Transverse Momentum of Charged Particles in DIS at Low Q^2.

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Outline

Motivation

- Measured in an inclusive experiment, $ep \rightarrow e'X$, the structure function $F_2(x, Q^2)$ failed to discriminate between DGLAP and beyond DGLAP models.
  Semi-inclusive measurements $ep \rightarrow e'hX$ are believed to possess higher discriminating power

  The observables for physics beyond DGLAP:

  - Transverse energy flow
  - Transverse momentum spectra
    - Hadrons at large p_T
  - Forward jets

Event and track selections

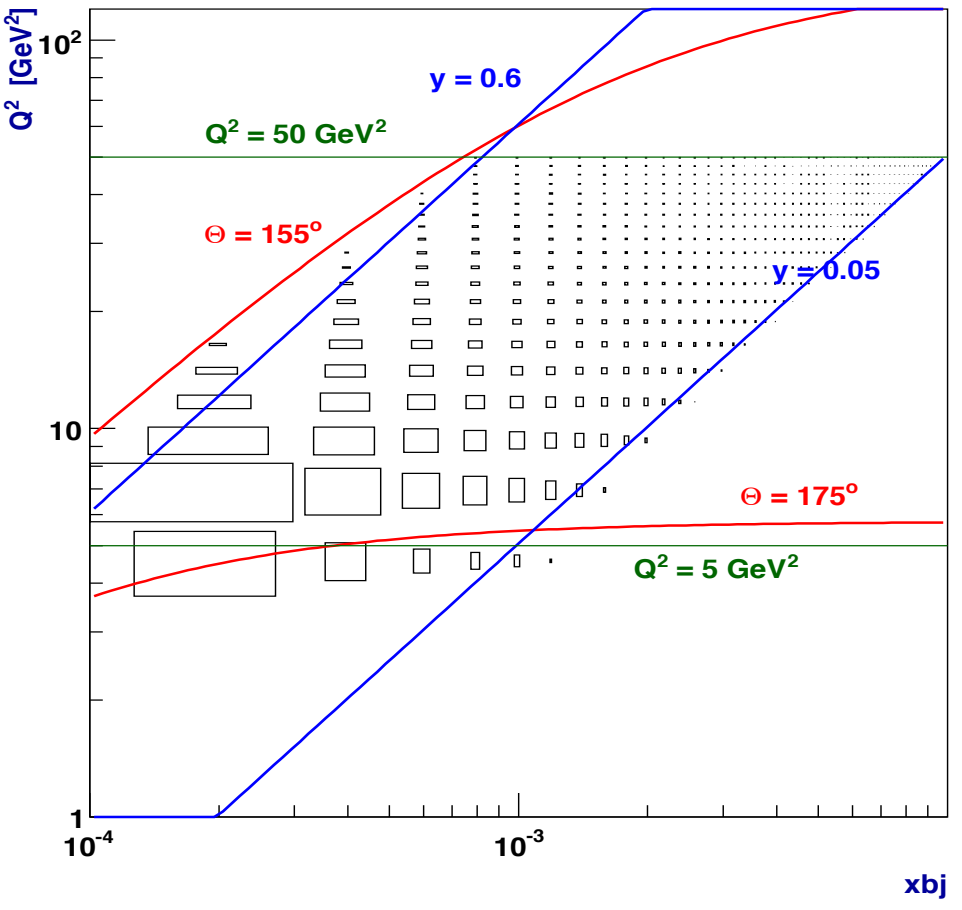
- Data 2006 for positron
- lumi $= 88.64\ \mathrm{pb}^{-1}$

DIS cuts :

