b-id status

Sebastien Greder, IPHC / CNRS, Strasbourg

Introduction

Methods

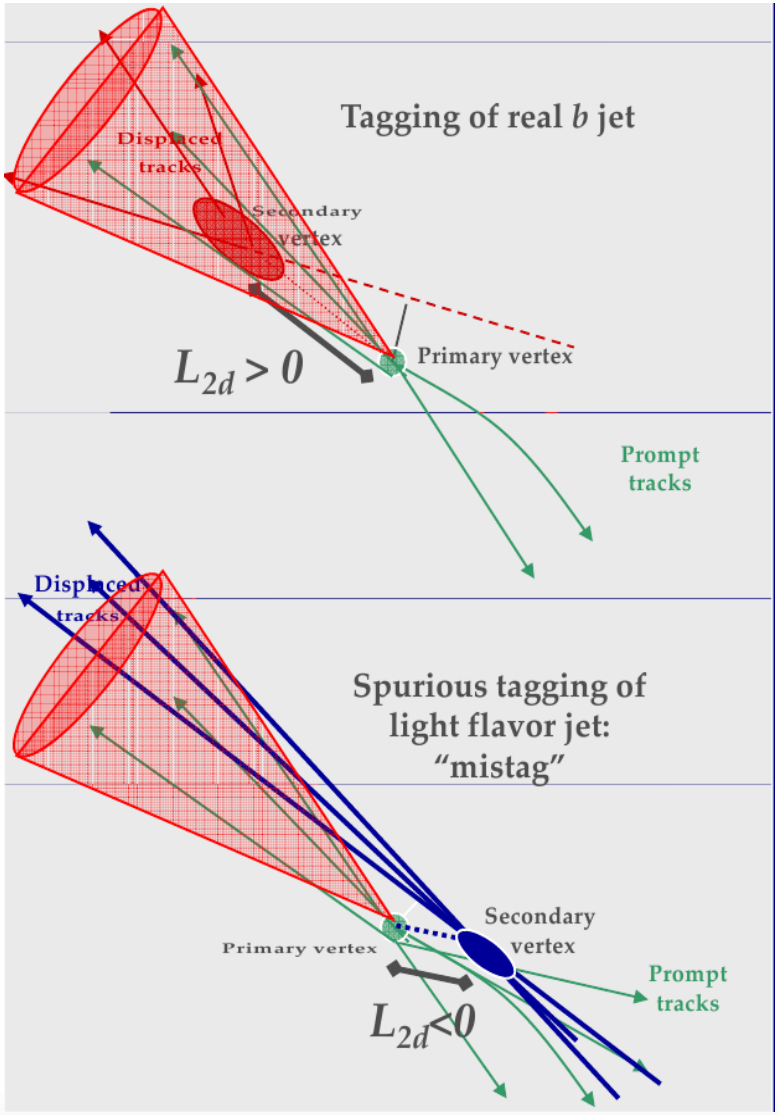
- Track impact parameter based (CSIP,JLIP)
- Displaced Secondary vertex (SVT)
- Combined with multivariate techniques
  - NN-tagger
  - MVA tagger(s)

But ...

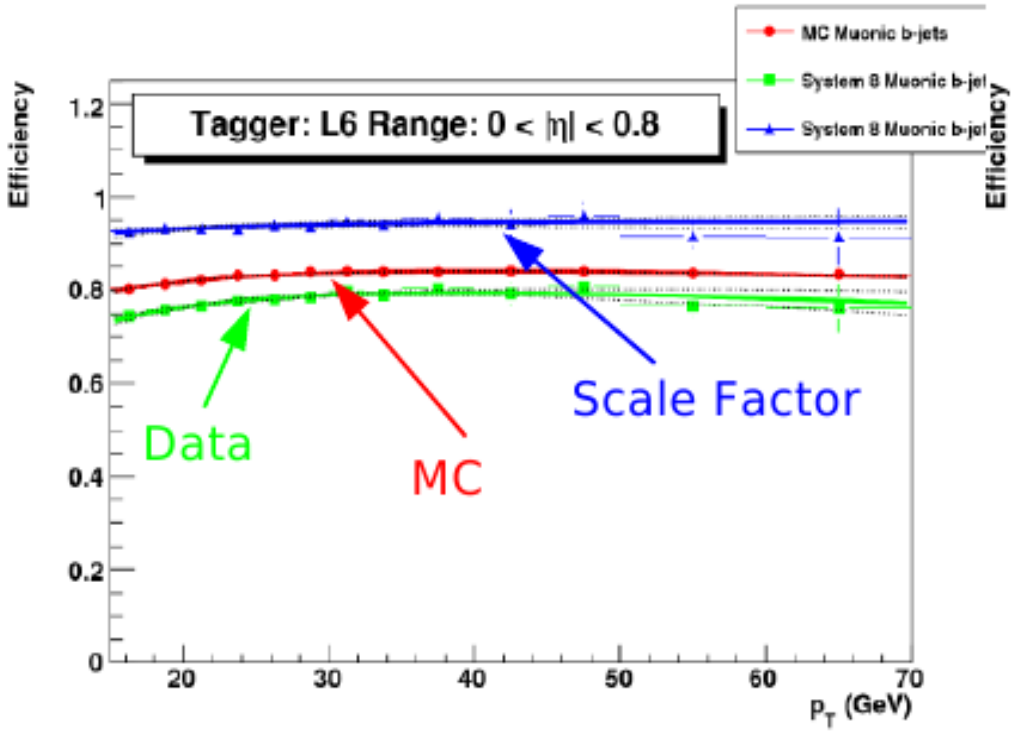
- data - MC have different tracking performances
- Need to correct MC: scale factors (SF)

