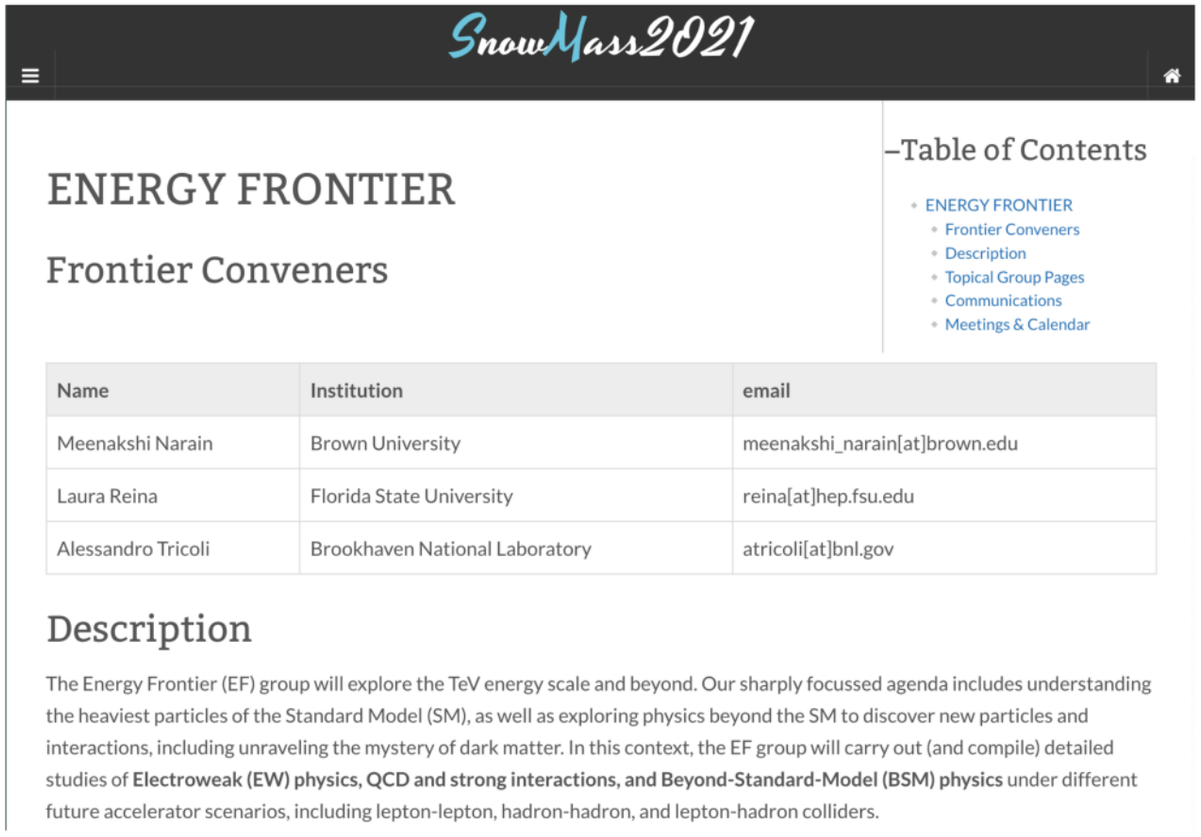
PB TMD meeting

- Hoping that you are all ok !

SnowMass 2021

The non-exhaustive list of EF05 topics includes

* Strong coupling determination
* PDFs and strong coupling from Lattice QCD
* Perturbative calculations for total and differential cross sections
* Interplay of QCD and EW effects
* Precision resummation
* Measurements and calculations needed to improve PDF fits
* Connections between central and forward QCD
* Non-perturbative QCD & connections to QIS
* Jet substructure (Theory & MC modeling, Experimental techniques, Tagging)
* Physics Observables (Higgs, heavy quarks, Drell-Yan, multi-boson, jets, ...)
* Non-factorizable corrections, double-parton scattering, color reconnections
* Monte Carlo event generators (incl. tuning)
* Simulations for EIC and knowledge transfer from LHC


SnowMass2021

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ENERGY FRONTIER

Frontier Conveners

Name	Institution	email
Meenakshi Narain	Brown University	meenakshi_narain[at]brown.edu
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Alessandro Tricoli	Brookhaven National Laboratory	atricoli[at]bnl.gov

Description

The Energy Frontier (EF) group will explore the TeV energy scale and beyond. Our sharply focussed agenda includes understanding the heaviest particles of the Standard Model (SM), as well as exploring physics beyond the SM to discover new particles and interactions, including unraveling the mystery of dark matter. In this context, the EF group will carry out (and compile) detailed studies of **Electroweak (EW) physics, QCD and strong interactions, and Beyond-Standard-Model (BSM) physics** under different future accelerator scenarios, including lepton-lepton, hadron-hadron, and lepton-hadron colliders.

