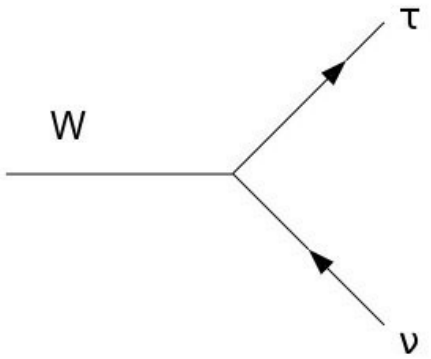
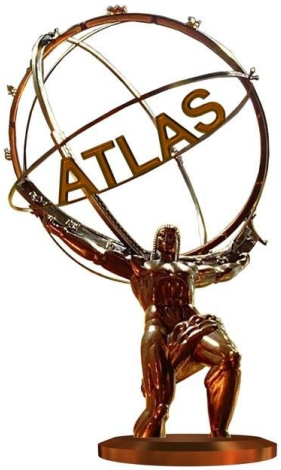
HepMC Analysis





Marc Sangel
Supervisor: Sebastian Johnert
DESY Summer Student Programm
Hamburg, DESY, 02. September 2011

Outline

Analysis Chain

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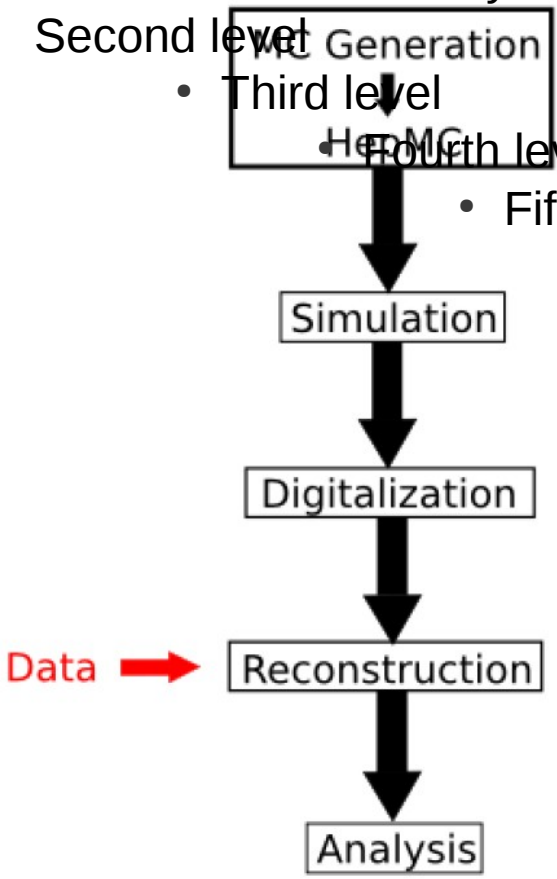
    - Fourth level
      - Fifth level



HepMC Format

Graph structure of physics event
HepMC format: vertex and particle structure
Particles: kinematic information, ID, …
Each particle belongs at least to one vertex