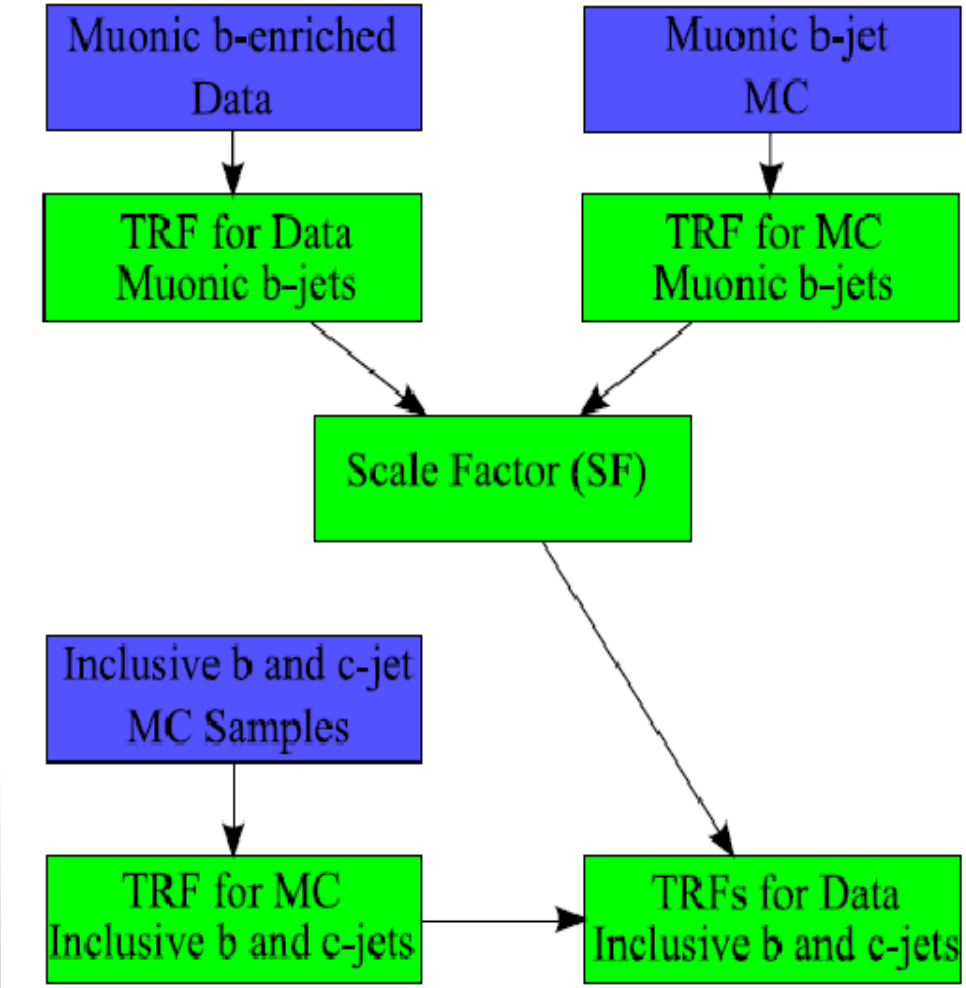
The job:

- maintain algorithms
- provide MC SFs
- certify tools (only object-id with its own EB !)



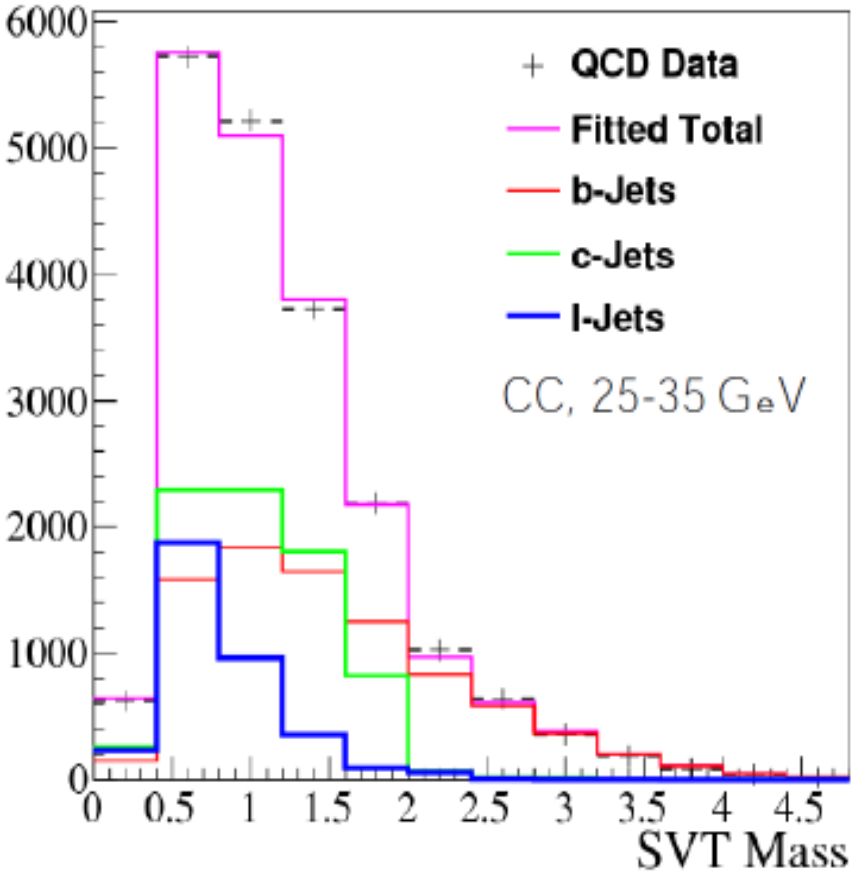
b efficiency scale factors: how-to





fake rate: how-to

- Light-jet SFs
- Measured by comparing data/MC efficiencies
- Data efficiency measured using system of equations
  - Input b- and c-jet TRFs
  - Estimate flavor content
  - Solve for fake-rate
- Parameterized vs p_T in 3 η regions
- (Re-)done for all types MC and data epochs



