

Fragmentation Functions in xFitter

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xFitter external meeting

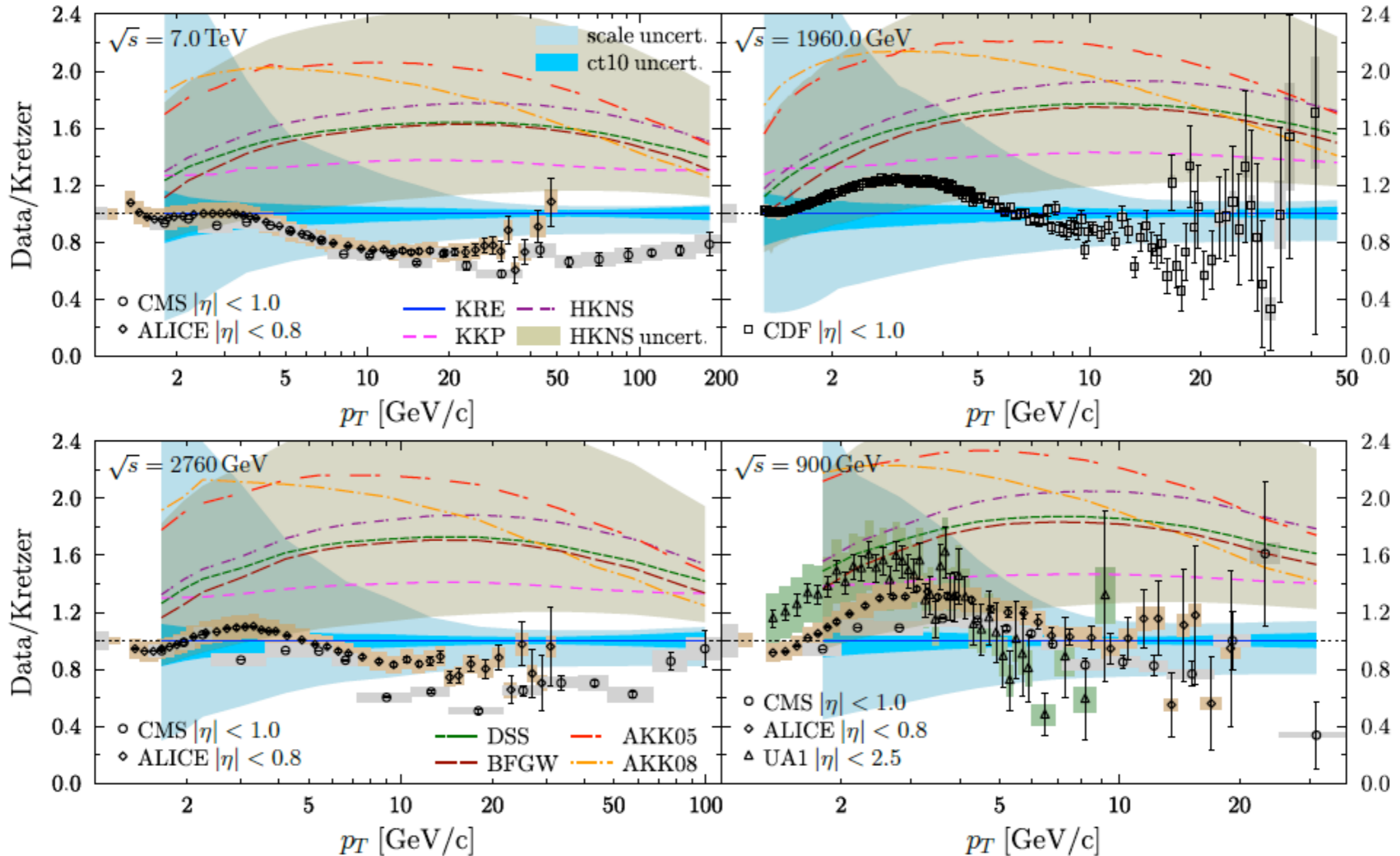
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Fragmentation Functions

- A faithful determination of fragmentation functions (FFs) is extremely important to study the universality of the QCD factorisation theorems.
- The inclusive hadron measurements at the LHC, sensibly extending the previous kinematical coverage, are particularly useful for studying the FFs.
- A good knowledge of FFs is functional to the determination of the **polarised PDFs**.
- The **spread between the different FFs** present on the market is currently very large.
- None of the existing FF sets describes the recent LHC and Tevatron experimental data.