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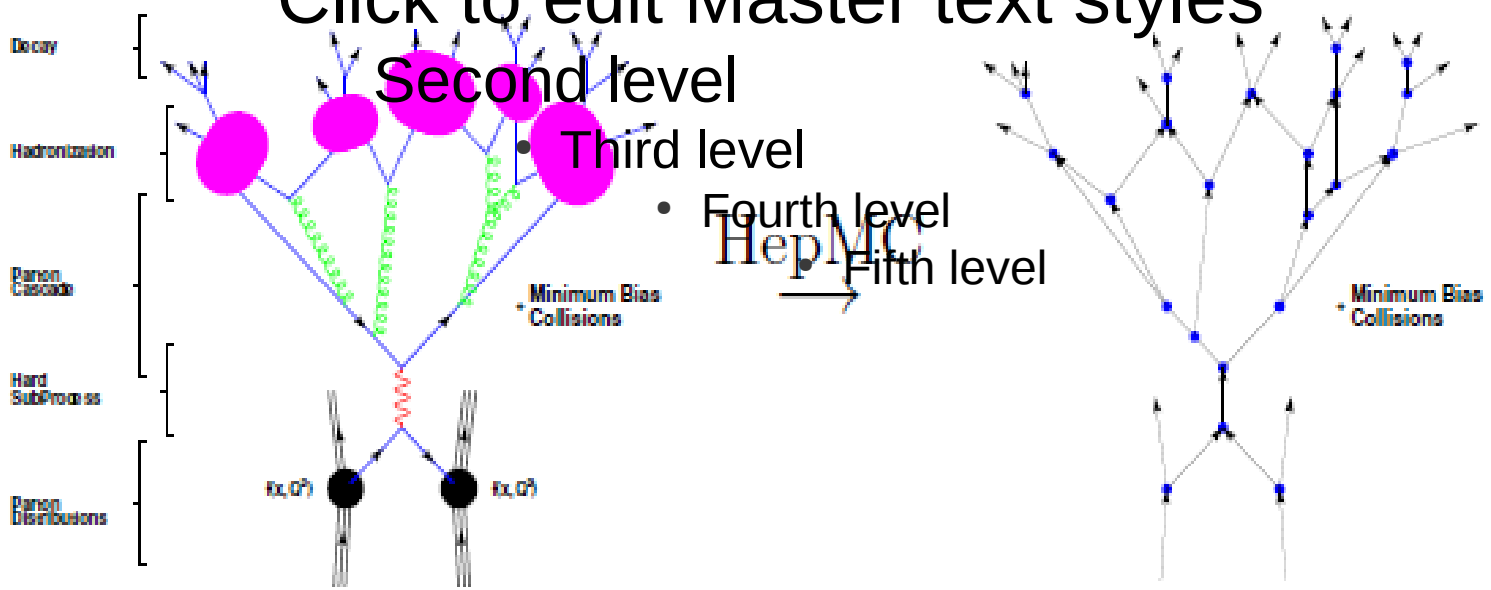
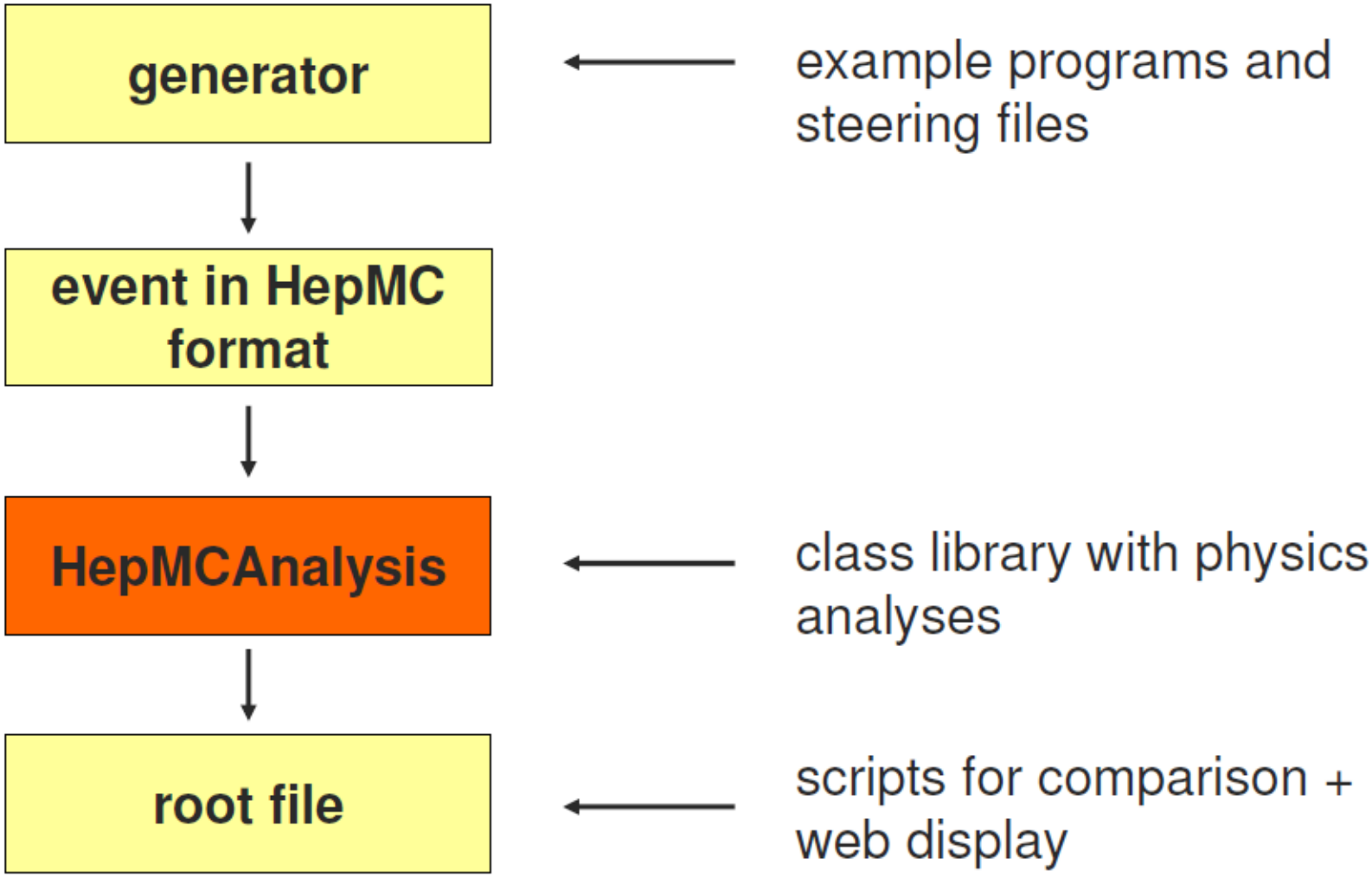
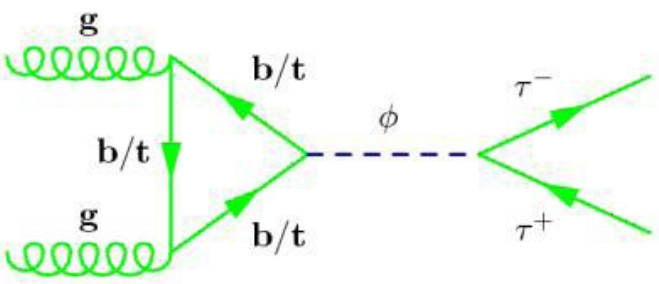
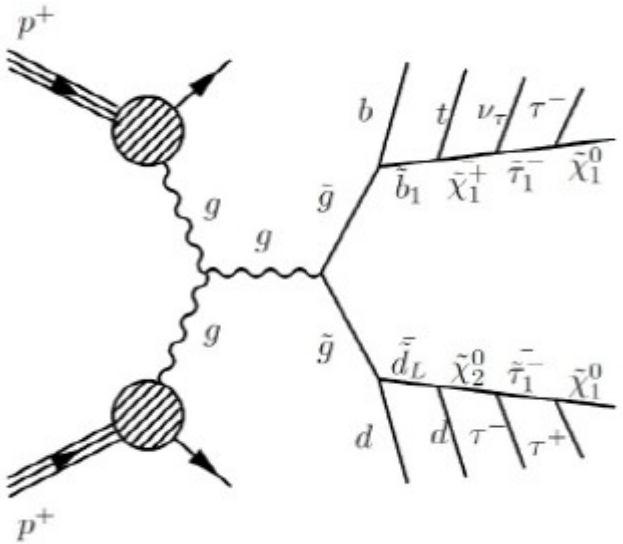


