

EvtGen Report

“Status of external generator support”

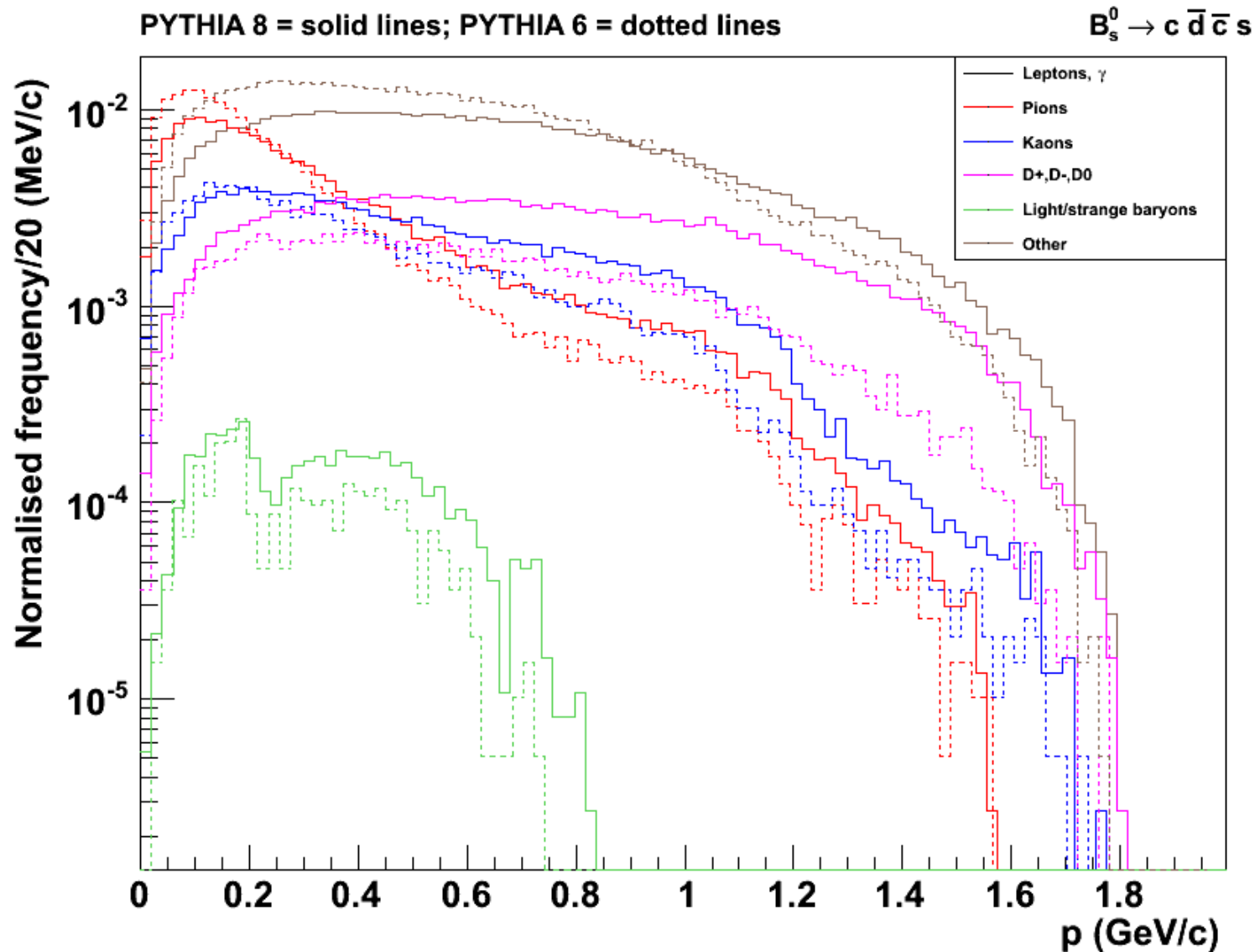
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(on behalf of the EvtGen Warwick team)

