
Updates

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8th June 2022

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FCC week 2022 Paris

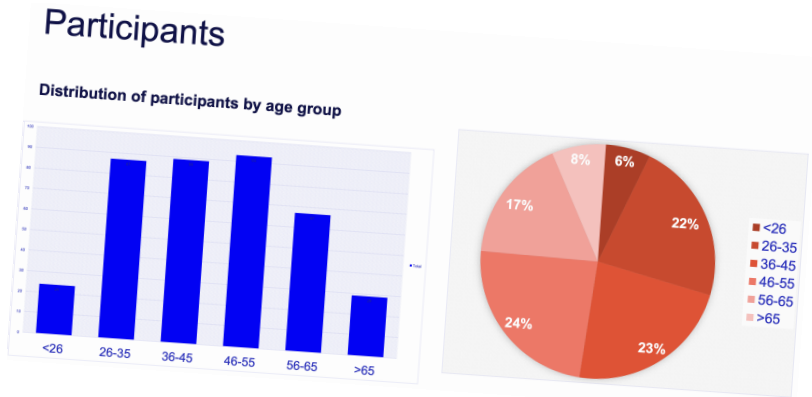
- Successful FCC week 2022 in Paris ✓ → FCC week 2023 in London!

| Day | Monday | Tuesday | | | | Wednesday | | | Thursday | | | | Friday | Time | | |
|-------------|-------------------------------|---|------------|------------|------------|--------------------------------|-------------------------------|---------------------------|----------------------------------|--------------------------------|-------------|------------------------|-----------------------------------|--|-------------------------------|-----------|
| | | Parallel 1 | Parallel 2 | Parallel 3 | Parallel 4 | Parallel 1 | Parallel 2 | Parallel 3 | Parallel 1 | Parallel 2 | Parallel 3 | Parallel 4 | | | | |
| Room | Primary Campus Corbelliers | OCESJ Auditorium Room 305 Room 307 Room 309 Room 116 | | | | Campus Corbelliers ROUSSEY | ROUSSEY | ROUSSEY | Campus Corbelliers FABARDIEUX | FABARDIEUX | ROUSSEY | ROUSSEY | ROUSSEY | Primary Campus Corbelliers FABARDIEUX | Room | |
| Time | | | | | | | | | | | | | | Time | | |
| 08:00-09:30 | | FCCee Accelerator FCCee WFS | | | | FCCee Accelerator FCCee WFS | PHY Programme/ Performance | FCCee WFS Socio-Econom | | FCCee Accelerator FCCee WFS | FED EPOL | FCCee WFS Placement | FED/ACC FCCee EPOL | RF Parks for FCC-ee | Technology | Summaries |
| 09:30-10:00 | Plenary session | T. Neumann S. Jellach | | | | G. Apollinar | E. Garfelec | F. Eder | F. Willeke | J. P. Tack | R. Laska | Coffee break | | | | |
| 10:00-10:30 | | Coffee break | | | | Coffee break | | | | Coffee break | | | | Summaries | | |
| 10:30-11:00 | L. Röhrig | Coffee break | | | | Technology | FED Detector Concepts | Grid Engineering | FED/ACC FCCee MDK | Electricity and Cooling | Technology | Summaries | | | | |
| 11:00-11:30 | Coffee break | FCCee Accelerator FCCee WFS | | | | PHY Programme/ Performance | SFP Directions for R&D | | | | | | | | R. Alesian | |
| 11:30-12:00 | Plenary session | B. Heilmann M. Minby F. Bickman O. Brunner | | | | F. Garbe | F. Bondry | M. Charno Lafay | L. Buhl | T. Plesan | | | | | | |
| 12:00-12:30 | | Lunch break | | | | Lunch break | | | | Lunch break | | | | | | |
| 12:30-14:00 | Lunch break | Lunch break | | | | Lunch break | | | | Lunch break | | | | | | |
| 14:00-14:30 | Plenary session | FCCee Injector FIB A. Gradler B. Ceccegnani A.M. Valente F. Guerin | | | | PHY Programme/ Performance | Technology SFP | RF meeting CLOSED | FCCee Accelerator | FED Detector Concepts | FCCee WFS | FED/ACC FCCee MDK | Transport & Ingrids, Safety | | | |
| 14:30-15:00 | | A. Gradler B. Ceccegnani A.M. Valente F. Guerin | | | | A. Fair-Gaffe | S. Gascou- Dubois | M. Charno- Lafay | K. Glaz | C. Prasad | | | | | | |
| 15:00-15:30 | | Coffee break | | | | Coffee break | | | | Coffee break | | | | | | |
| 15:30-16:00 | J. Blich | Coffee break | | | | Coffee break | | | | Coffee break | | | | | | |
| 16:00-16:30 | Coffee break | FCCee Injector FIB M. Charno-Lafay | | | | PHY Programme/ Performance | Technology SFP | RF meeting CLOSED | FCCee Accelerator | Ti Gendery and serviz | M. Chalmers | FCCee WFS | | | France, special session | |
| 16:30-17:00 | Plenary session | I. Chankova M. Charno-Lafay | | | | T. Pradier F. Guerin | F. Carlier | A. Wiesel | FCCee WFS | | | | | | Poster session & break | |
| 17:00-17:30 | | M. Lamont | | | | Early Career Researchers | | | | RF meeting CLOSED | Summaries | | | | | |
| 17:30-18:00 | | | | | | E. Babitskiy F. Charno-Lafay | | | | | | | | | | |
| 18:00-18:30 | | | | | | | | | | | | | | | | |
| 18:30-19:00 | WELCOME RECEPTION | | | | | | | | | | | | | | | |
| 19:00-19:30 | | | | | | | | | | | | | | | | |
| 20:00-21:00 | | | | | | | | | | | | | | | | |
| 21:00-21:30 | | | | | | | | | | | | | | | | |