HepMCAnalysis tool

Workflow of HepMCAnalysis




g
b/t
g
b/t
b/t
ϕ
τ^-
τ^+


p^+
p^+
g
g
g
$\tilde{g}$
$\tilde{g}$
b
t
ν_τ
τ^-
$\tilde{b}_1$
$\tilde{\chi}_1^+$
$\tilde{\tau}_1^-$
$\tilde{\chi}_1^0$
$\bar{d}_L$
$\tilde{\chi}_2^0$
$\tilde{\tau}_1^-$
$\tilde{\chi}_1^0$
d
d
τ^-
τ^+

Results for different generators: W histograms

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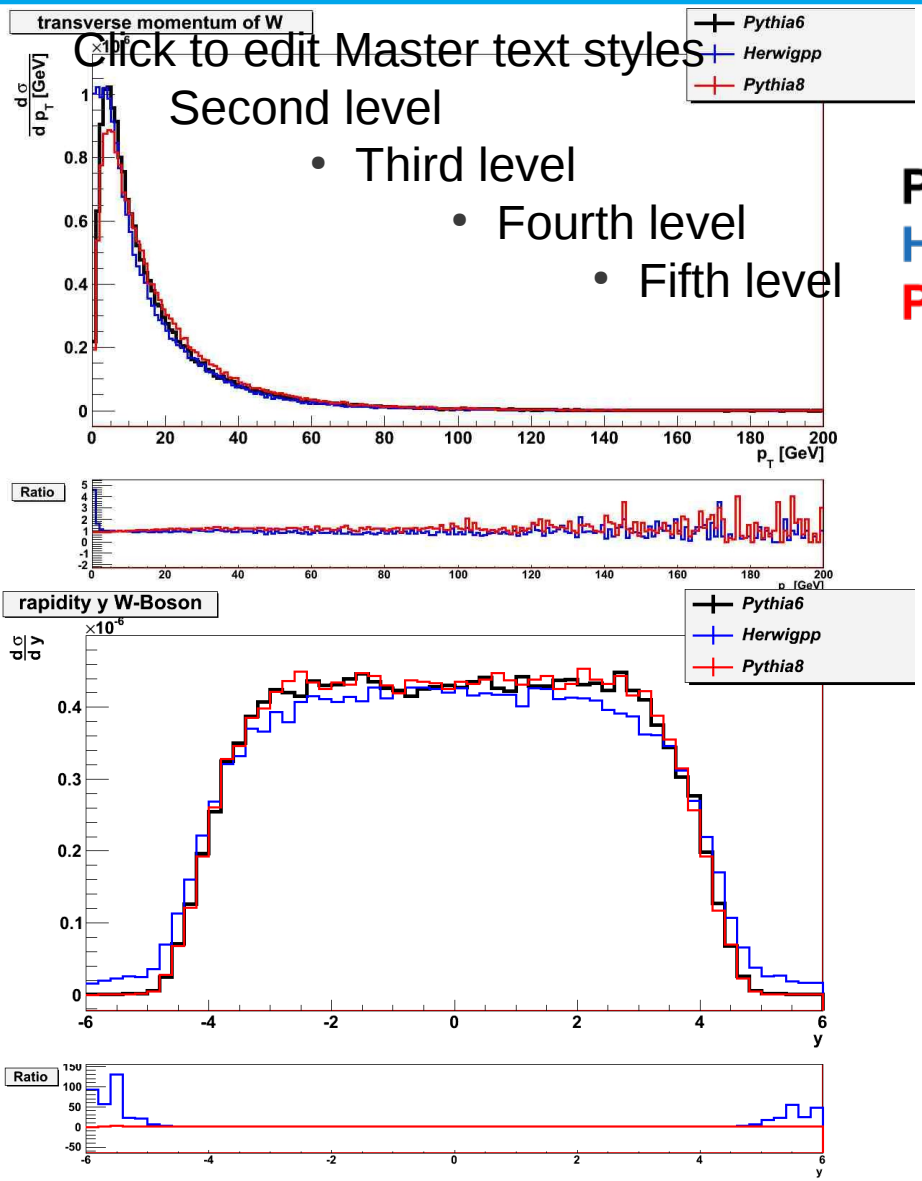

