

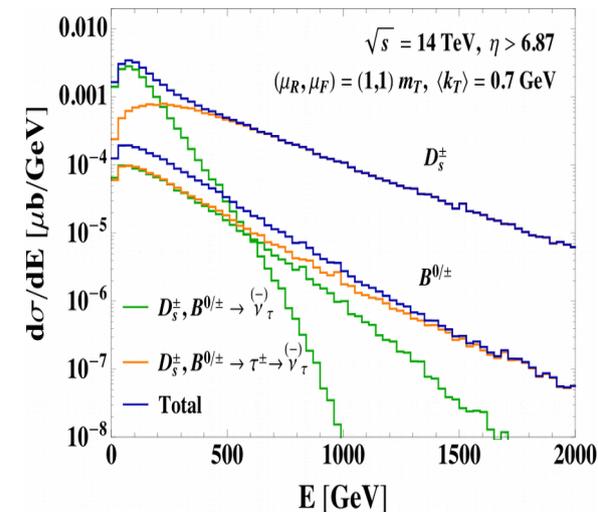
Far forward neutrinos at the LHC as an opportunity to study various QCD aspects

- Plenty of experiments under design or already in preparation ([Faser-v](#), [Faser2](#), [XSEN](#), [SND@LHC](#)), using neutrino beams produced by collisions at the LHC and extracted along a line tangent to the LHC beam line. In some cases, data taking already expected during Run3.
- **Potentiality of making measurements useful for**
 - detecting BSM effects (neutrino oscillations in different mixing frameworks, long-lived exotic particles)
 - tuning MC codes **useful for many other collider studies**
 - better understanding ν -induced DIS (inclusive DIS and heavy flavour production in DIS), exploring energies never explored before at accelerators (TeV scale neutrinos) **useful for (nuclear) PDF fits**
 - better understanding forward heavy-flavour production in pp collisions (reconstructing hadrons from their decay products), **useful for understanding QCD dynamics and interplay of perturbative and non-perturbative QCD aspects.**
- **Need of accurate predictions** for neutrino fluxes, **to “control” neutrino beams** impinging over the detectors and then be able to disentangle New Physics effects and/or **to interpret SM measurements** (e.g. the measure of DIS cross-sections).

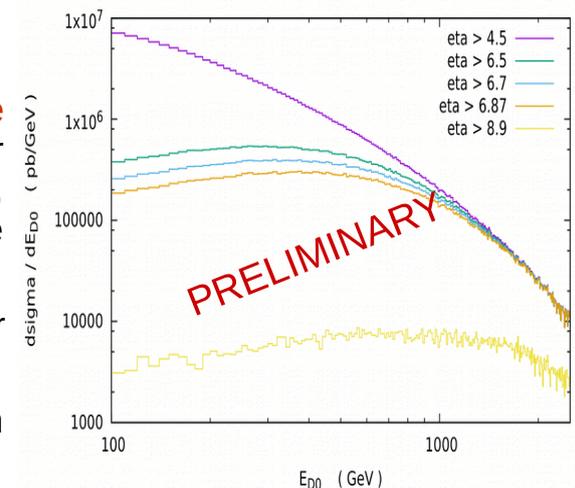
Our Program

- We will focus on providing **accurate theory predictions for these fluxes, focusing on the uncertainties** arising from different elements of the calculations, including missing higher orders in perturbative QCD, parton distribution functions and fragmentation functions, possible intrinsic charm effects, multiple parton interactions, etc....continuing the work we already started in [[arXiv:2002.03012](#)].
- As a further step, we will study the **potential of the experiments** of producing data useful for new PDF and FF fits.
- Some interplay with the experimental groups, as well as with further theory groups with experience on specific aspects of the calculation (e.g. PDF/FF fit experts), is envisaged.

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Our predictions for the energy distributions of forward tau neutrinos from heavy-flavour decays at the LHC ($E_{\text{CM}} = 14 \text{ TeV}$). To appear in JHEP.



Our predictions for the energy distributions of $D^0 + \bar{D}^0$ mesons produced in pp collisions at the LHC ($E_{\text{CM}} = 14 \text{ TeV}$), for various pseudorapidity cuts.