The EF05 Topical Group solicits suggestions for focused studies by the participants that will be published as Snowmass papers and will provide the material for the main Snowmass document to be released in November 2021. We encourage you to communicate your ideas to us via the registration form, during the discussions, or by emailing the conveners. Once the plans for focused studies take shape, the participants are encouraged to submit a more detailed Letter of Interest [2] before August 31, 2020 to help us coordinate the working groups.

TMDlib 2.0: news

- multiple TMD sets in fortran interface is ready:
  - identified by TMDset id:

```
c check using multiple sets
  do i=0,34
     iset =102200+i
     call TMDinit(iset) ! all TMD uncertaities PB-NLO-set2
  end do
c since we have multiple sets, we need to specify with TMDset(iset) which set to use:
  do i=0,34
     iset =102200+i
     call TMDpdf(iset,kf,x,xbar,kt,mu,up,ubar,dn,dbar,strange,sbar,charm,cbar,bottom,bbar,glu)
     write(6,*) ' fortran TMDlib: iset = ',iset, ' xu = ',up,' xd = ',dn,'xg = ',glu
  end do
```

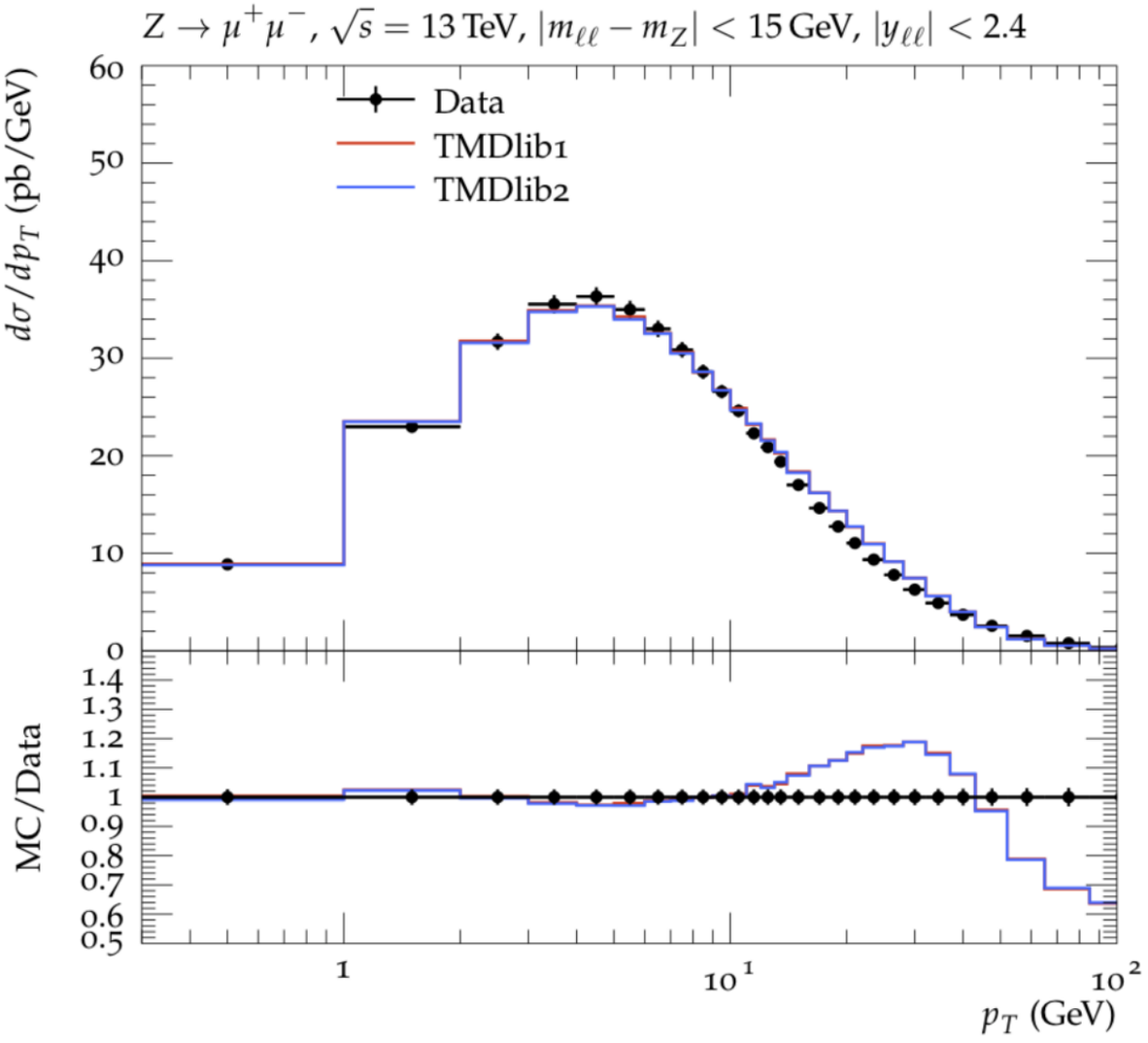
- What to do with extrapolations ?
  - new label in info file:

```
Extrapolation_x: fixed
Extrapolation_Q2: fixed
Extrapolation_kt: fixed
```

