

Simultaneous tuning to Tevatron and uncorrected ATLAS data

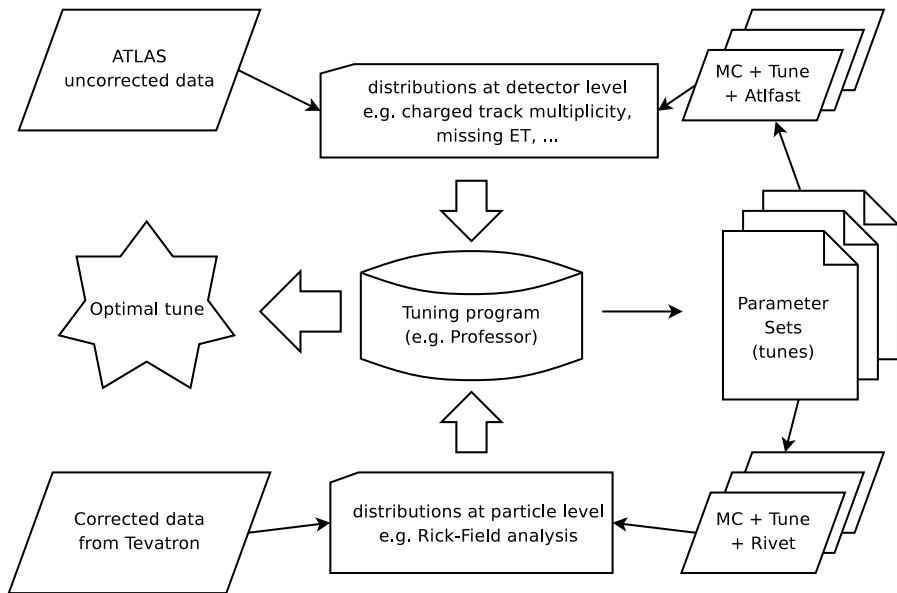
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01 October 2009, ATLAS MC Tuning Task Force



Workflow to incorporate early Atlas data into UE tunes



ATLAS part (with Alex Richards)

- First **detector level observables** defined and implemented using AOD objects (from AtIfast I at the moment)
- Made available to a Rivet **pseudo analysis** so that they fill histograms
- Running Athena jobs through **GRID**

Rivet/Professor part

- Use two existing scripts from **Professor**:
 - `prof-scanparams` To dice points in the parameter hypercube
 - `prof-tune` To tune resulting histograms to a given reference
- Extended `prof-scanparams` for easy creation of **Athena** job-option files
- Many Tevatron UE analyses available in **Rivet**

First test cases

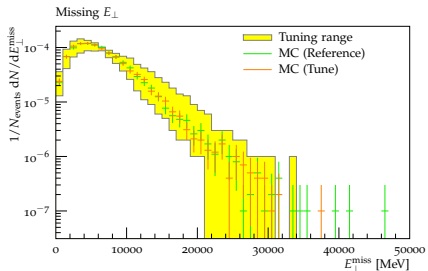
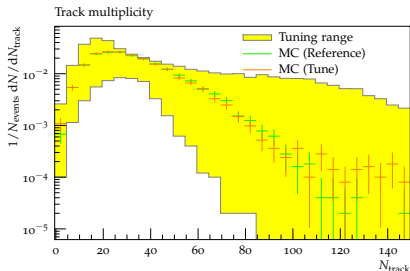
- **Herwig/Jimmy** QCD+MPI events
- **Pythia** MinBias events

Input

- 50 parameter points **sampled** in:
 - PTJIM = $F \cdot (\sqrt{s}/1.8\text{TeV})^E$
where F and E are tuned
 - $F = 2.0 \dots 5.0$
 - $E = 0.254 \dots 0.294$
 - JMRAD = $0.3 \dots 4.0$
- Created **pseudo data** with the default values of the parameters:
 - $F = 3.6$
 - $E = 0.274$
 - JMRAD = 2.2

Result

- Use pseudo data as **reference**
- Tuning output:
 - $F = 3.4963$
 - $E = 0.288$
 - JMRAD = 1.975
- Reproduces reference
- Example distributions generated with this parameter point: Track multiplicity and missing E_{\perp}



