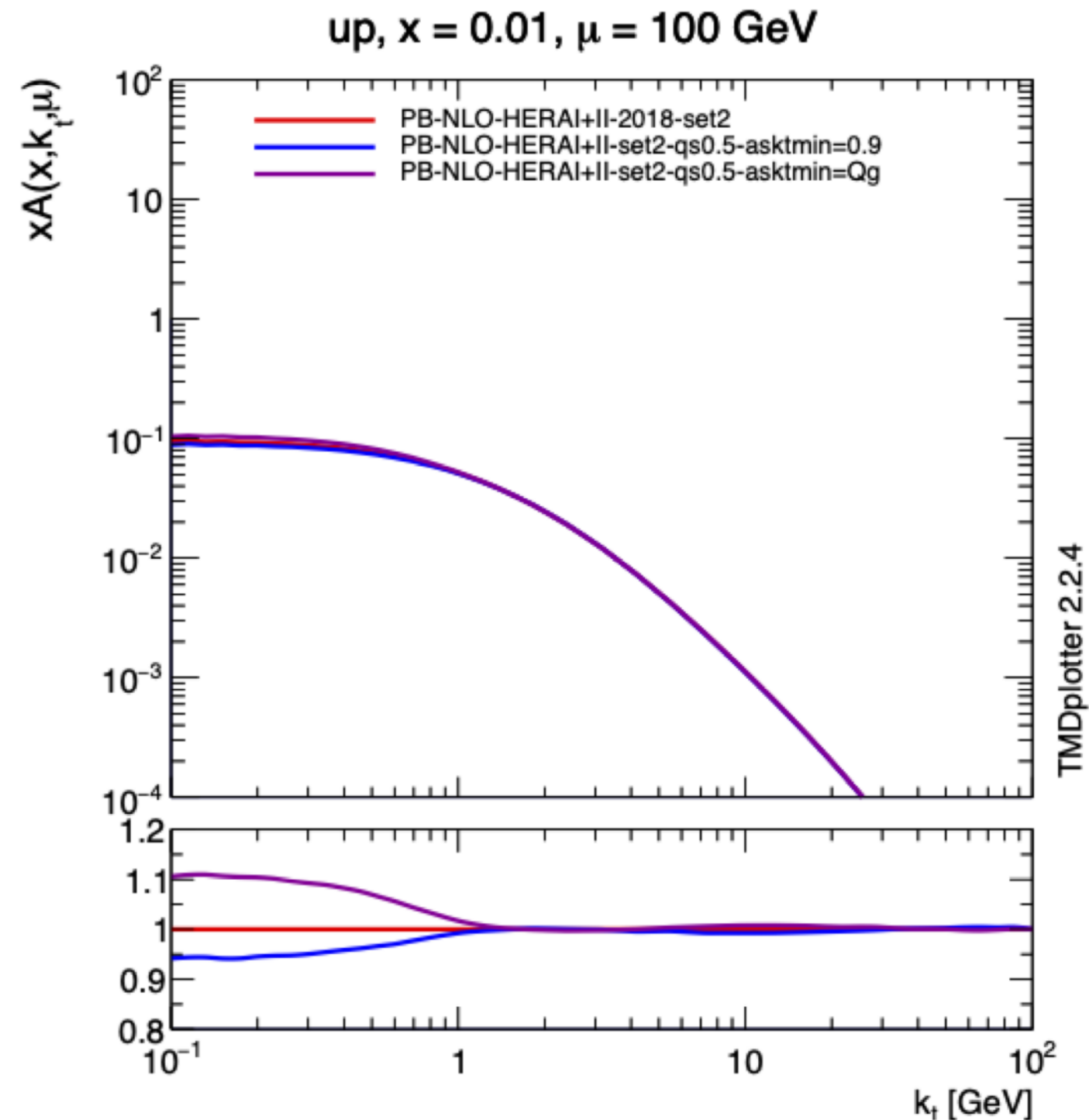
$$(2)$$

Electroweak PDFs