    - if nothing specified, TMD=0 outside range given in info file
    - other options still possible

TMDlib 2.0 – Status & ToDo

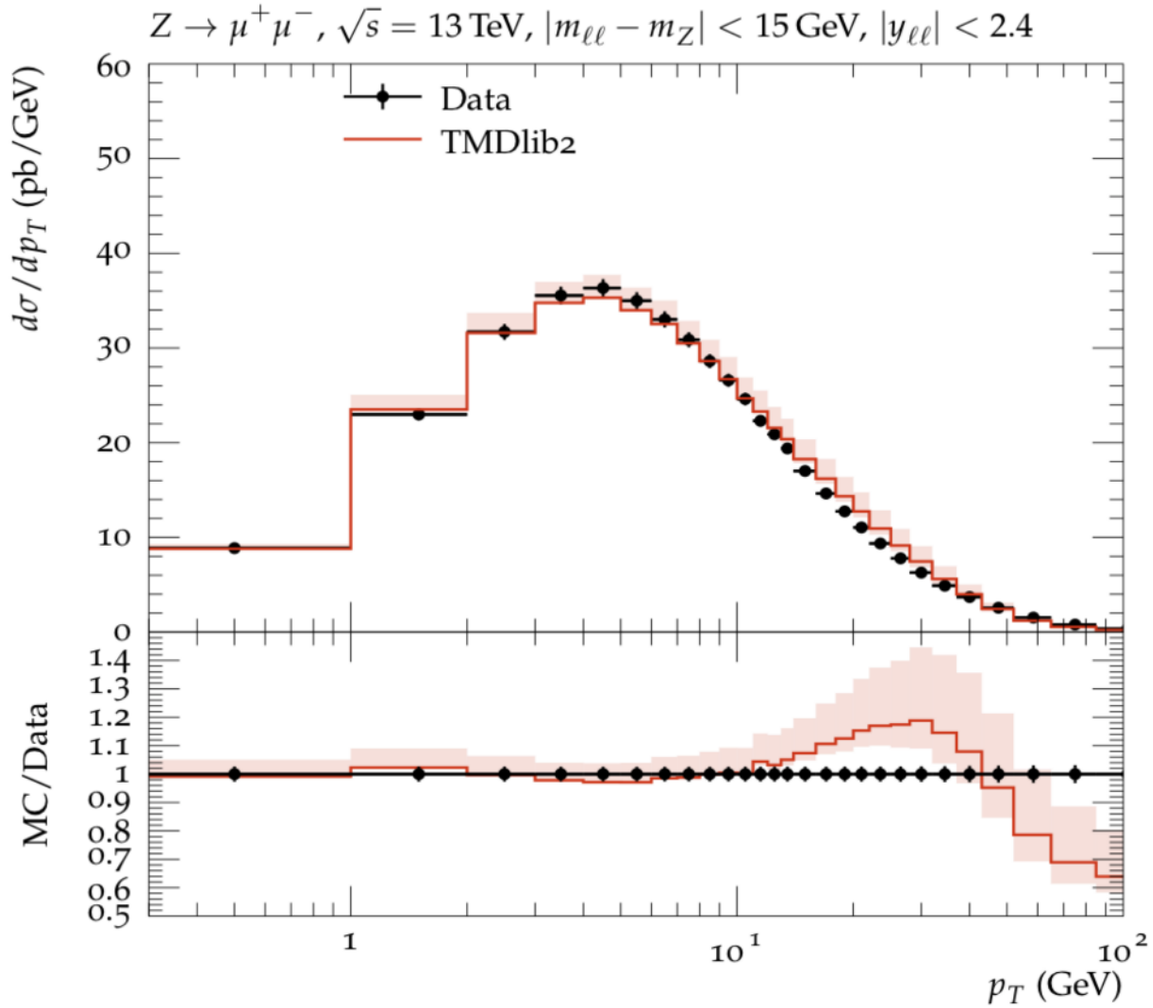
- Comparison TMDlib1 – TMDlib2



- TMDlib 2.0
  - issue with memory in YAML interface ...
    - M. Rohrmoser (Cracow) is looking into it
  - different hadrons – for example pA

Multiple weights in CASCADE

- CASCADE can handle multiple weights:
  - weights are ported to HEPMC for further analysis in Rivet3
    - from scale variation in LHE file (9 weights for μ_F and μ_R variations
    - from TMD uncertainties (~30 different weights)



AOB

- Setting up Ticketing for TMDlib and CASCADE:
  - CASCADE: https://gitlab.cern.ch/jung/cascade/-/issues
    - please try it … for the moment it is just a test :)

Agenda

PB TMD discussion

Thursday, 14 May 2020 from **15:30** to **17:30** (Europe/Berlin)
at **CMS meeting room**

Manage

Description Join Zoom Meeting
https://cern.zoom.us/j/7861953672

Meeting ID: 786 195 3672

Thursday, 14 May 2020

15:30 - 15:50 Intro *20'*

15:50 - 16:10 Multijet merging *20'*

Speaker: Armando Bermudez Martinez (DESY)

Next workshops

- ICHEP 2020 30 July – 5 August Prague(is now video only)
  - Jet production at NLO in the Parton Branching method at LHC energies

    A. Bermudez, F. Hautmann

My abstracts

3 / 3 | Enter #id or search string

616.TMD densities at leading and higher order from the Parton Branching method

Sara Taheri Monfared (Deutsches Elektrone...)

Last modified: 21 Feb 2020

Submitted

We present a new determination of Transverse Momentum Dependent (TMD) parton distributions obtained with the Parton Branching (PB) method at LO, NLO and NNLO. The PB TMDs are extracted from fits to precision DIS data using

