

MC-Data comparison for Inclusive-jet photoproduction at HERA using Pythia 8.3

March 3, 2021

Dr. Sadhana Dash
IIT Bombay

Akhil Mithran
IISER Pune

Introduction

- Inclusive-jet photoproduction at HERA
- Single-differential inclusive-jet cross sections jet F (transverse energy, E_T^{jet} , pseudorapidity, η^{jet}) based on the k_T , anti- k_T and SIScone jet algorithms.
- The results compared as $f(E_T^{jet})$ in diff bins of η^{jet} for k_T algorithms and full range [$\eta^{jet} \in (-1., 2.5)$, $E_T^{jet}/GeV \in (17, 100)$] for anti- k_T and SIScone.
- ◇ Two types of QCD processes contribute to jet production in photoproduction :-
 - Direct
 - Resolved

Motivation

- The study of jet production in ep collisions at HERA has been well established as a testing ground of perturbative QCD (pQCD).
- Jet cross sections provided precise determinations of the strong coupling constant, α_s , and its scale dependence.

Event generation and selection

The data used for comparison period (2005–2007) @ HERA with

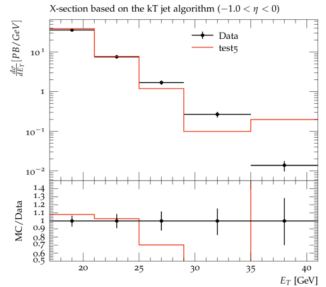
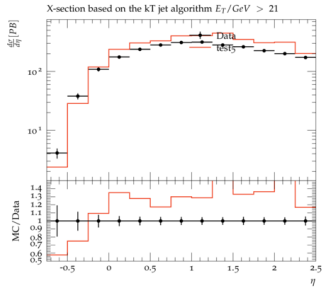
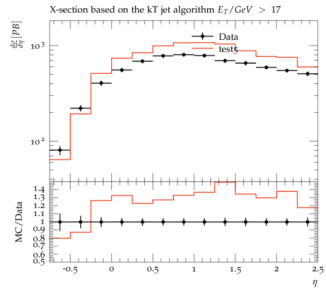
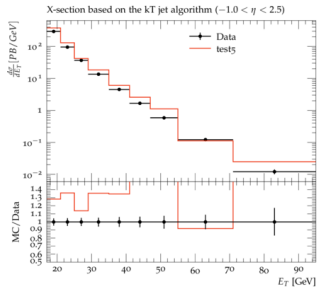
- proton(Beams:idA of energy $E_p = 920$ GeV
- electrons or positrons (Beams:idB of energy $E_e = 27.5$ GeV

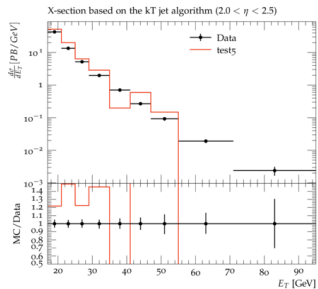
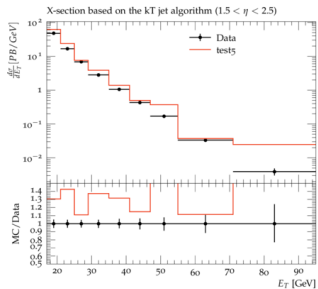
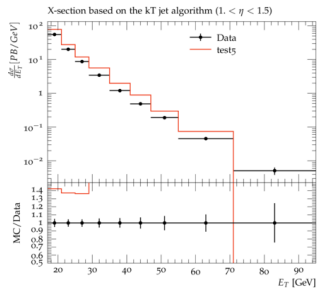
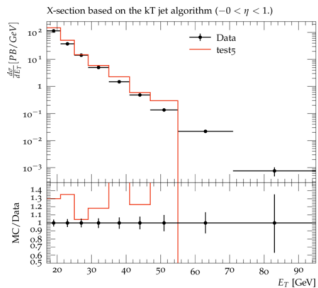
The ep centre-of-mass energy of $\sqrt{s} = 318$ GeV

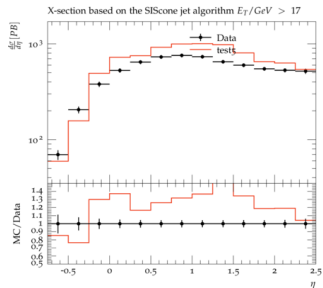
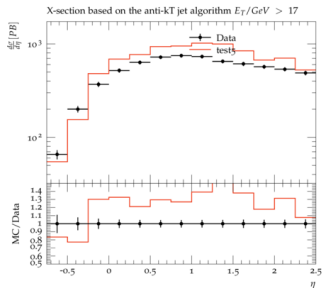
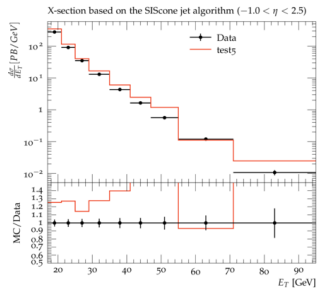
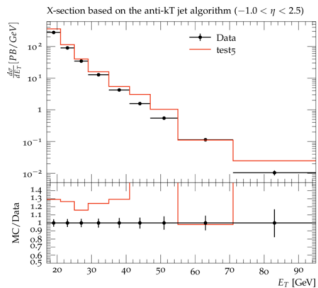
- A run of 1M events in total using Pythia 8.3.
- events with at least one jet of $E_T > 17$ GeV and $\eta < 2.5$ were accepted.
- $Q^2(\text{GeV}^2) < 1. \text{ GeV}^2$
- $\gamma - p$ centre-of-mass energies $142 < W_{\gamma p} < 293 \text{ GeV}$
($W_{\gamma p} = \sqrt{sy}$)

Jacquet-Blondel equation :- $y_{jb} = \frac{E_h - p_{zh}}{2E_e}$

Comparisons(Pythia)







Future steps...

- Include results from Herwig and Sherpa.
- Wrap up the event shape variables analysis.
- Update on '**H1_2007_I746380**' from the rivet analysis repo.
- Start writing the script on '*hep-ex/0306018v2*' with reference from repo.



ZEUS Collaboration

Inclusive-jet photoproduction at HERA and determination of α_s

arXiv:1205.6153v1 [hep-ex] 28 May 2012

Thank You