14th June 2011

External Generators

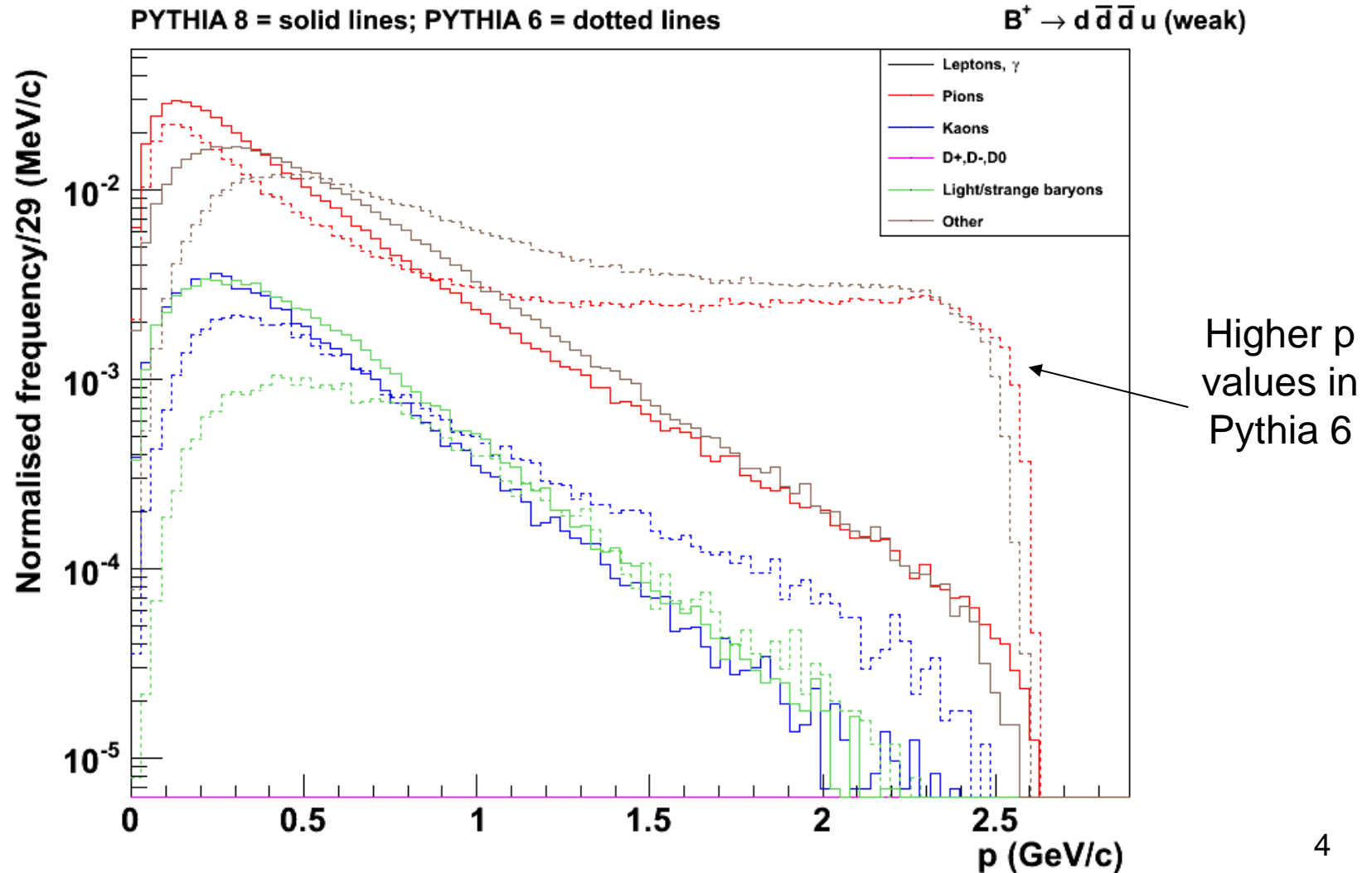
- EvtGen can now use C++ external generators (with HepMC):
 - Pythia 8 (can now use aliased decays)
 - Tauola C++ interface
 - Photos C++ interface
- EvtGenModels/EvtAbsExternalGenerator
 - Abstract interface for using external generators
 - Various “engine” classes runs the external generators and creates EvtParticles from them:
 - EvtPythia: uses EvtPythiaEngine (PYTHIA model)
 - EvtTauola: uses EvtTauolaEngine (TAUOLA model)
 - EvtPHOTOS: uses EvtPhotosEngine (PHOTOS model)
 - Straightforward to add more generators