800.Drell-Yan production at NLO in the Parton Branching method at low and high DY masses and low and high *sqrts*

Qun Wang (Peking University (CN))

Last modified: 25 Feb 2020

Submitted

Transverse Momentum Dependent (TMD) parton distributions obtained from the Parton Branching (PB) method are combined with next-to-leading-order (NLO) calculations of Drell-Yan (DY) production. We apply the MC@NLO method for

857.Parton Branching method and applications to pp and ep processes

Jindrich Lidrych (Deutsches Elektrone...)

Last modified: 26 Feb 2020

Submitted

Transverse Momentum Dependent (TMD) parton distributions obtained within the Parton Branching (PB) approach offer a wide spectrum of applications to describe processes in pp as well as in ep interactions. We give an overview of the PB

News

- CASCADE 3.0.2-beta02 released:
  - `/afs/desy.de/user/j/jung/scratch-dust/cvs/cascade3/cascade-3.0.2-beta02.tar.gz`
- next release:
  - allow for multiple weights → to be used in Rivet3 for scales (and perhaps for TMD)
- further CASCADE strategy:
  - need to rewrite CASCADE for modern language
    - either: separate CASCADE with links to pythia (strategy as is now)
      - standalone making use of tools from Pythia
    - or: CASCADE as plugin to pythia
      - included in Pythia, just as a switch

PB strategies

- Need a repository for predictions and comparisons
  - PBplots (similar to MCplots)
    - allow to plot any distribution, compare to data, but also to std MCs
    - link to some PB plots

- Prepare for a systematic comparison of PB pred with data (Armandos idea)
  - prepare for a legacy paper ?
  - PB comparisons
    - inclusive DY at LHC
    - inclusive DY at low $\sqrt{s}$ and low m_{DY}
    - Z+jets, W+jets
    - Z+bjets
    - inclusive jets
    - inclusive b-jets
    - di-jet correclations
    - etc ?