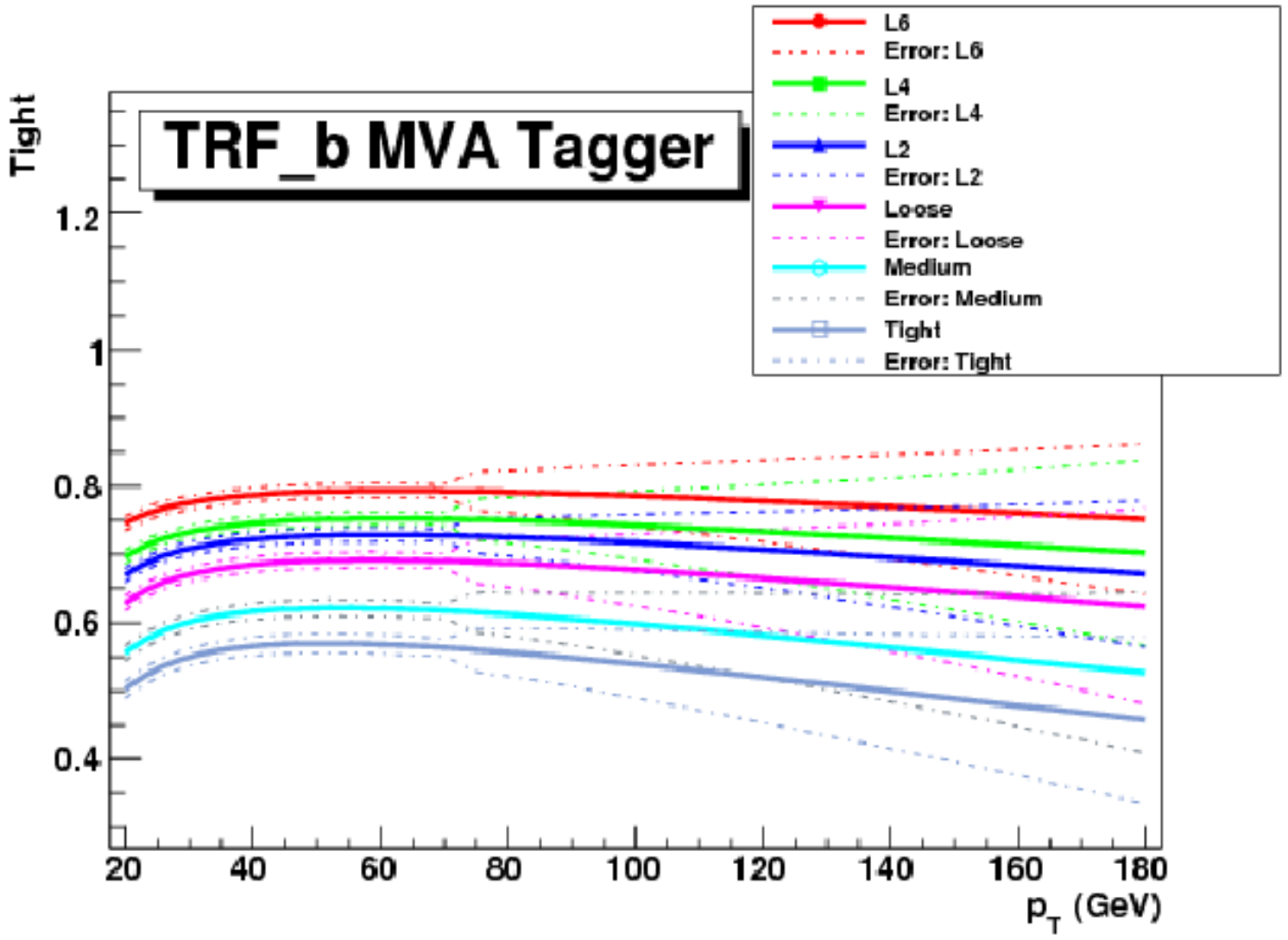
Deliverables

- Taggers:
  - Certification of MVA (BL, BB, BC)
- Improved Fake Rate / Fits for all taggers
  - Redoing RunIIb1
- Algorithm (`btags_cert`) and correction code (`btags_corr`) now separated → many advantages

MC	*Epoch*	*Available*	*Use*
p17.09	RunIIa	✔	✔
p20.09	RunIIb1	✔	✔
p20.15	RunIIb2-4	✔	✔
p20.17	RunIIb3-4	✔	(✔)
p20.15	RunIIb2	✔	