Pythia6
Herwig++
Pythia8

- Hardly differences between Pythia6 and Pythia8
- Higher differences between Herwig++ and Pythia
- Herwig++ does not decrease for first bin → will be checked

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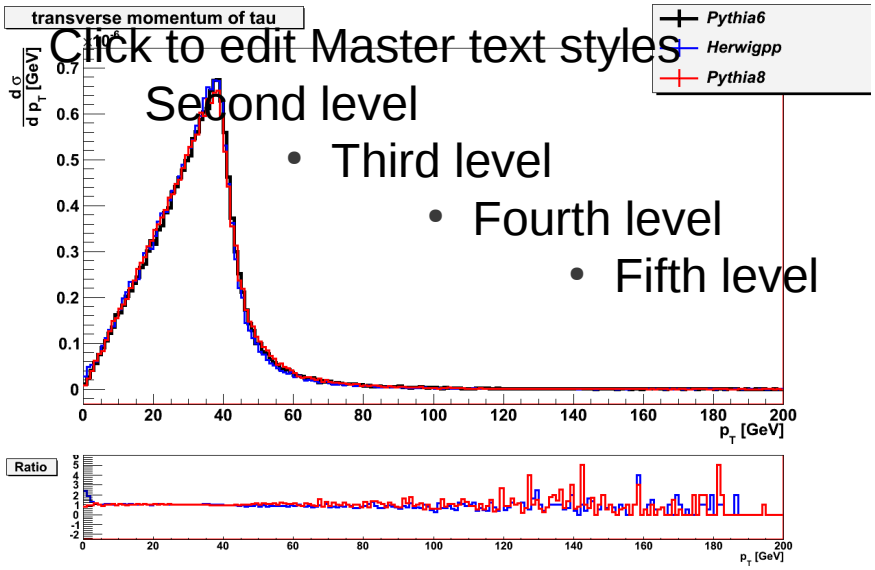
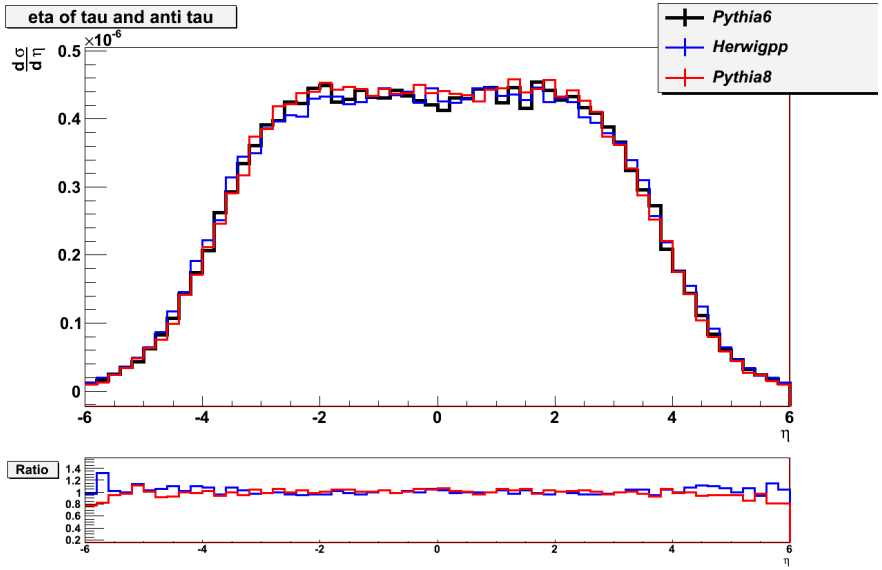
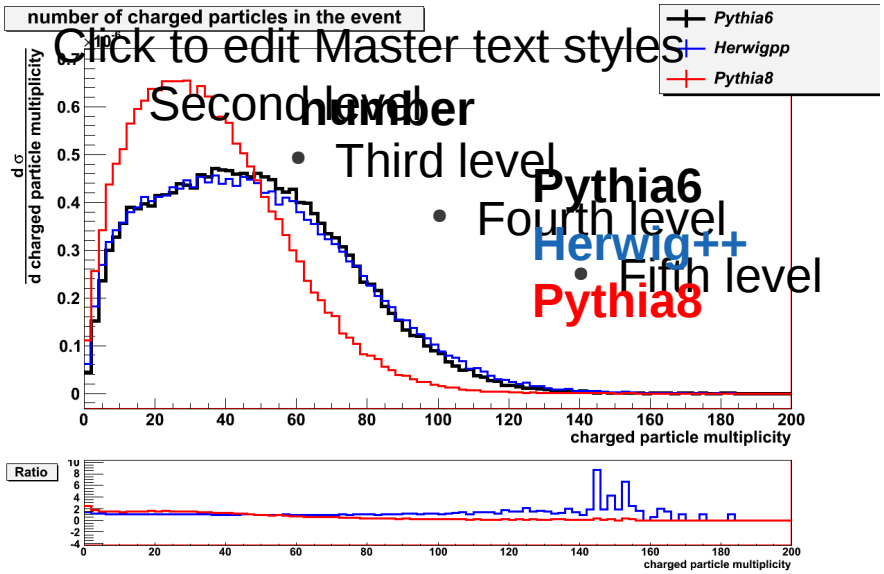