Fragmentation Functions

- Inclusive charged-hadron spectrum:



- Large discrepancies that need to be understood.

Fragmentation Functions

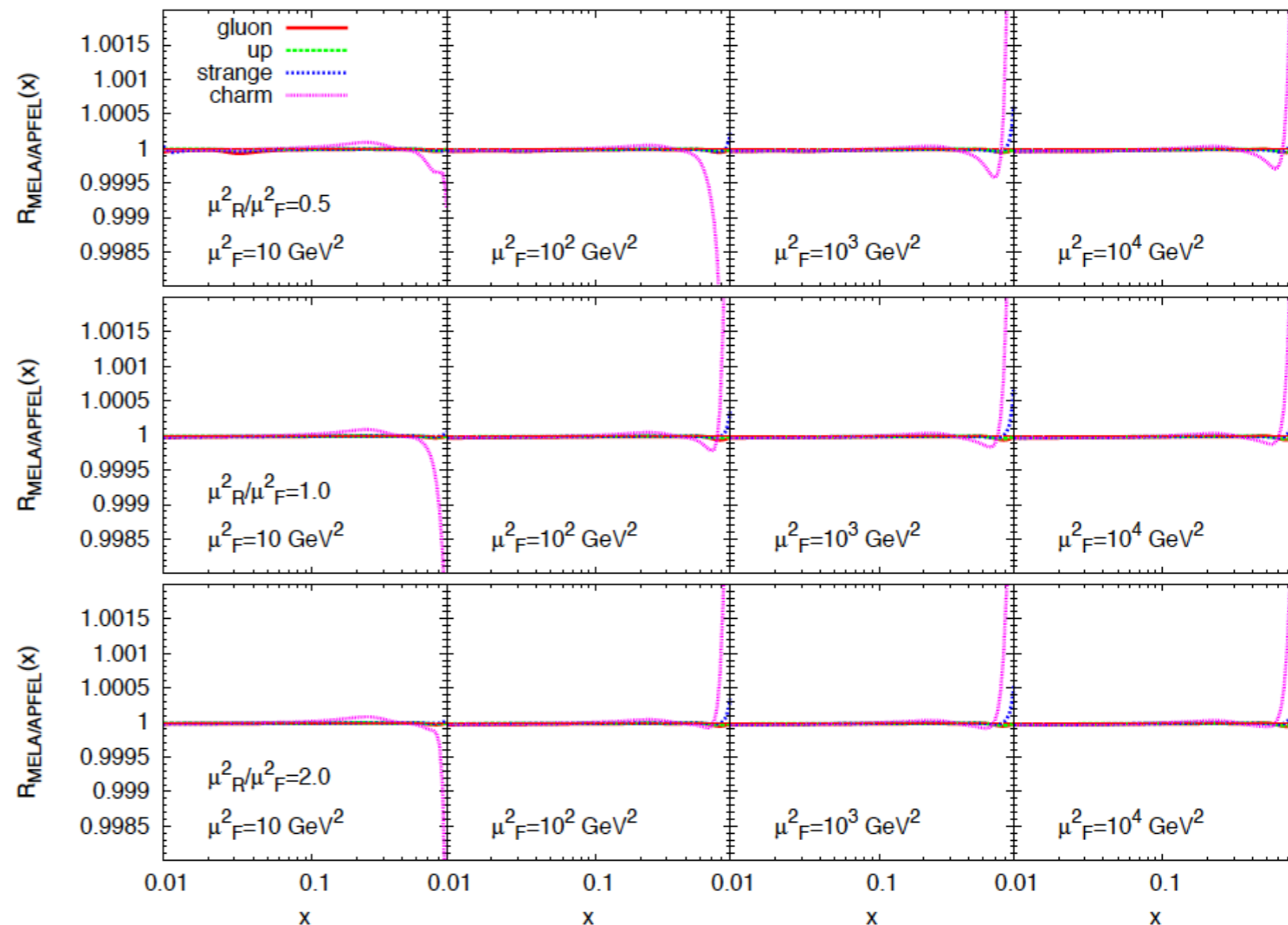
- APFEL implements the **time-like evolution**:
 - up to NLO in the VFNS,
 - up to NNLO in the FFNS (NNLO matching conditions unknown).