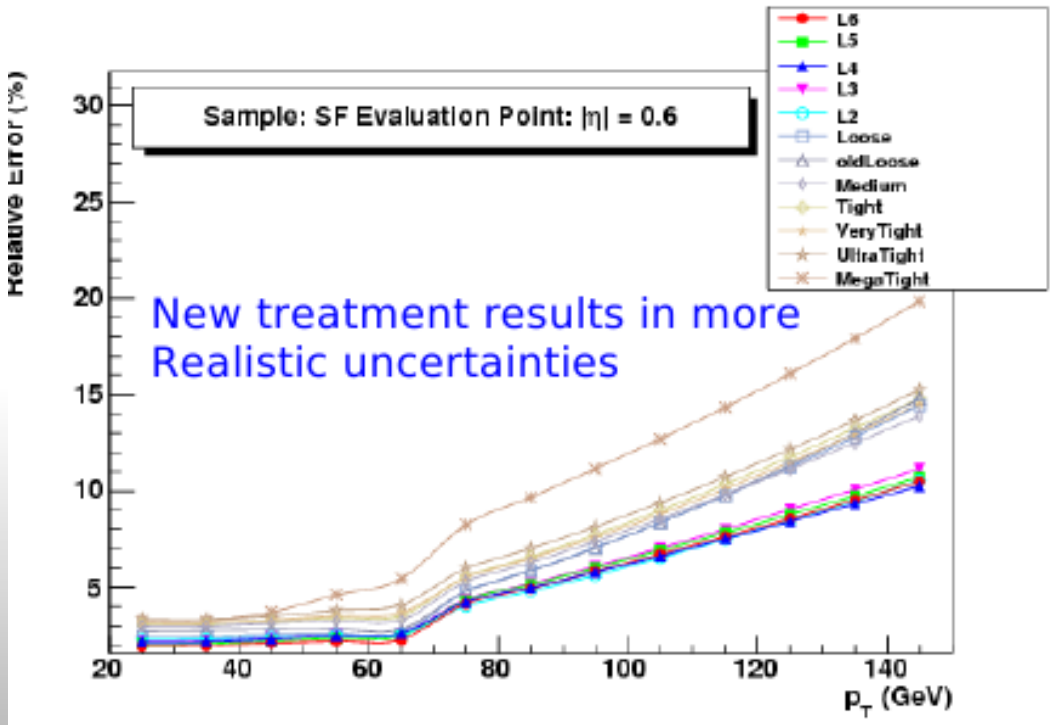
b-efficiencies errors

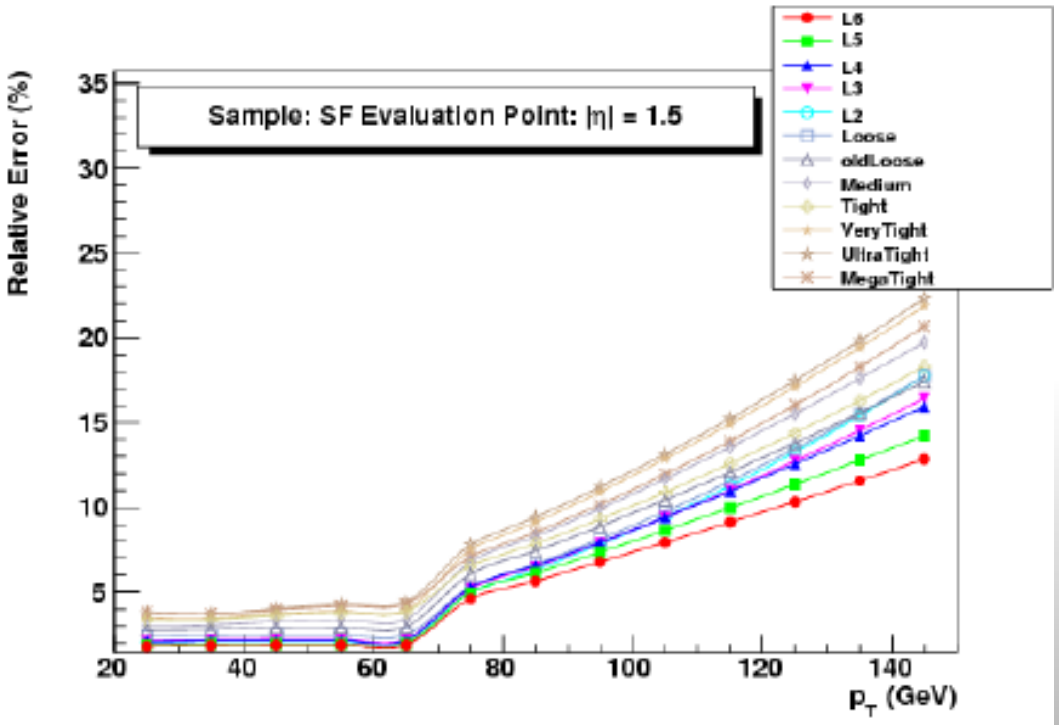
- Improved SF fit leads to more stable behaviour at high p_T