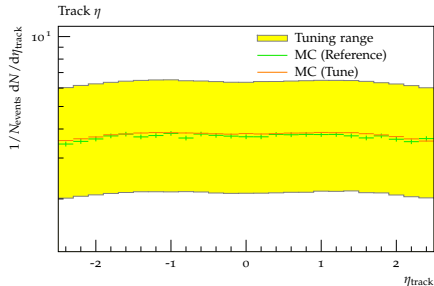
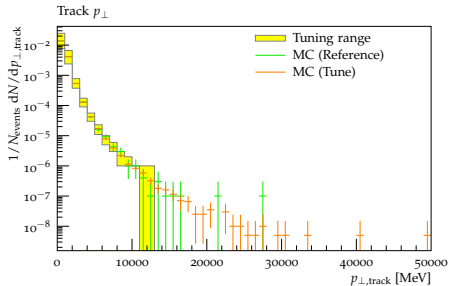
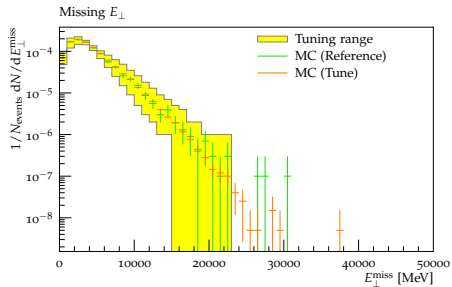
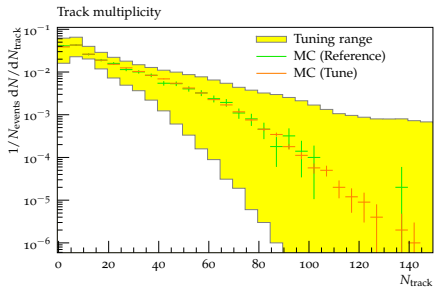
Input

- 200 parameter points **sampled** in:
 - PARJ81 = 0.25 ... 0.35
 - PARP78 = 0.01 ... 0.5
 - PARP80 = 0.05 ... 0.2
 - PARP82 = 1.5 ... 2.5
 - PARP83 = 0.5 ... 2.5
 - PARP84 = 0.2 ... 1.0
 - PARP90 = 0.1 ... 0.3
- Created **pseudo data** with the MC8 values:
 - PARJ81 = 0.29
 - PARP78 = 0.3
 - PARP80 = 0.1
 - PARP82 = 2.1
 - PARP83 = 0.8
 - PARP84 = 0.7
 - PARP90 = 0.16

Result

- Tuning output:
 - PARJ81 = 0.30740 ± 0.01123
 - PARP78 = 0.31759 ± 0.02958
 - PARP80 = 0.062778 ± 0.02082
 - PARP82 = 2.0275 ± 0.1075
 - PARP83 = 1.0900 ± 0.2881
 - PARP84 = 0.81536 ± 0.04572
 - PARP90 = 0.16414 ± 0.01968
- Values similar to reference
- Distributions reproduce reference

Pythia continued

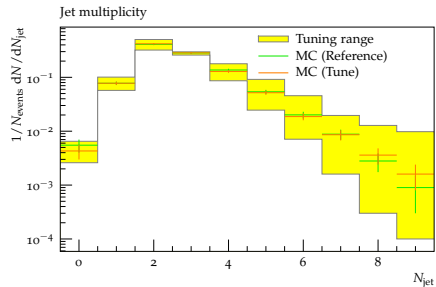
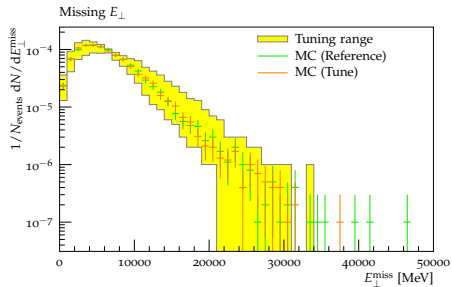


- Determine more early data distributions to include in tuning
 - Improvements in Atlfast I for track simulation ⇒ Alexander Richards (UCL)
 - Possible use case: “Tune” Atlfast I parameters to full simulation (using fixed generator parameters)
 - Include Tevatron runs/data into tune, three scenarios
 - ① LHC pseudo data from known good tune
 - ② LHC pseudo data from known good tune with different energy extrapolation parameters
 - ③ LHC pseudo data from parameters which are incompatible with Tevatron data
- ⇒ See how global tune reacts to such scenarios