45 sessions, 202 presentations, + 20 posters

FCC week 2022 Paris

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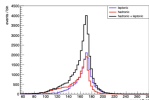
Two indirect contributions

2) Overview of the studies: connecting some dots



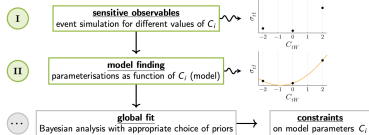
- Embrace top quark, Z pole and Flavour observables to operate a SMEFT analysis. Exercised first with top quark:

Very first look at simulated $t\bar{t}b\bar{t}$ events



Motivation Part I

- Goal: Global fit with current and future measurements in top + flavor physics
- Intermediate steps I and II completed

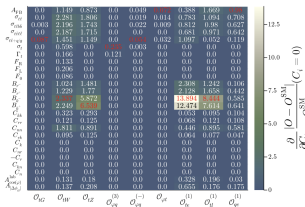


L. Röhrig | May 25, 2022

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Two indirect contributions

Ongoing study



Generator-level (MadGraph)

- New study of EFT-sensitive $t\bar{t}$ observables at FCC-ee
- Global fit is final aim
- Transition to Whizard planned
- Started to look at reconstructed observables with Delphes samples

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...besides that

- Paris was a great experience! (...especially the gala dinner @Théâtre du Merveilleux)

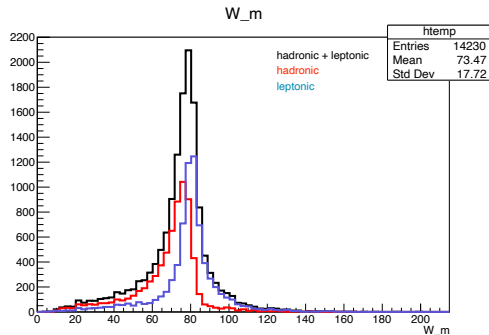


Back to physics

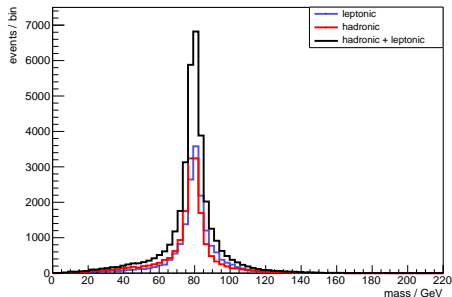
- Used the inclusive clustering for jet clustering
- Reconstructed masses too less energetic due to energy loss in the process of incl. clustering
- Performed overlap removal to remove jets that had same kinematics as lepton (in the semilep. channel)

FCC performance meeting status (16.05.2022)

- Used exclusive clustering to exactly $N_{\text{jets}} = 4$ with k_{\perp} algorithm
- Removed the isolated lepton and the MissingET from clustering
- Light-jets mass distribution much more centered around m_W + more events remain