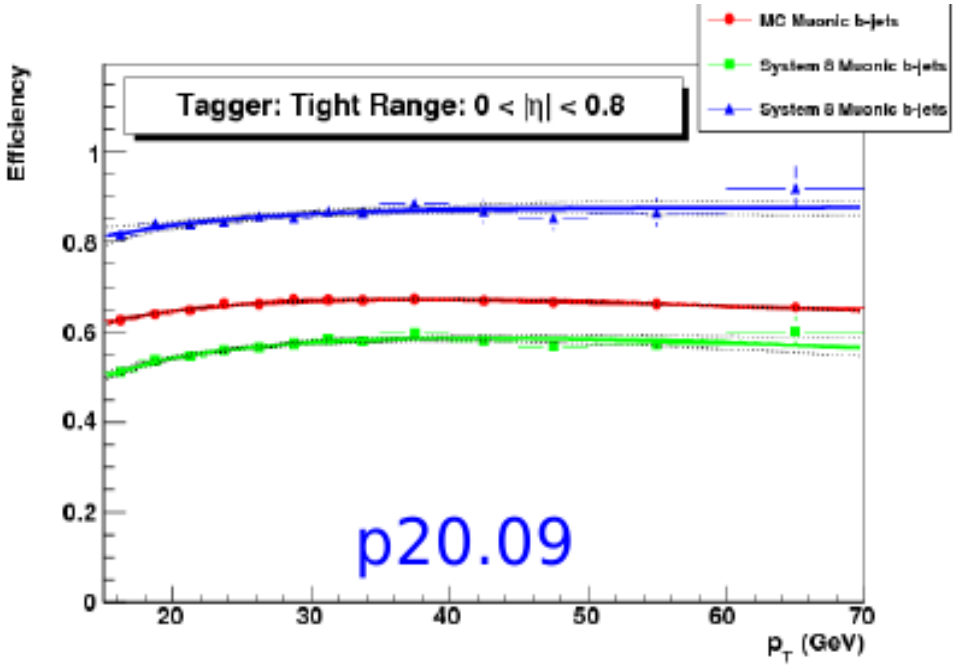
b-efficiencies errors

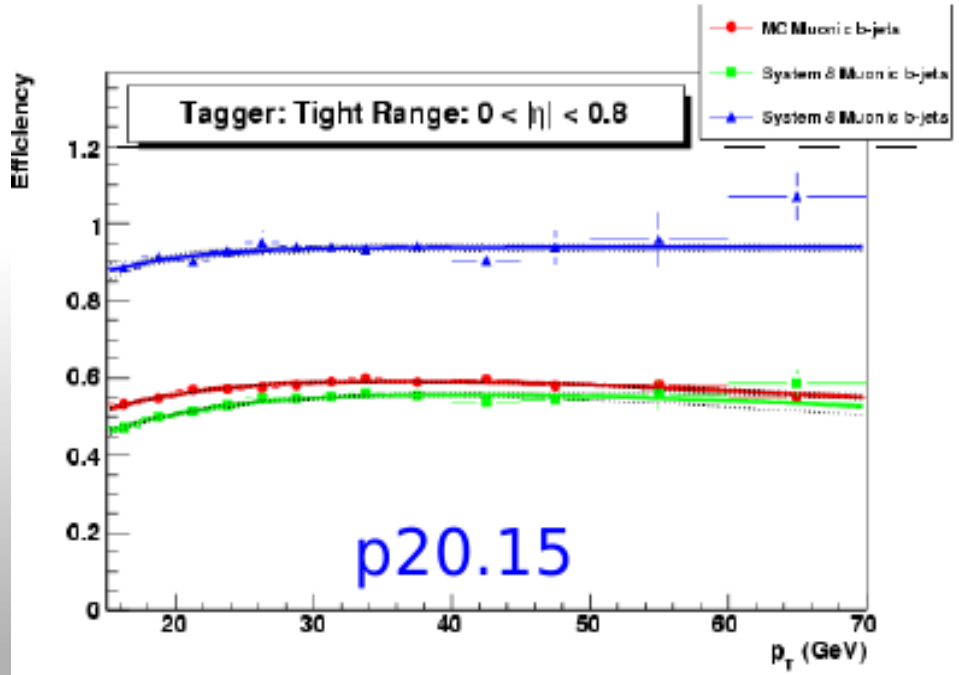
- Uncertainties as expected from last certification
- Uncertainty due to lack of SF measurement at high p_T now from S8 fit error





b-SF vs. MC


MC Muonic b-jets
System 8 Muonic b-jets
System 8 Muonic b-jets
Tagger: Tight Range: 0 < |η| < 0.8
Efficiency
p20.09
p_T (GeV)