Example B_s decay Pythia comparison



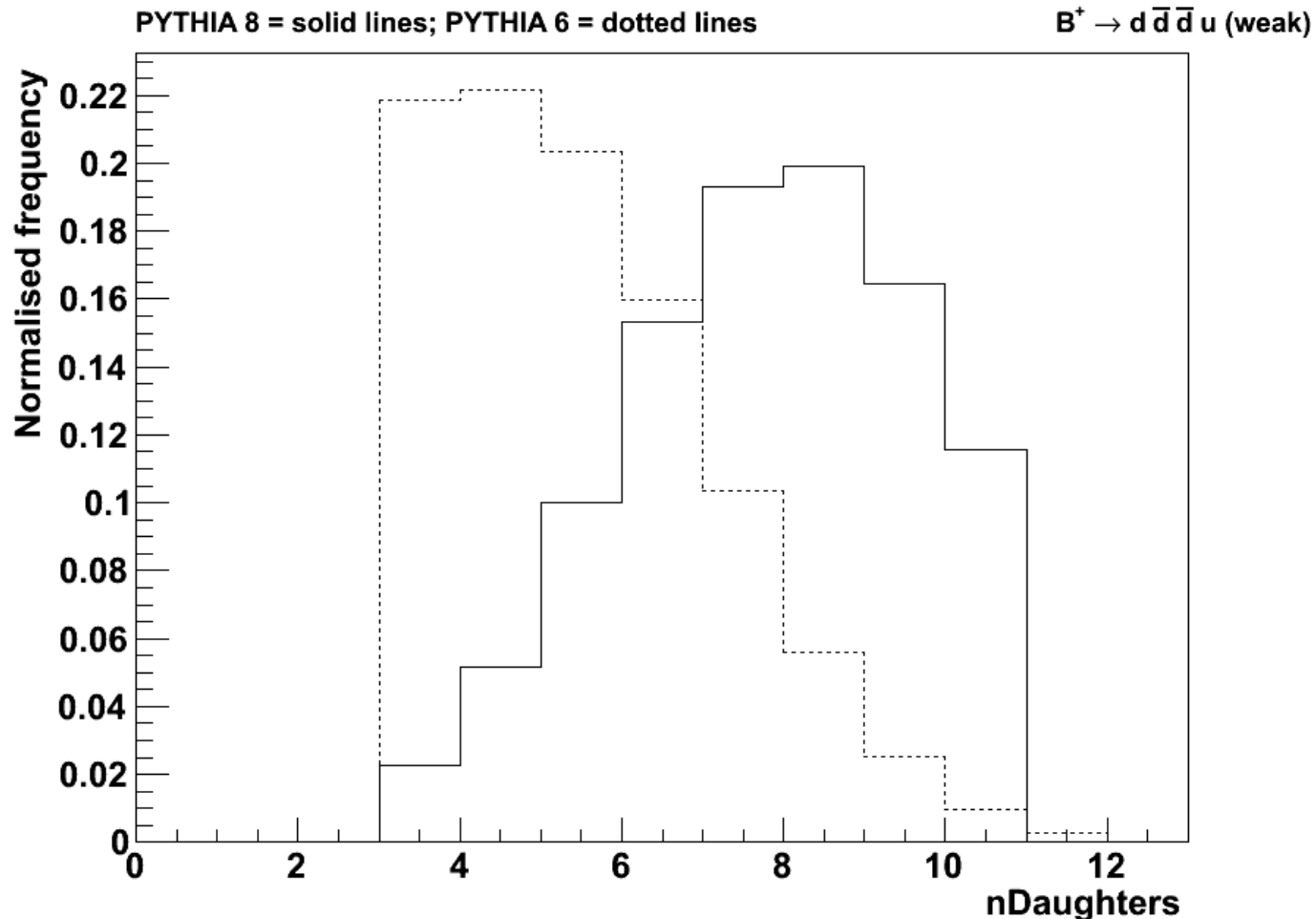
Example hadronic weak B^+ decay in Pythia