APFEL vs. MELA: VFNS at NLO

- Careful **benchmark** of the evolution against the MELA code
[\[arXiv:1501.00494\]](https://arxiv.org/abs/1501.00494).

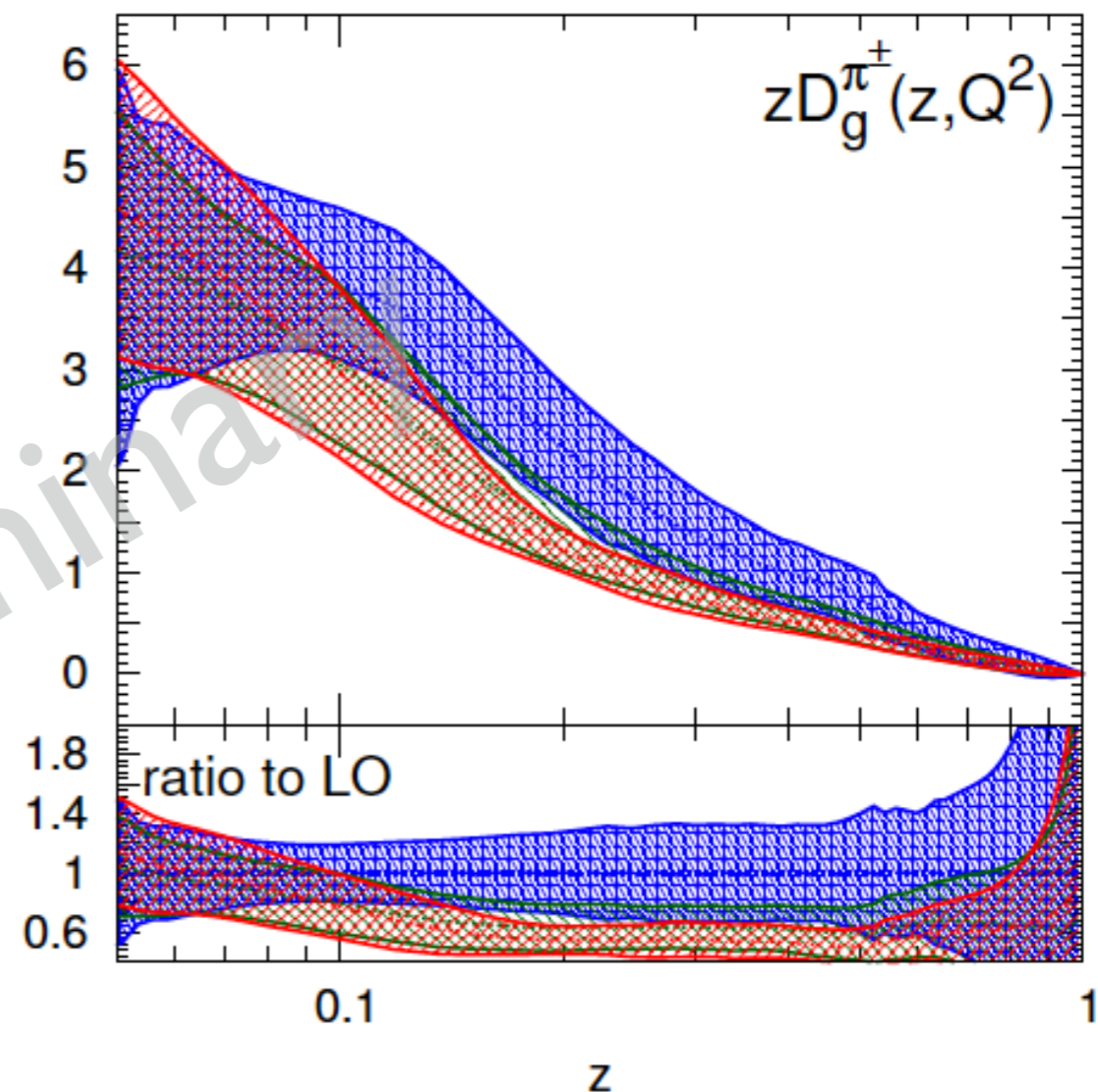
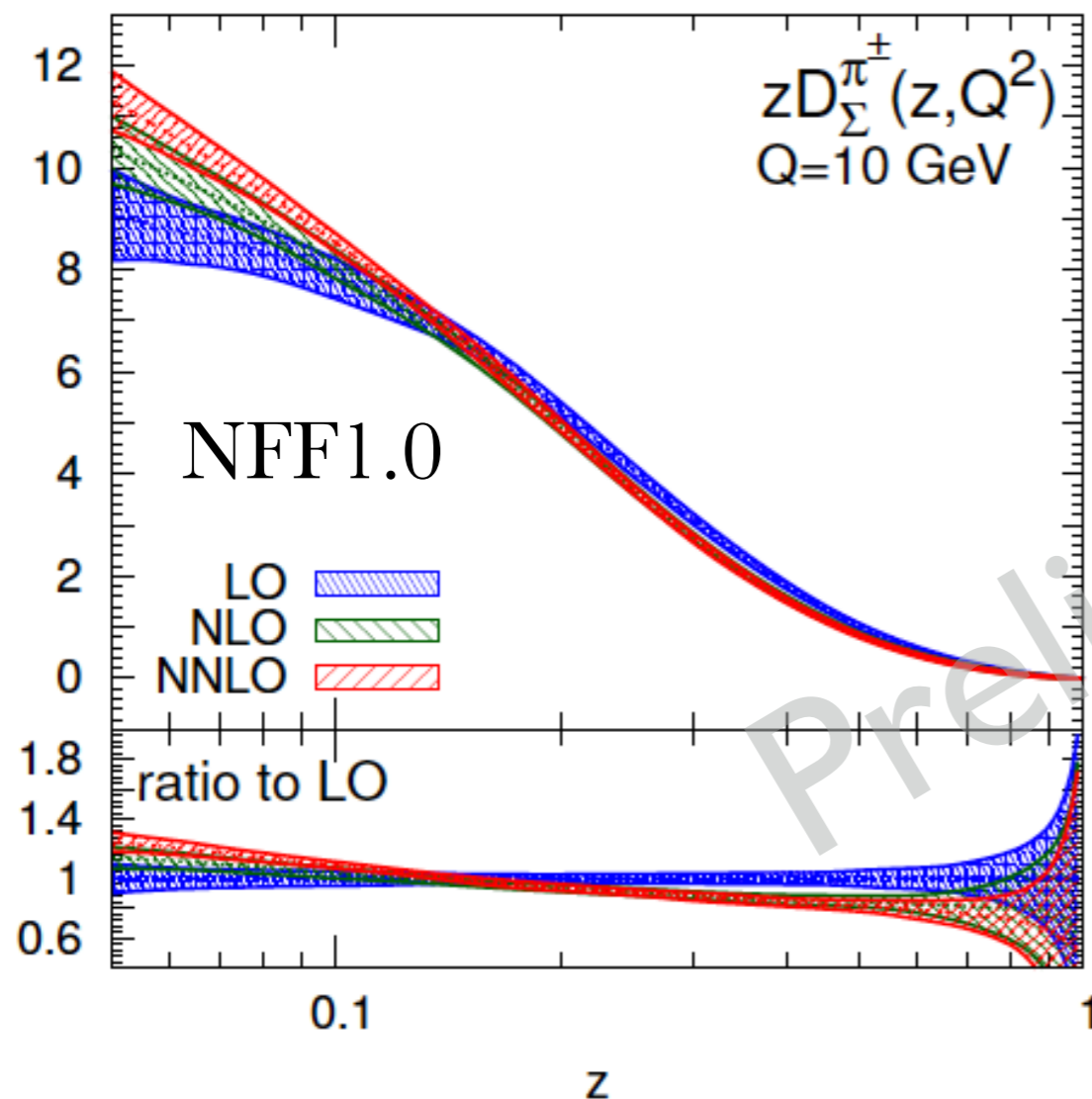
- x -space vs. \mathcal{N} -space

- Excellent agreement at all perturbative orders.