Pythia6
Herwig++
Pythia8

Results for different generators: charged stable particles



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- Second level
  - Third level
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      - Fifth level

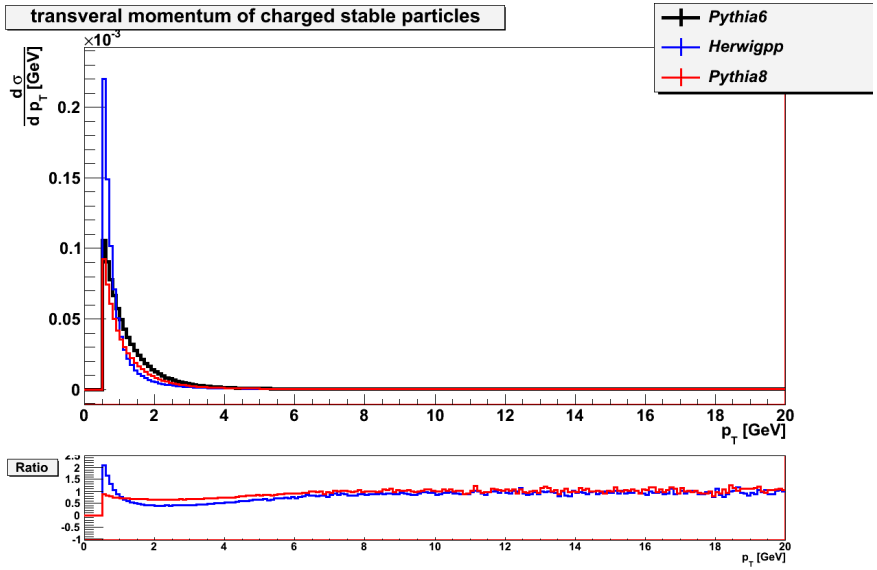
number

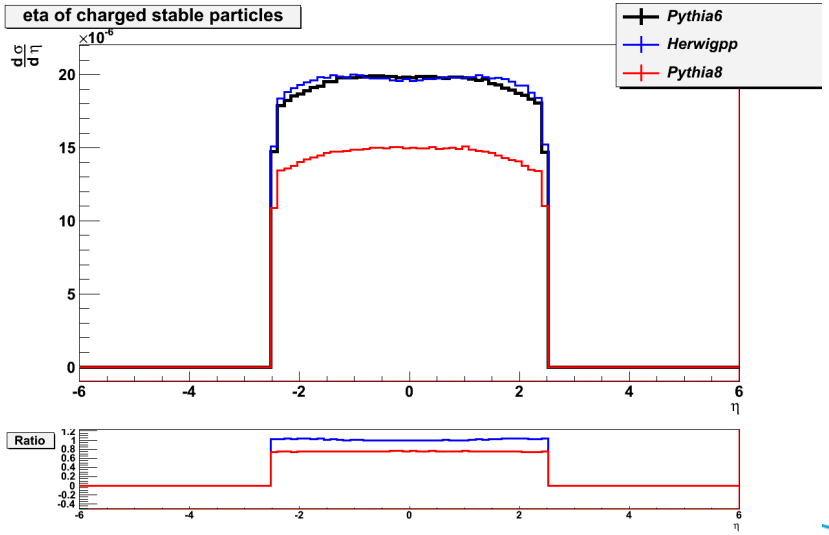
Pythia6

Herwig++

Pythia8

- peculiar behaviour of Pythia 8
- Pythia 6 and Herwig++ very similar





Parton Distribution Functions (PDFs)