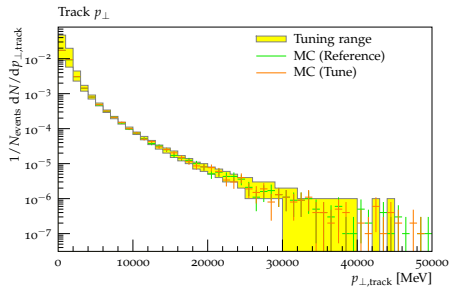
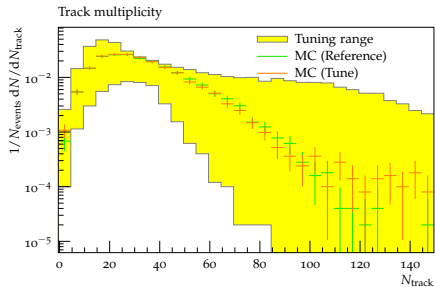
Goal

- Easily usable package/instructions for use by other ATLAS members
- Use of the framework for quick turnaround tunes when first data arrives

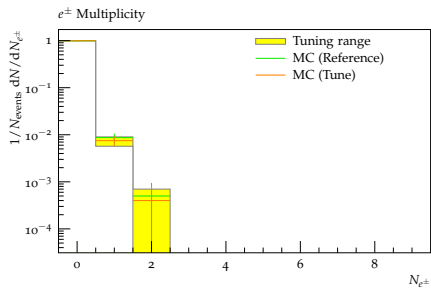
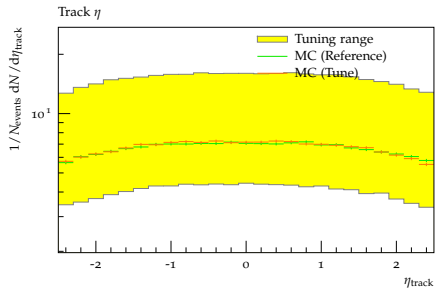
All Herwig/Jimmy distributions



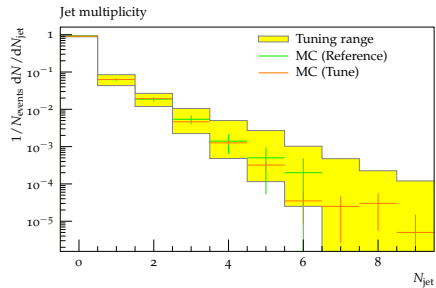
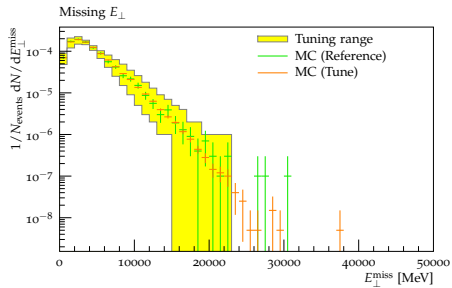
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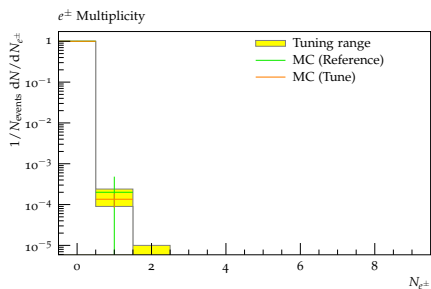
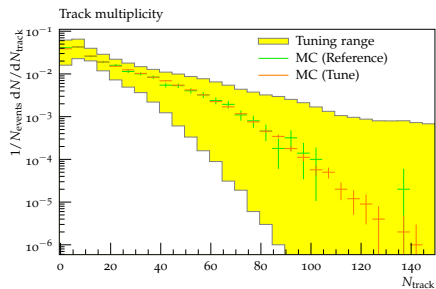
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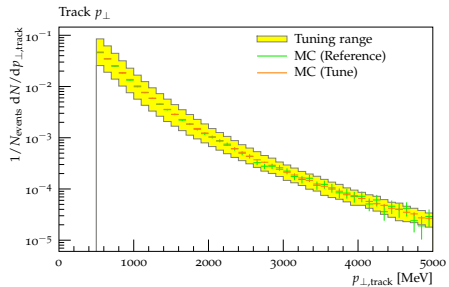
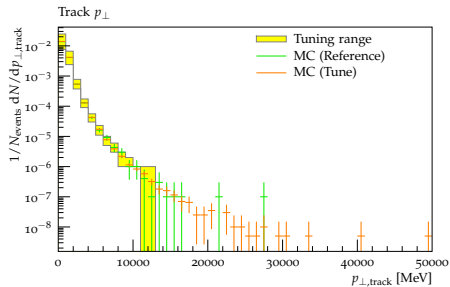
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