MC Muonic b-jets
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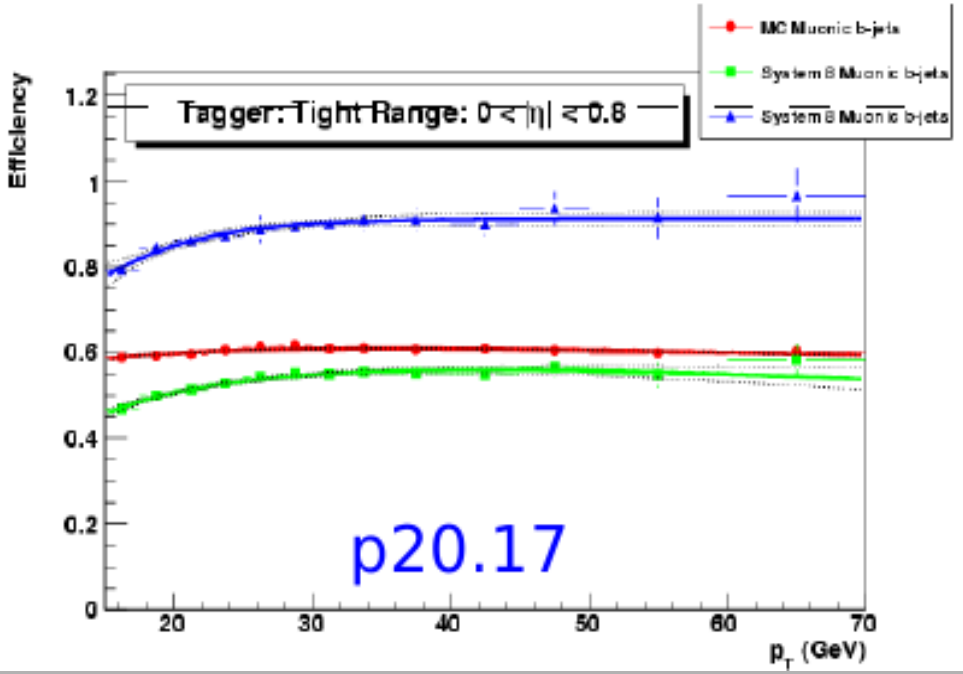
System 8 Muonic b-jets
Tagger: Tight Range: 0 < |η| < 0.8
Efficiency
p20.15
p_T (GeV)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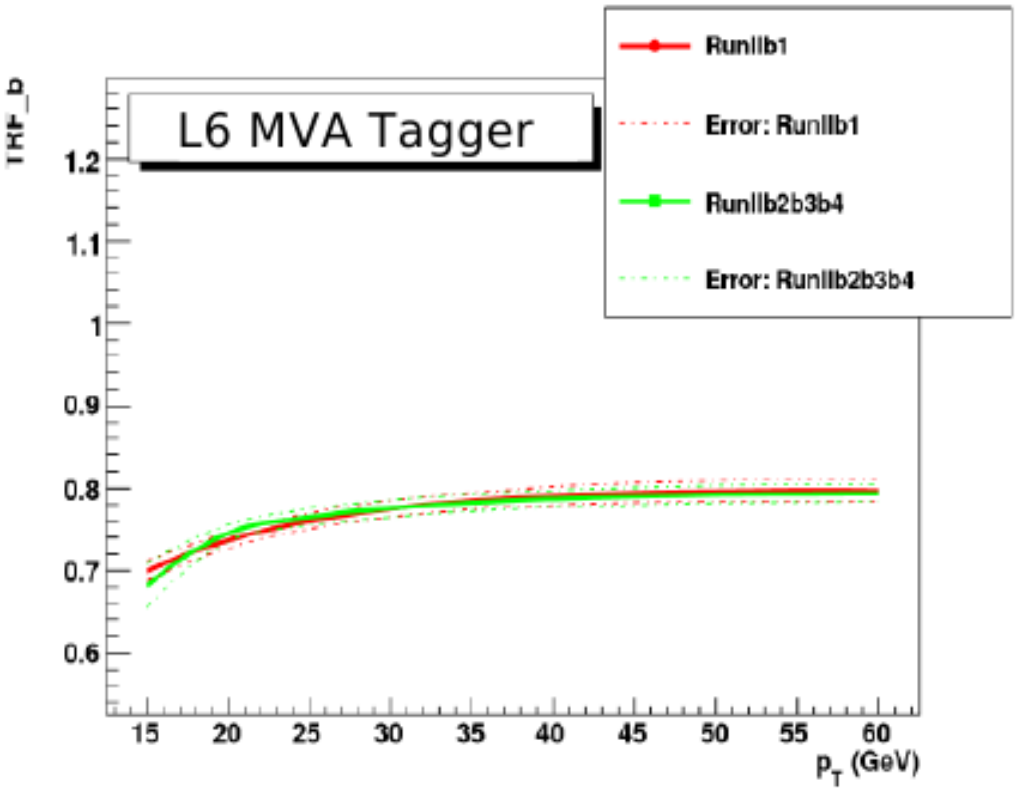
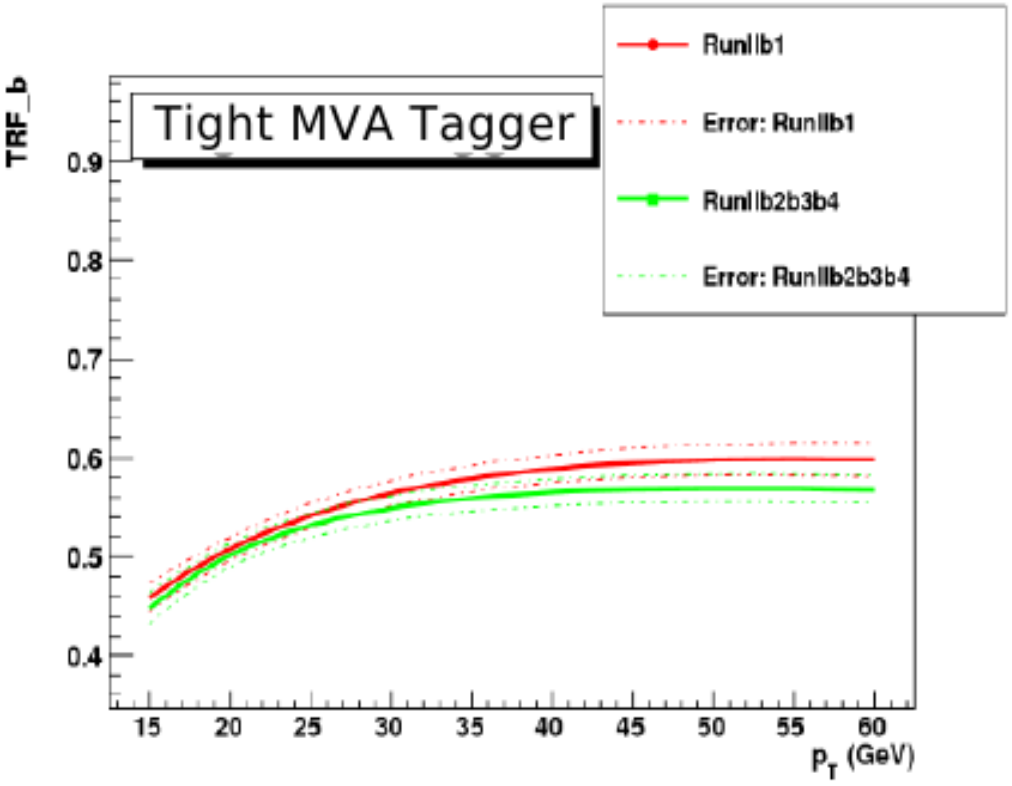
Tagger: Tight Range: 0 < |η| < 0.8
Efficiency
p20.17
p_T (GeV)