Significant differences between Pythia 6 and 8 versions



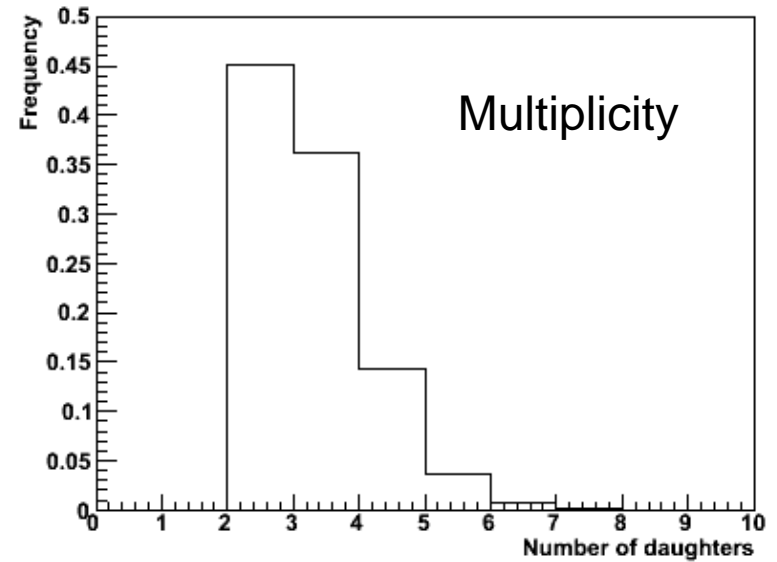
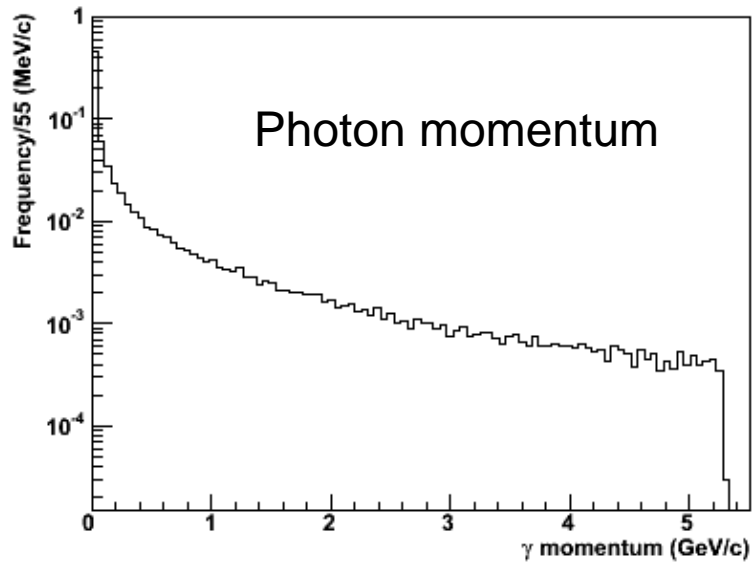
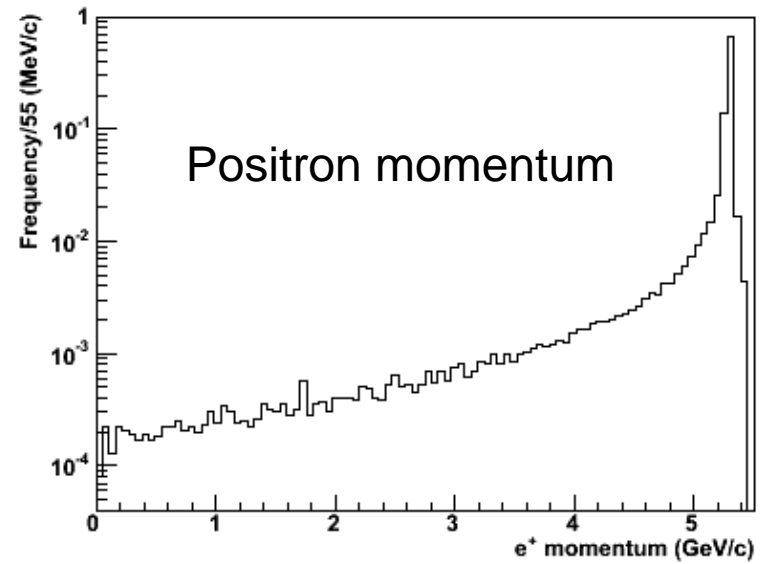
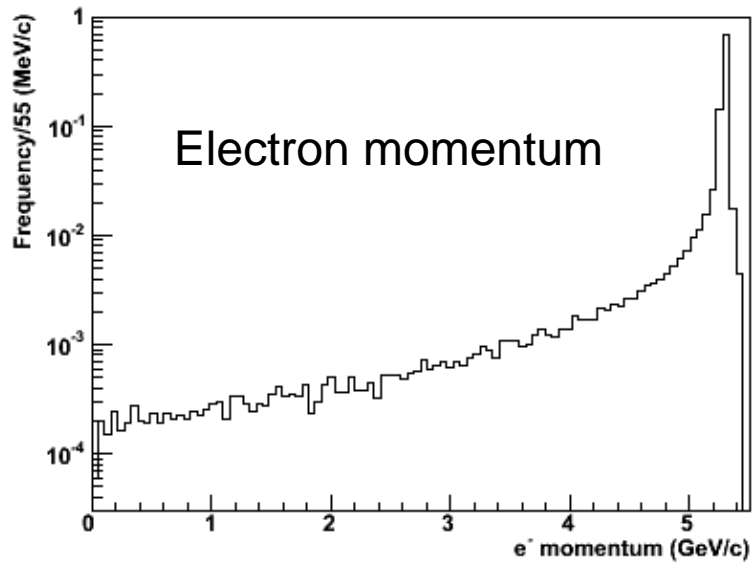
Example weak decay problem in Pythia 8

Higher multiplicities in Pythia 8 \Rightarrow lower momentum for particles (previous slide)
Pythia 8 authors have fixed this problem: new release expected July 2011