Results for Different PDFs: W histograms

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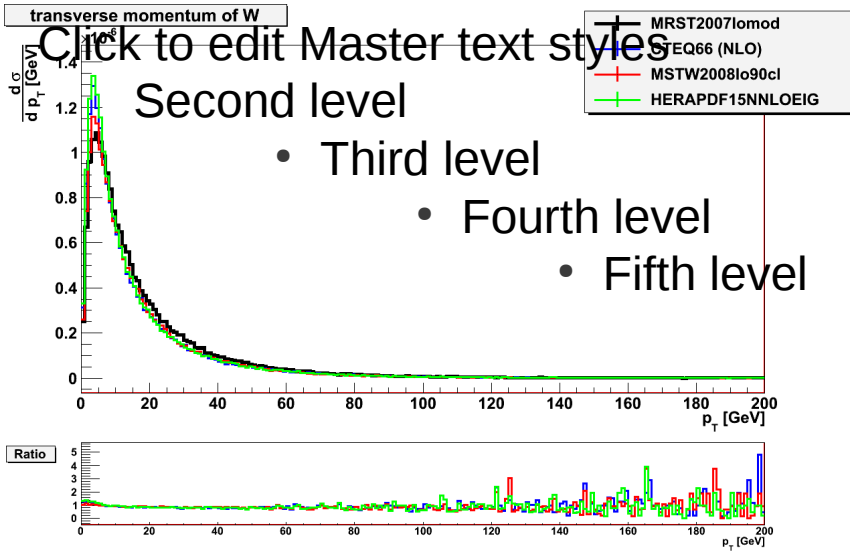
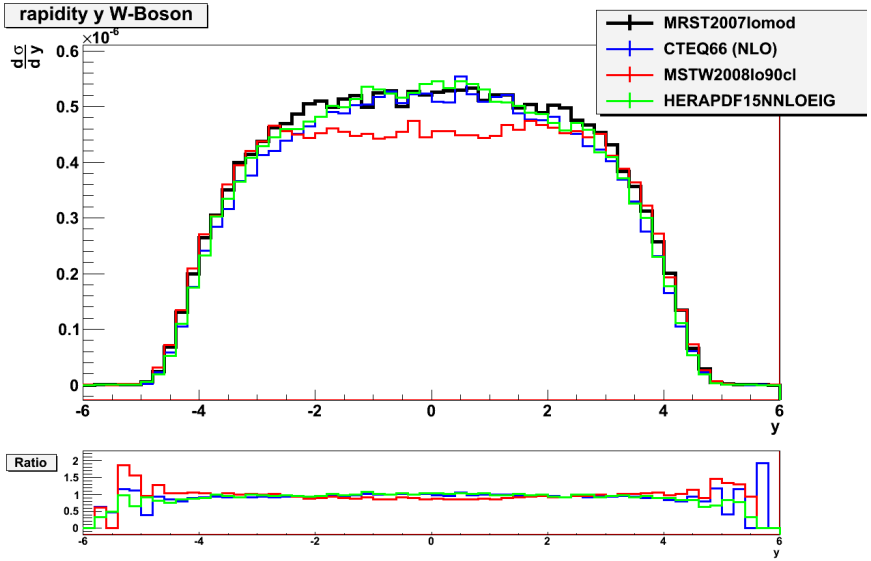
      - Fifth level





LO
NLO
NNLO
LOmod (LO*)

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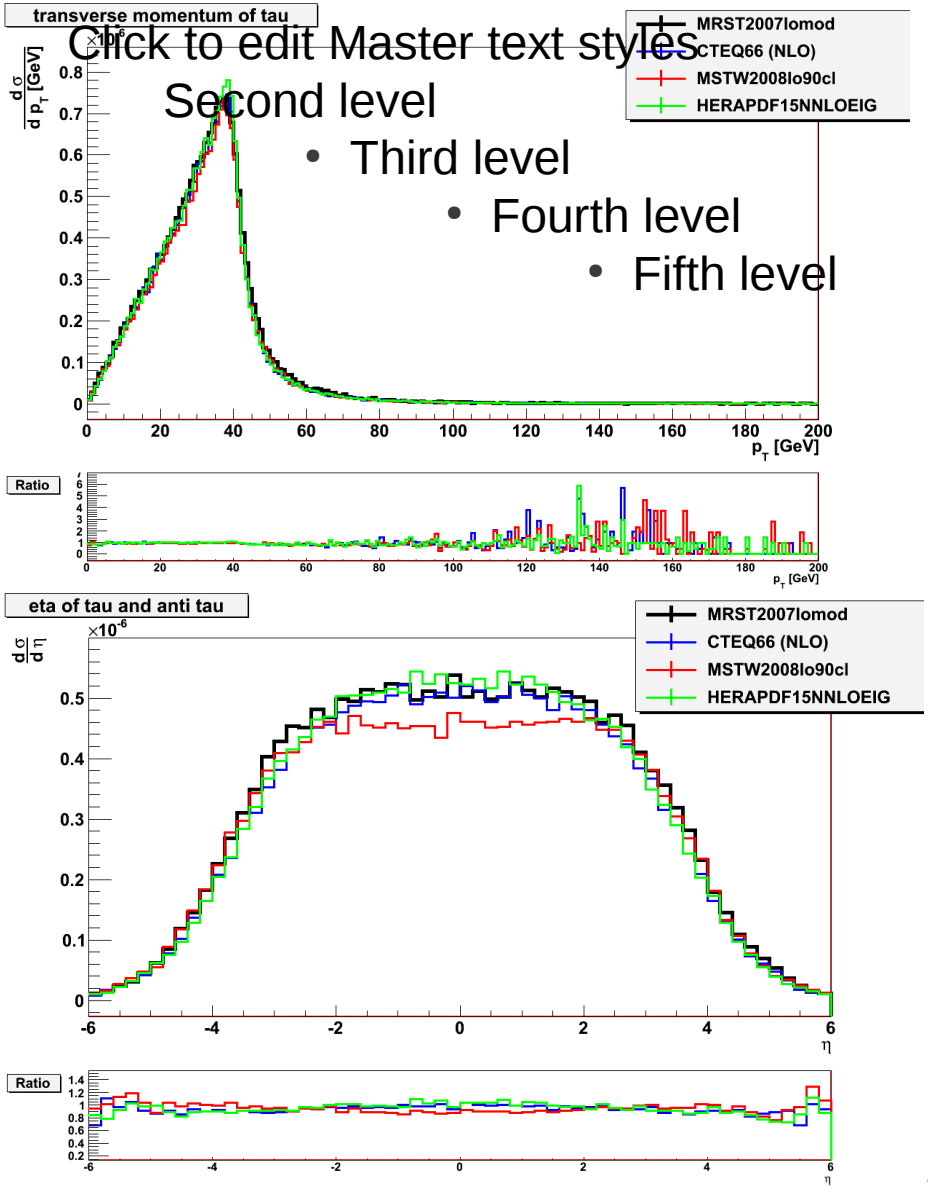
  - Third level
    - Fourth level
      - Fifth level