Inclusive



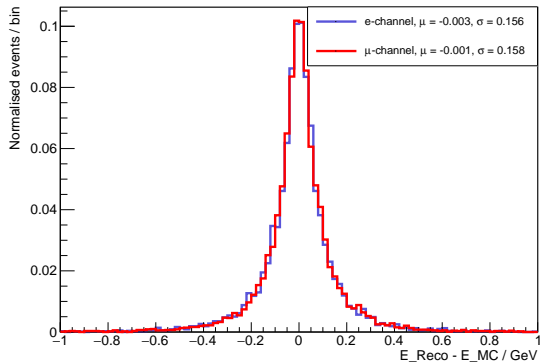
Exclusive

→ Proposal from community: Switch to $ee - k_{\perp}$ algorithm (just slight improvements)

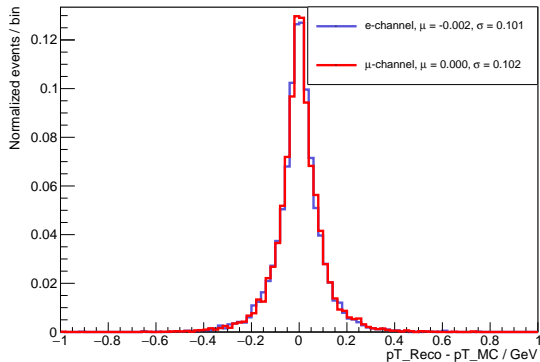
16.05.2022 – now

- Implement the MC-truth for all objects in the semileptonic channel
- Ran into some technical issues, that were discussed and kindly solved by the community (mostly E. Perez)
- Performed resolution studies to all final-state objects:
 1. Lepton (e^- and μ^- -channel separately)
 2. Neutrino/MET
 3. Jets (light- and b -jets separately)

Resolution and reconstruction efficiency — Lepton kinematics



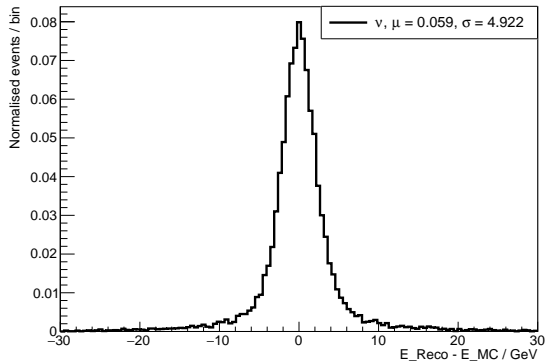
E_{ℓ} .



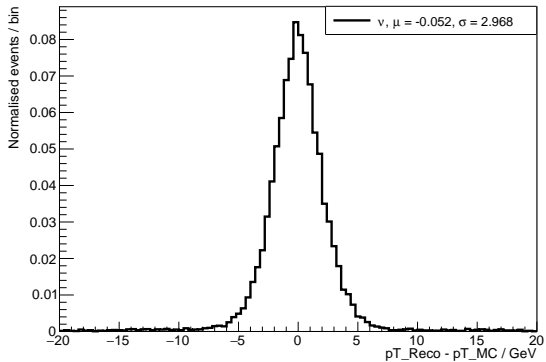
$p_{T,\ell}$.

$\rightarrow \Delta\phi_{\ell}$ and $\Delta\eta_{\ell}$ in $\mathcal{O}(10^{-5} - 10^{-6})$

Resolution and reconstruction efficiency — Neutrino kinematics

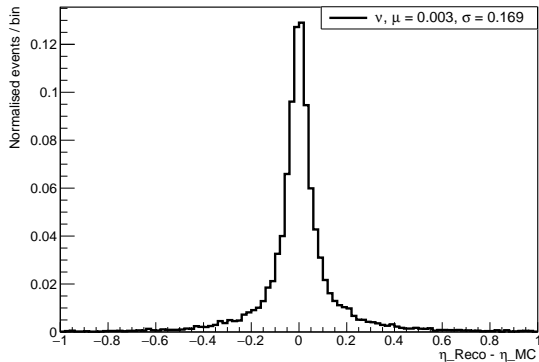


E_{ν} .