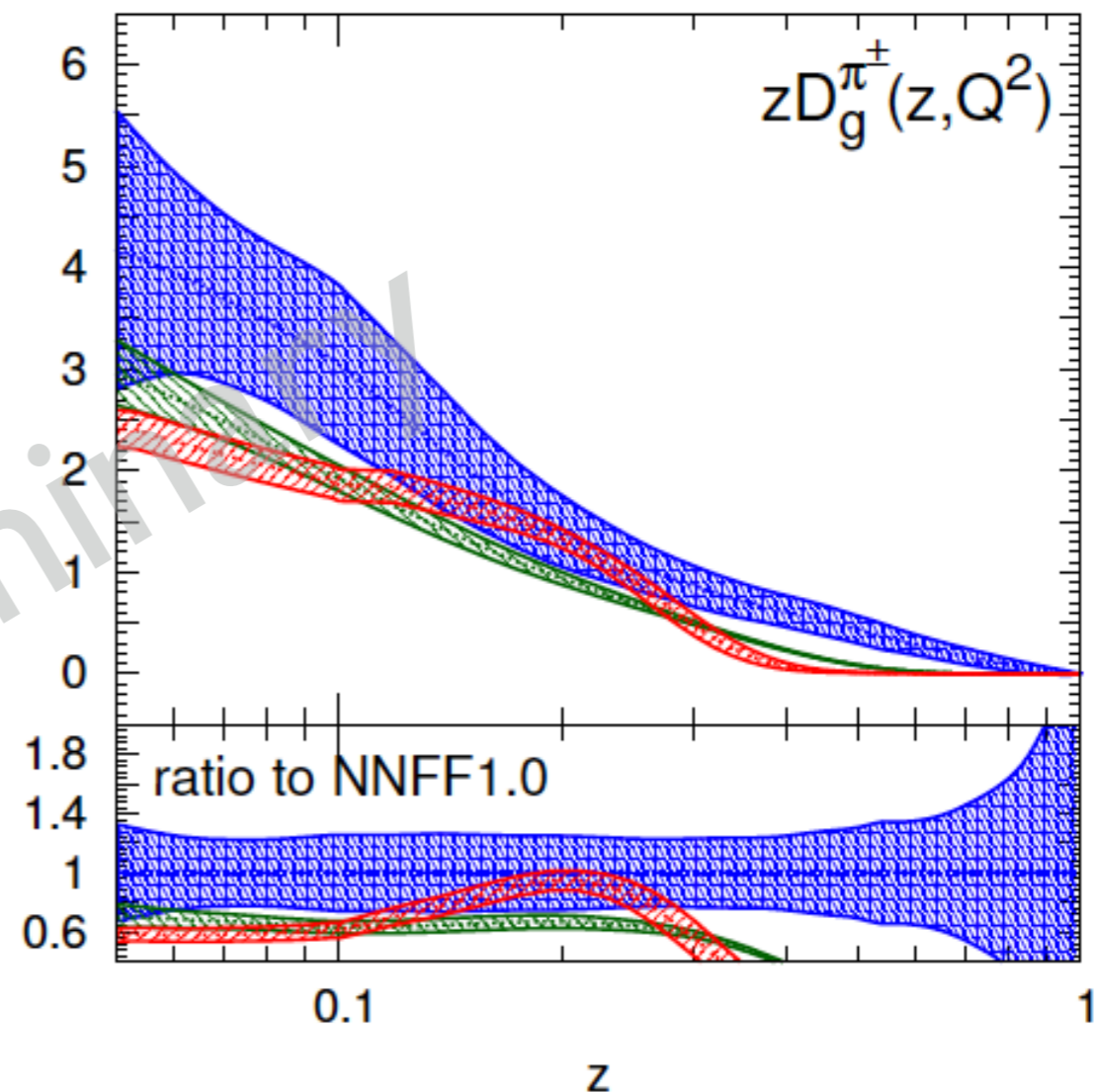
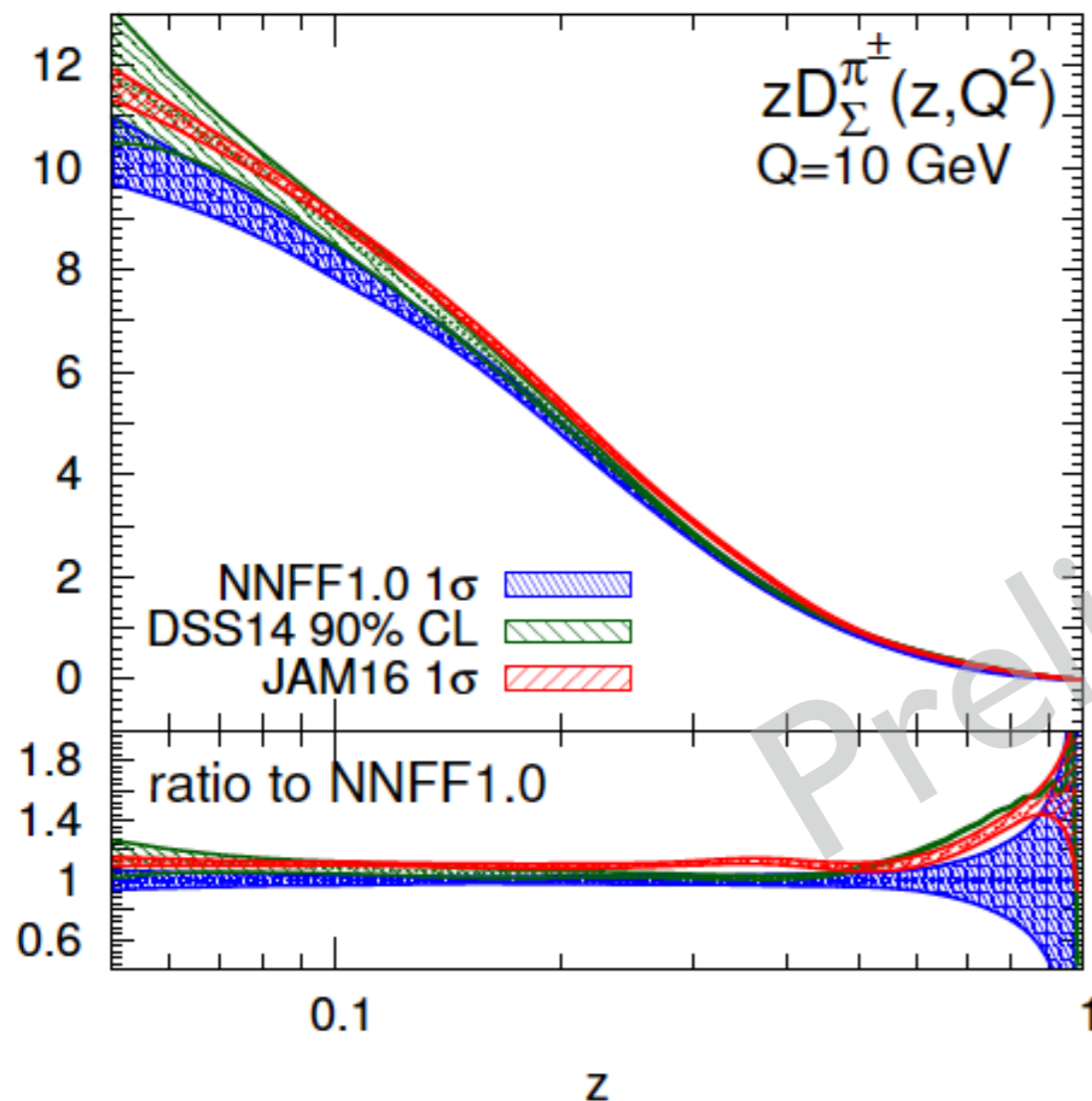
Fragmentation Functions

- Single-inclusive e^+e^- annihilation (SIA) structure functions are also implemented in APFEL up to NNLO in QCD:
 - partial benchmark against DSS code (thanks to D.P. Anderle).
- APFEL can now be used to **determine FFs** from SIA data.



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Outlook

- Use APFEL to determine FFs in the xFitter framework:
 - Short term:
 - initially based on SIA data,
 - implement experiments in the xFitter format (BELLE, BABAR, etc.).
 - Longer term:
 - implement computation of SIDIS observables in APFEL,
 - implement computation of pp observables in APFEL,
 - attempt a global fit of FFs
- Collaborate with BELLE experimentalists at DESY to exploit FFs to compute hadronization in MC generators.