LO
NLO
NNLO
LOmod (LO*)

Results for different PDFs: Charged particles

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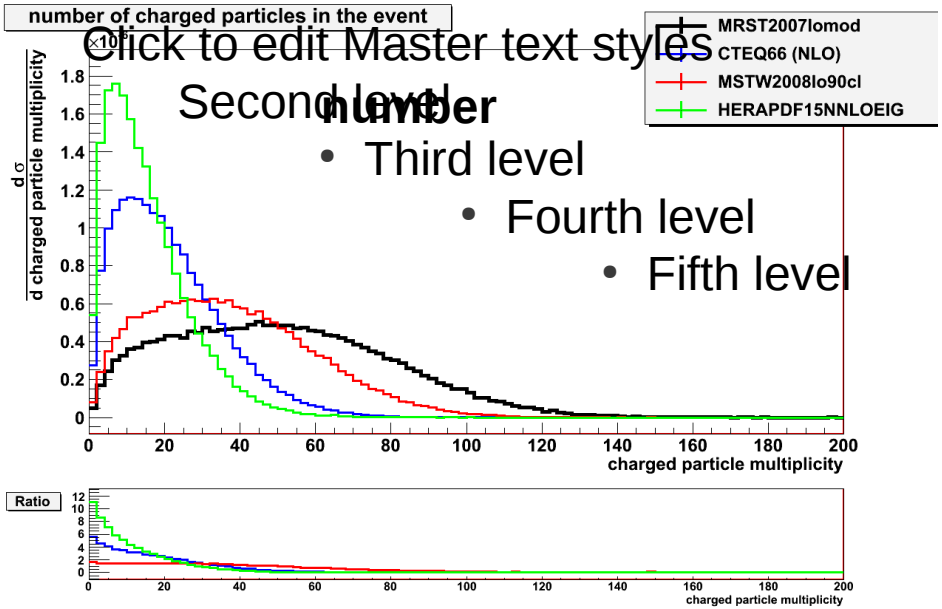
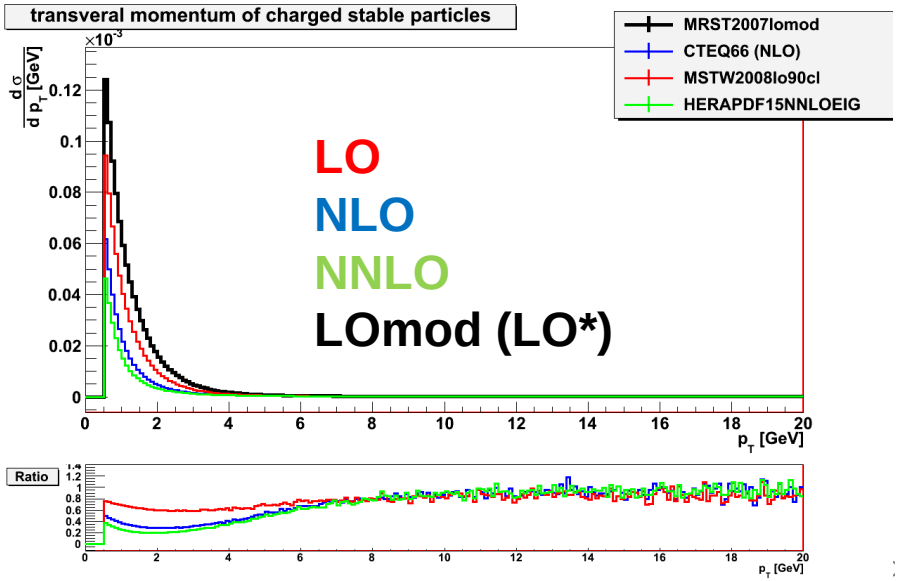
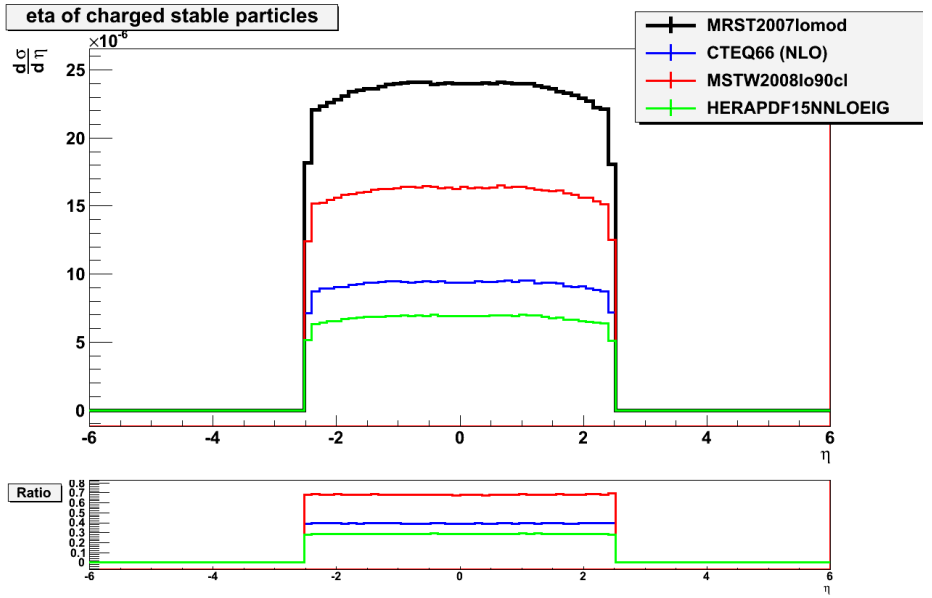
- Second level
  - Third level
    - Fourth level
      - Fifth level