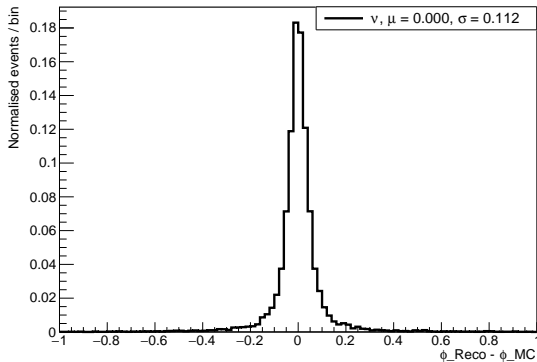


$p_{T,\nu}$.

Resolution and reconstruction efficiency — Neutrino kinematics

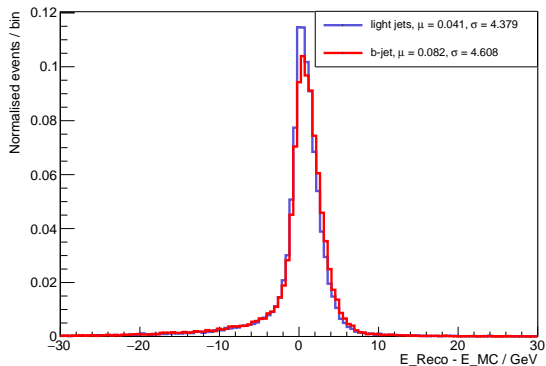


η_{ν} .

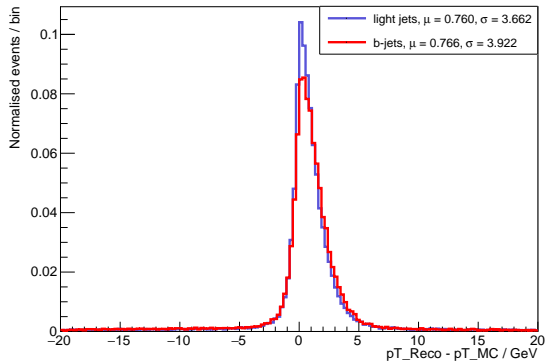


ϕ_{ν} .

Resolution and reconstruction efficiency — Jet kinematics

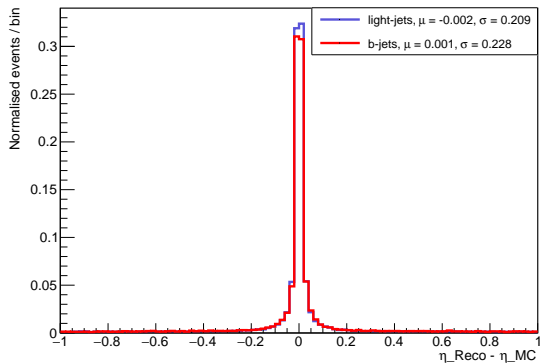


E_j .

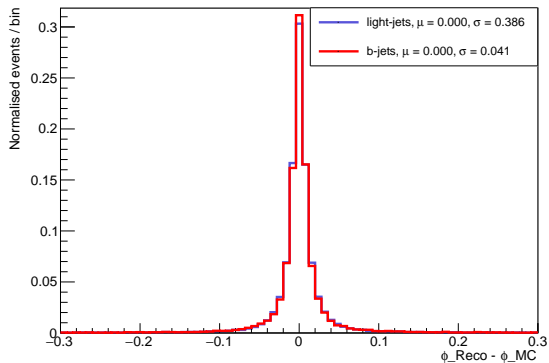


$p_{T,j}$.

Resolution and reconstruction efficiency — Jet kinematics



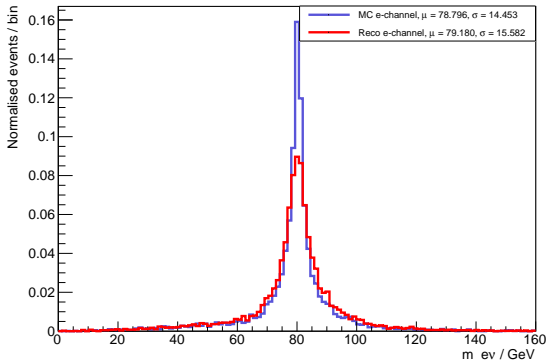
η_j .