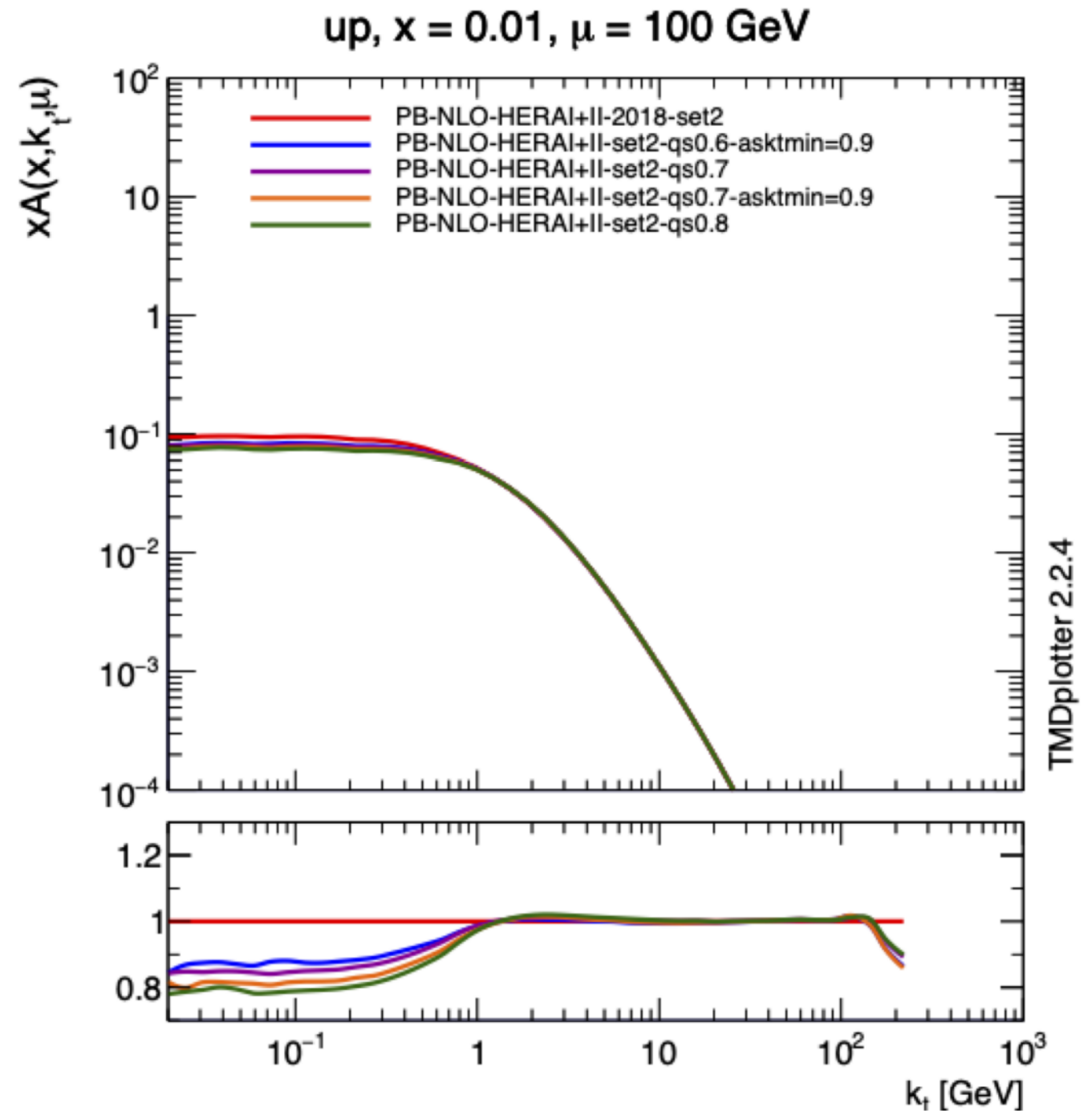- Integrated PDFs from PB set2