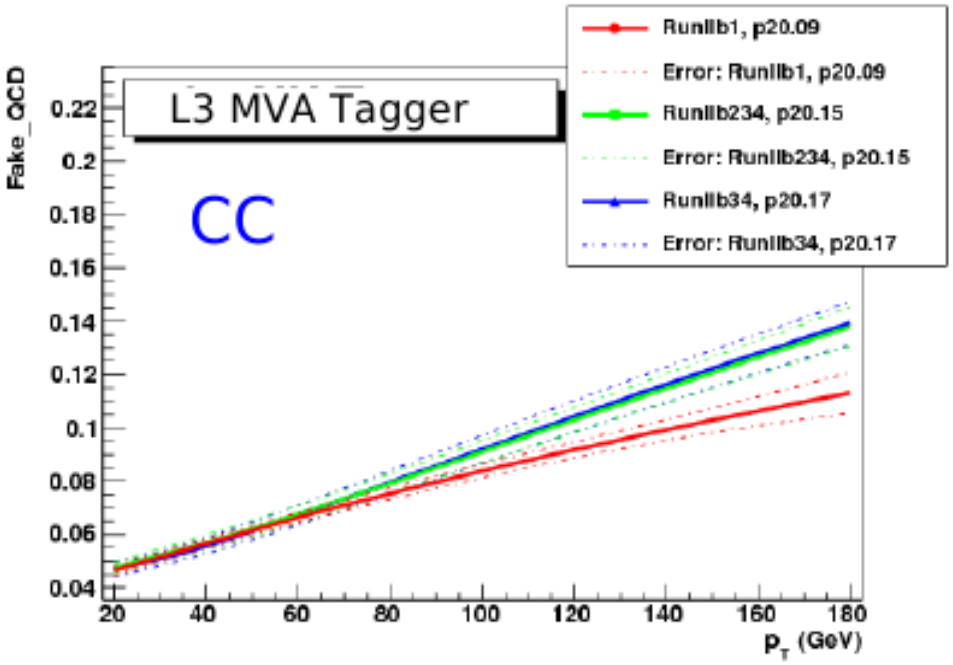
b-eff vs. time

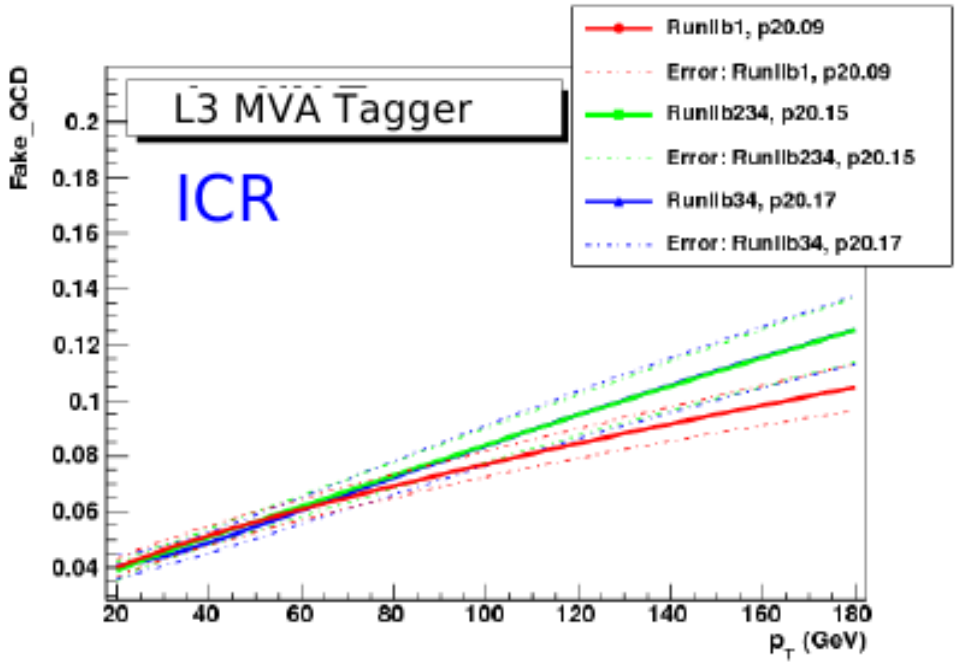
- Comparing RunIIb1 vs. RunIIb2b3b4
  - Tighter operation points slightly less efficient than in latest data
  - No significant changes for looser OP