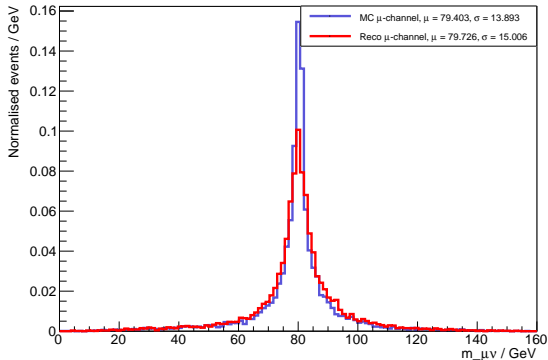
ϕ_j .

Resolution — W -boson mass

- Several comparisons performed: Reco vs. MC, e^- vs. μ^- -channel vs. qq -channel



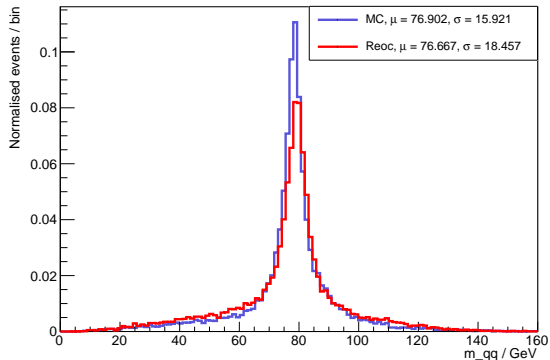
e^- -channel.



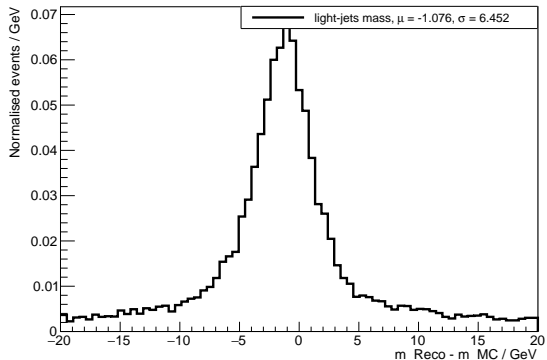
μ^- -channel.

Resolution — W -boson mass

- Here: Reco vs. MC in the hadronic channel: Reco-jets still too less energetic?



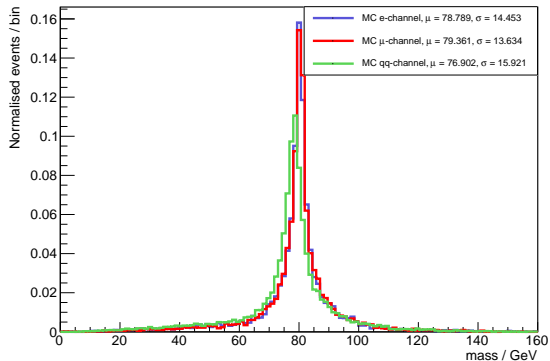
qq-channel.



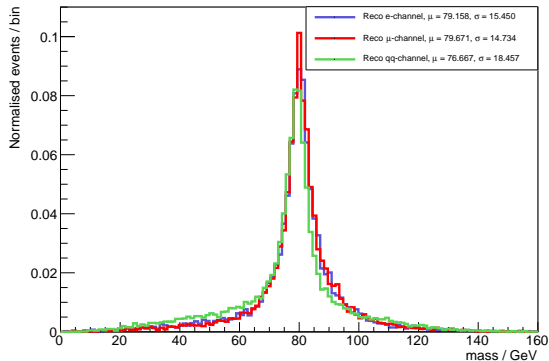
Difference in qq-channel.

Resolution — W -boson mass

- Here: Reco and MC in all channels



MC.



Reco.

What to cluster and what not to cluster (that's the question)

- Concrete and precise definition, of what objects are used to cluster them to jets
- Slight differences in reconstructed jets and MC-jets...?

Reco

- Remove *isolated* leptons from the collection
- Neutrinos/MissingET stays in the collection (?)
- Apply an energy cut on the collection, so that $E_i > 0.5$ GeV?

MC

- Remove the associated isolated MC-lepton from the collection (checks to be done, if correct lepton is removed)
- Remove the neutrinos from the stable particle collection
- Apply an energy cut on the collection, so that $E_i > 0.5$ GeV!
→ (so far: cut can be moved such that $\mu(E_{\text{jet, Reco}} - E_{\text{jet, MC}}) \sim 0$)

Outlook

- Perform clustering based on comparison between reconstructed and MC kinematic distributions & the hadronic W boson
- Find the *real* truth W boson on quark level
- **Then:** top reconstruction with the b quark