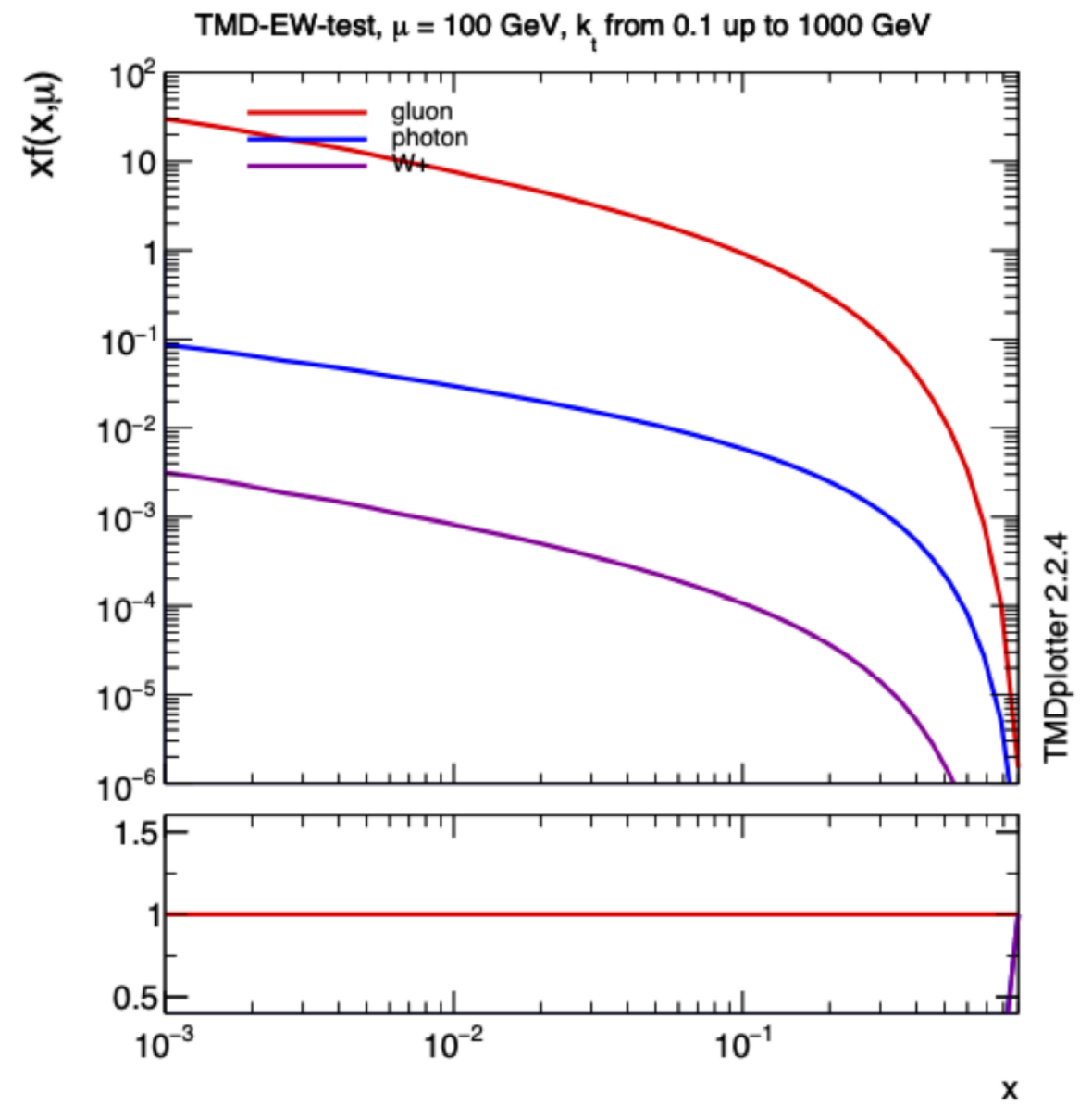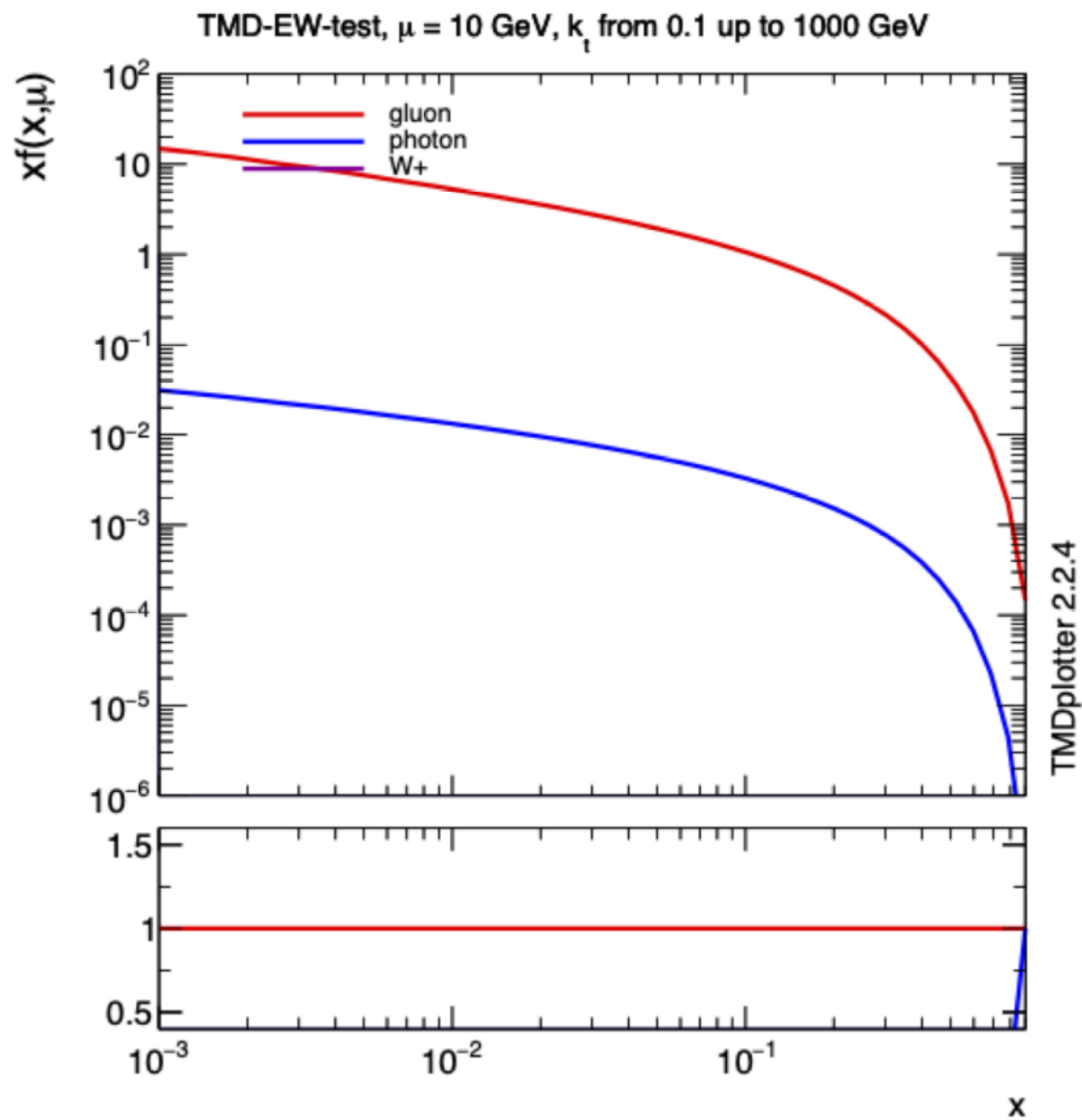
Electroweak TMDs