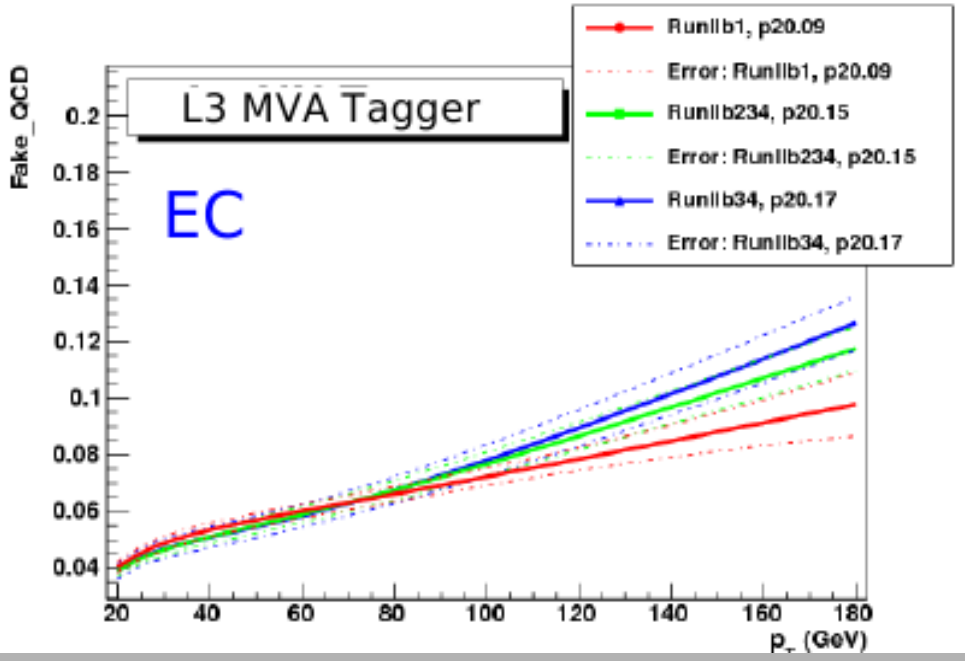




b-id vs. time

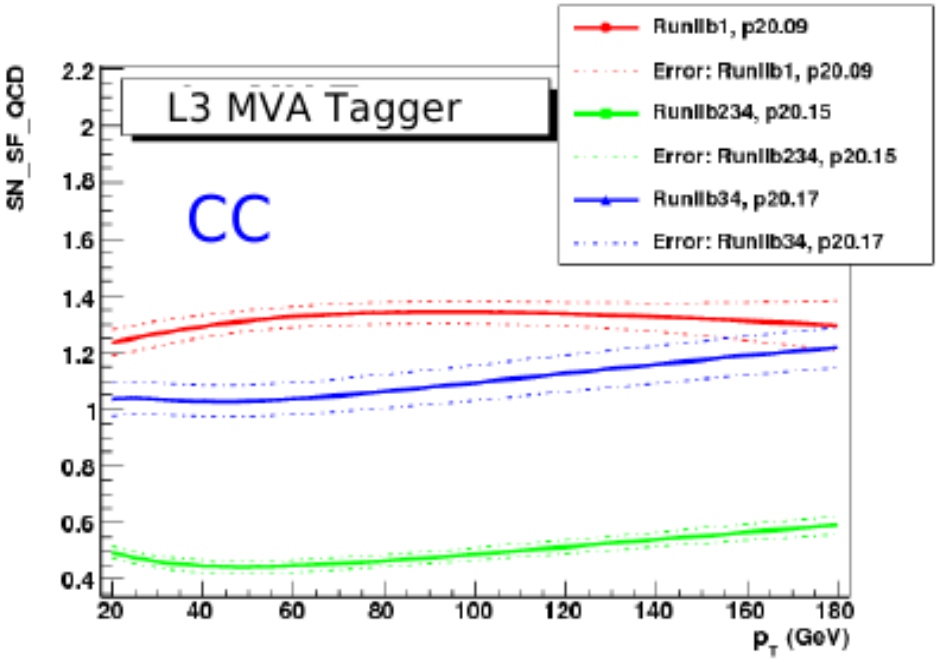


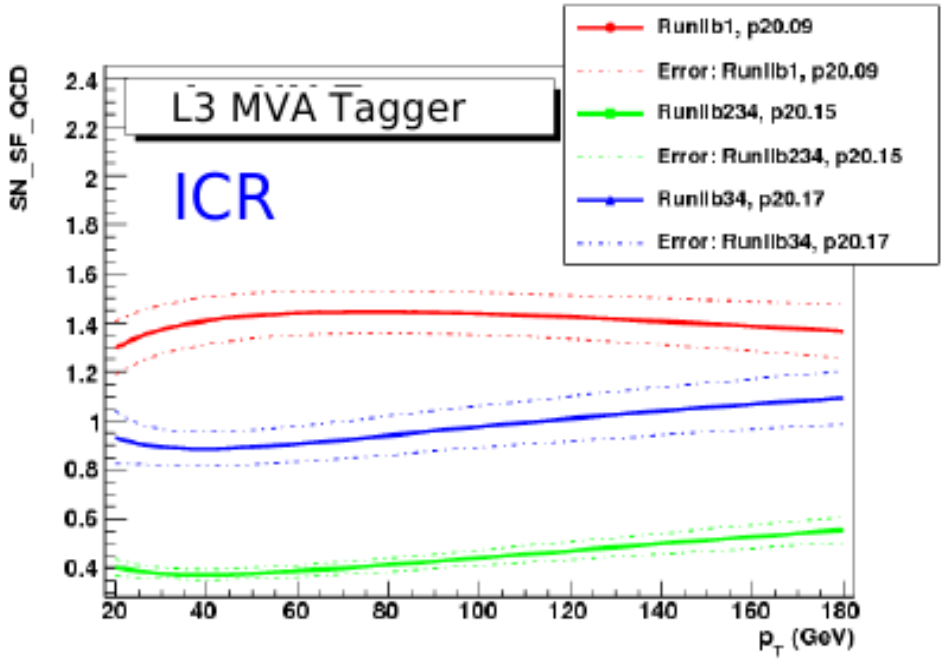




- Data fake rates stable over time

b-id vs. time / MC

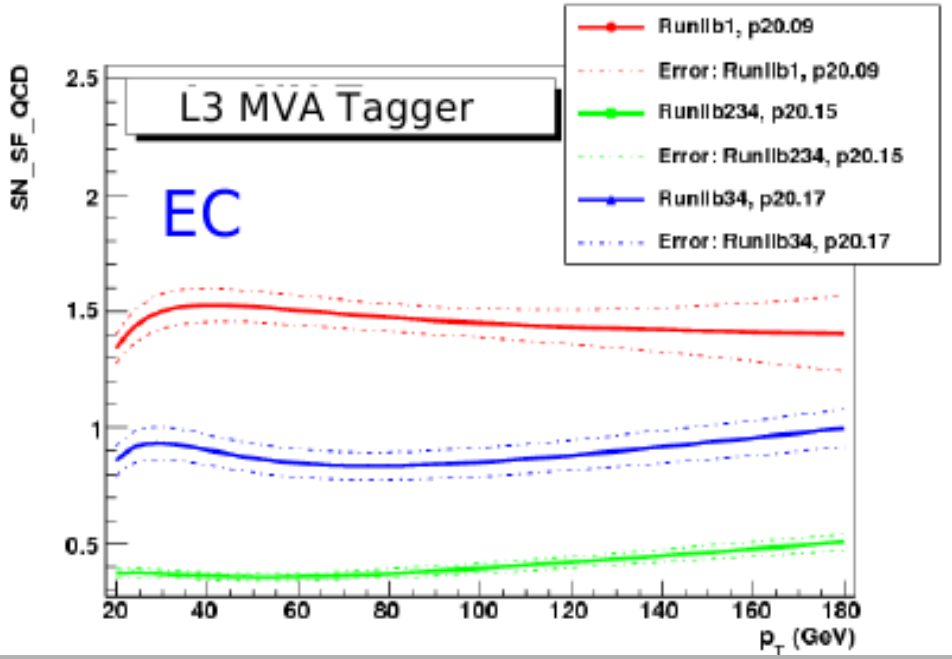




- Less hits → degrading IP resolution
  → more tracks obtain large life times
  → larger b-tagg eff.

- p20.15 → p20.17 more hits
  → MC fake rate decreasing

- Shows nicely how well the new MC performs



Conclusions / Plans

Many combinations to play with:

- run 2b 2/3/4 vs. MC p21.15
- run 2b 3/4 vs. MC p21.17
- re-visited run2b1 with latest improvements in methods
  - better high-pT fits, improved errors
- racking in p21.17 seems the most realistic
- b-eff slightly decreasing with time, fake rate ~stable

Plans

- potential improvements *(great opportunity for your latest student !)*
  - *negative tags, fake track killer, ... --> Super-MVA tagger*
  - *expect +5-10% per jet b-efficiency*
- *but manpower limited ...*