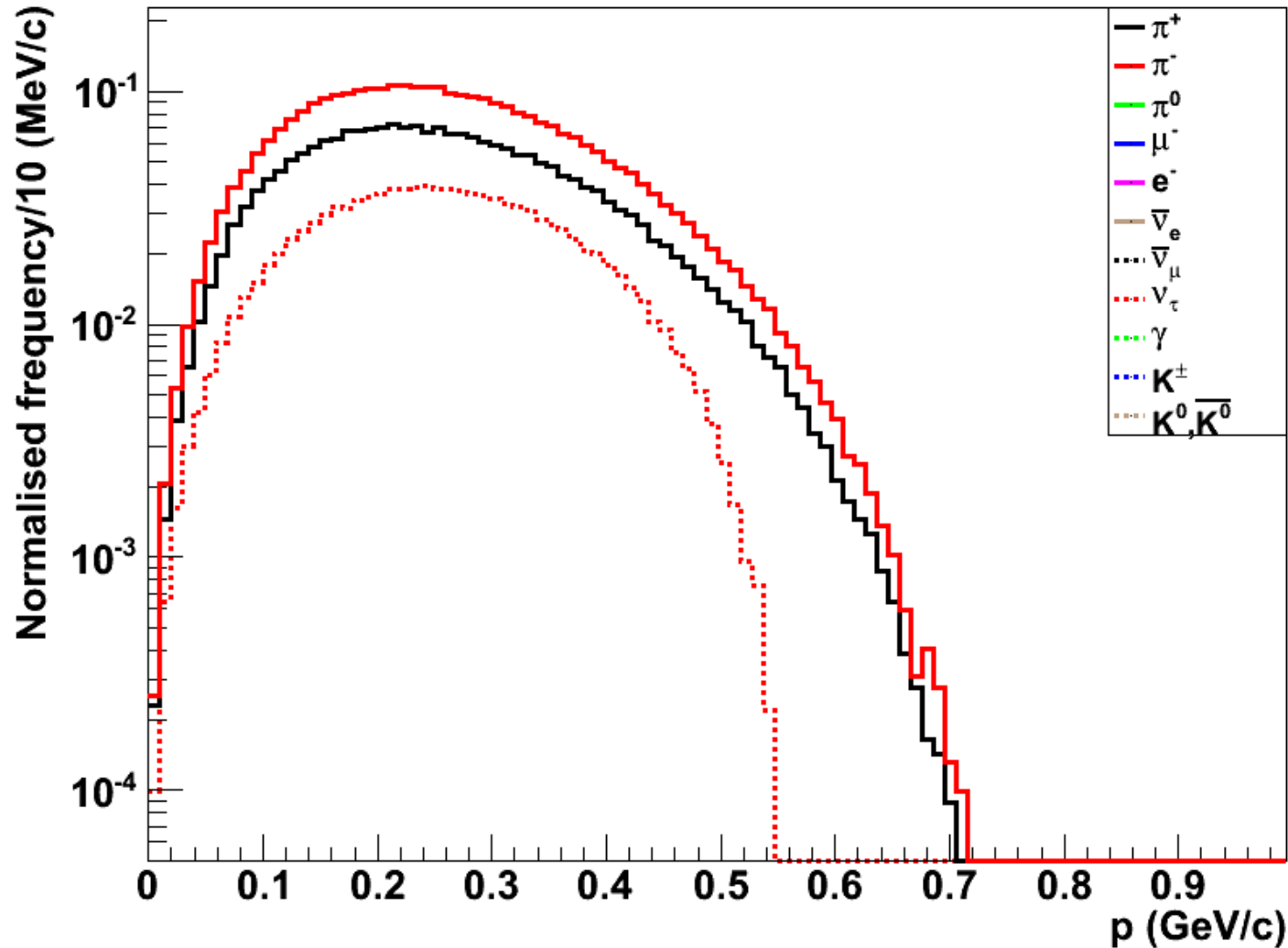
Photos example: $\Upsilon(4S) \rightarrow e^-e^+$

$\Upsilon(4S) \rightarrow e^-e^+$ decay with PHOTOS 3.0



Tauola example

$$\tau^- \rightarrow 3\pi^- 2\pi^+ \nu_\tau$$



Summary

- New EvtGen code with Pythia 8, Photos and Tauola C++ external generator support: release expected ~mid-July 2011
- Validation plots have been useful to test external generator output
 - Identified problem with weak decays in Pythia8
- Using Pythia 8 should solve problems with different parameter settings between initial event generation (p-p) and EvtGen specific (B) decays
- We have a preliminary updated DECAY.DEC file
 - Currently checking whether all edited BF values match current PDG database