- TMDs from PB set2

Intrinsic kt and $\alpha_s(p_T)$

- in set 2, $\alpha_s(p_T)$, has cutoff for $p_T < 1$ GeV

up, x = 0.01, μ = 100 GeV

PB-NLO-HERAI+II-2018-set2
PB-NLO-HERAI+II-set2-qs0.5-asktmin=0.9
PB-NLO-HERAI+II-set2-qs0.5-asktmin=Qg

Intrinsic kt and $\alpha_s(p_T)$

- in set 2, $\alpha_s(p_T)$, has cutoff for p_T < 1 GeV

  - changing cutoff, leads to similar effect as changing width of gauss !

  - importance on NP-Sudakov increases, while role of intrinsic kt distribution decreases

  - Note: NP Suda is constrained by inclusive pdf

up, x = 0.01, μ = 100 GeV

PB-NLO-HERAI+II-2018-set2
PB-NLO-HERAI+II-set2-qs0.6-asktmin=0.9
PB-NLO-HERAI+II-set2-qs0.7
PB-NLO-HERAI+II-set2-qs0.7-asktmin=0.9
PB-NLO-HERAI+II-set2-qs0.8

TMDplotter 2.2.4

New papers

- The small kt region in DY production at NLO with the parton branching method
  - pheno applications, determination of intrinsic kt
  - determine qs as fct of m_DY at 13 TeV
  - determine qs as fct of m_DY at 8 TeV ?

- This paper is open and will stay open:
  - Please reply to me, if you want to be co-author, after reading and commenting

AOB

- Further news ?