- Again big differences for charged particle histograms





Efficiency calculation

Results of efficiencies for different PDFs

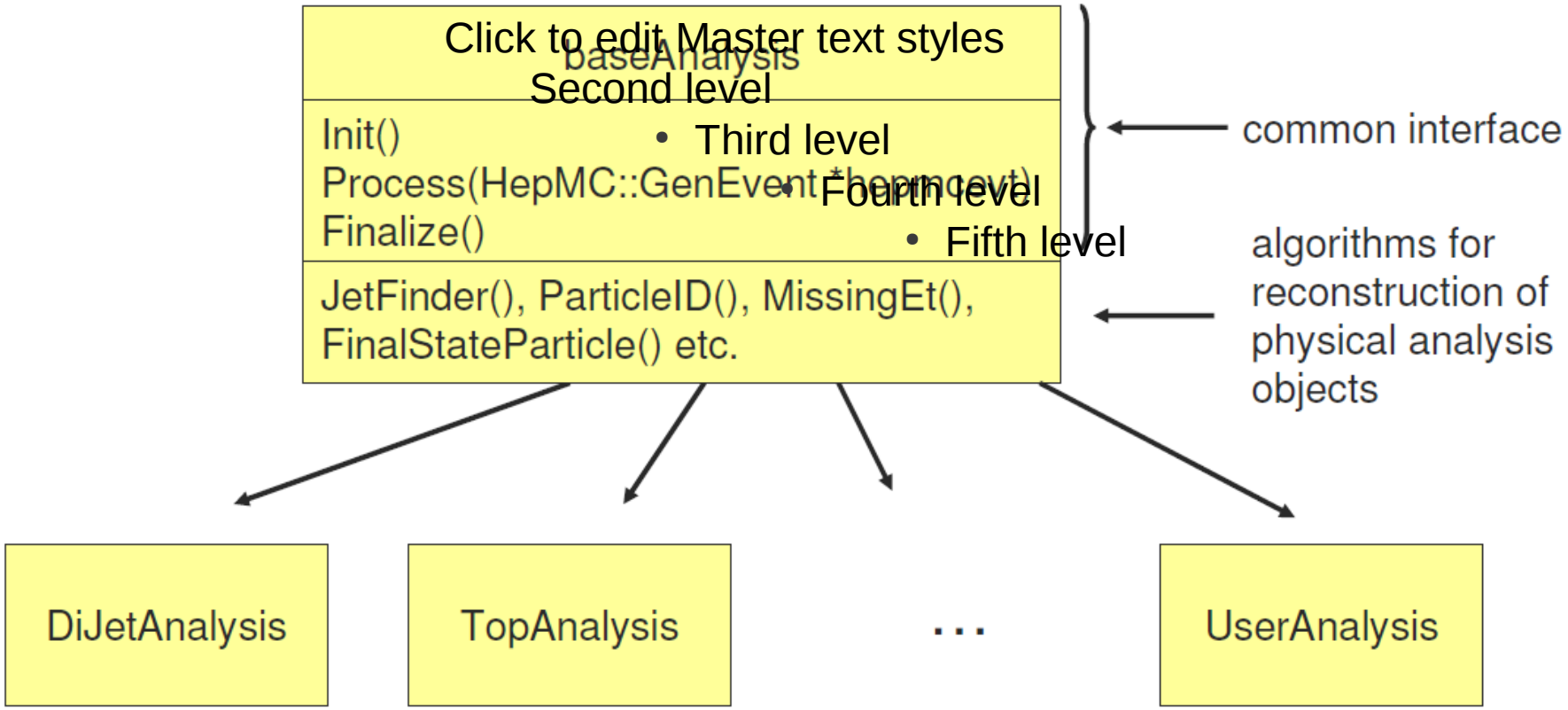
PDF	Efficiency	Error
MSTW2008lo90cl	0.12762	0.00119961
CTEQ66 (NLO)	0.13482	0.00123692
HERAPDF15NNLOEIG	0.13427	0.00123409
MRST2007lomod	0.13617	0.00124383

PDF	Efficiency	Error
MSTW2008lo90cl	0.08508	0.0008
CTEQ66 (NLO)	0.08988	0.000825
HERAPDF15NNLOEIG	0.089513	0.000823
MRST2007lomod	0.09078	0.000829

ATLAS: Efficiency: 0.0975, Error: 0.0019; (arXive:1108.4101v1)

Summary

Class Library



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Generators