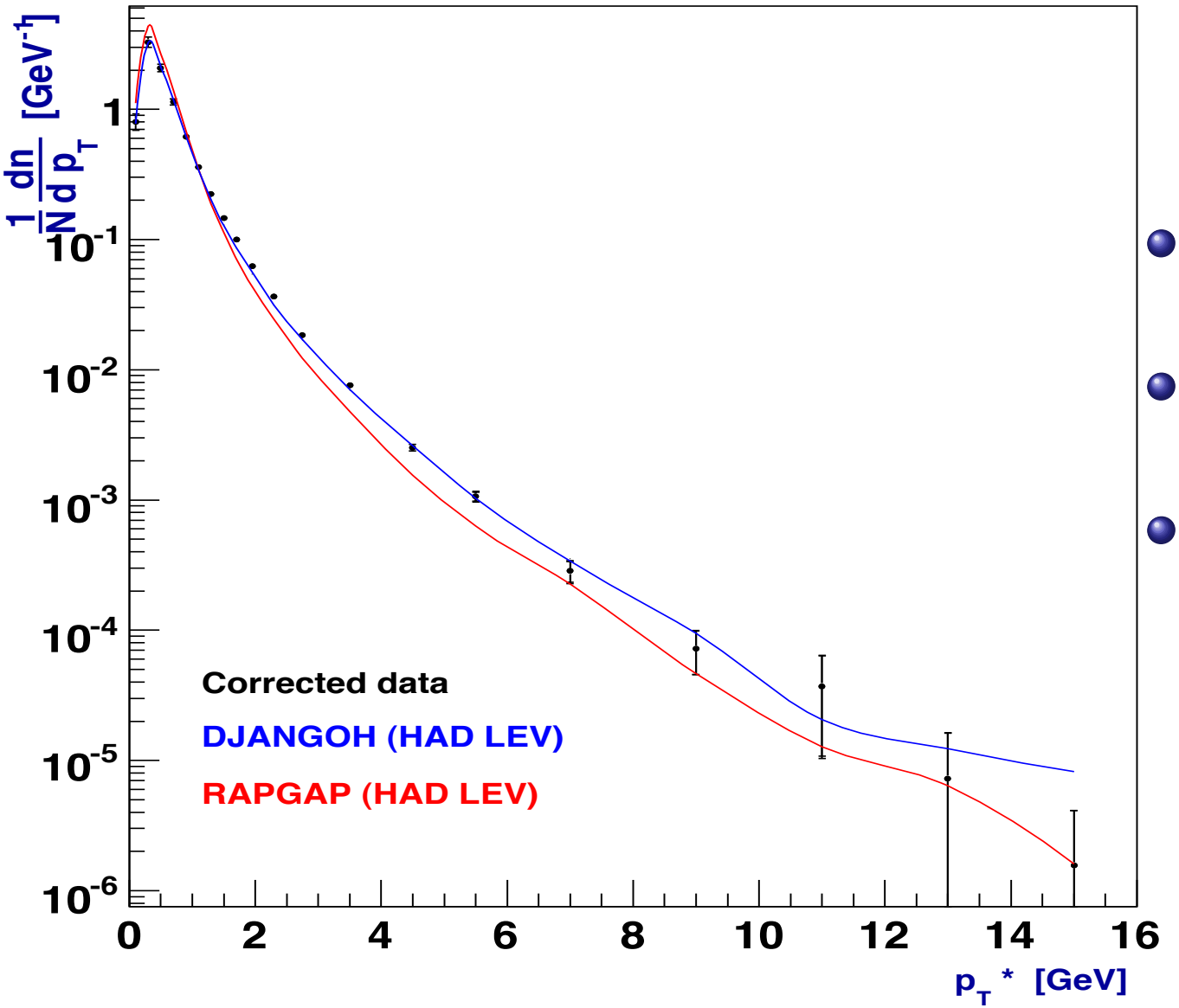
- $5 < Q^2 < 50\ \mathrm{GeV}^2$
- $0.05 < y < 0.6$
- $155^o < \Theta_e < 175^o$

Track selection:

- $p_T > 0.15\ \mathrm{GeV}$
- $20^o < \Theta < 155^o$



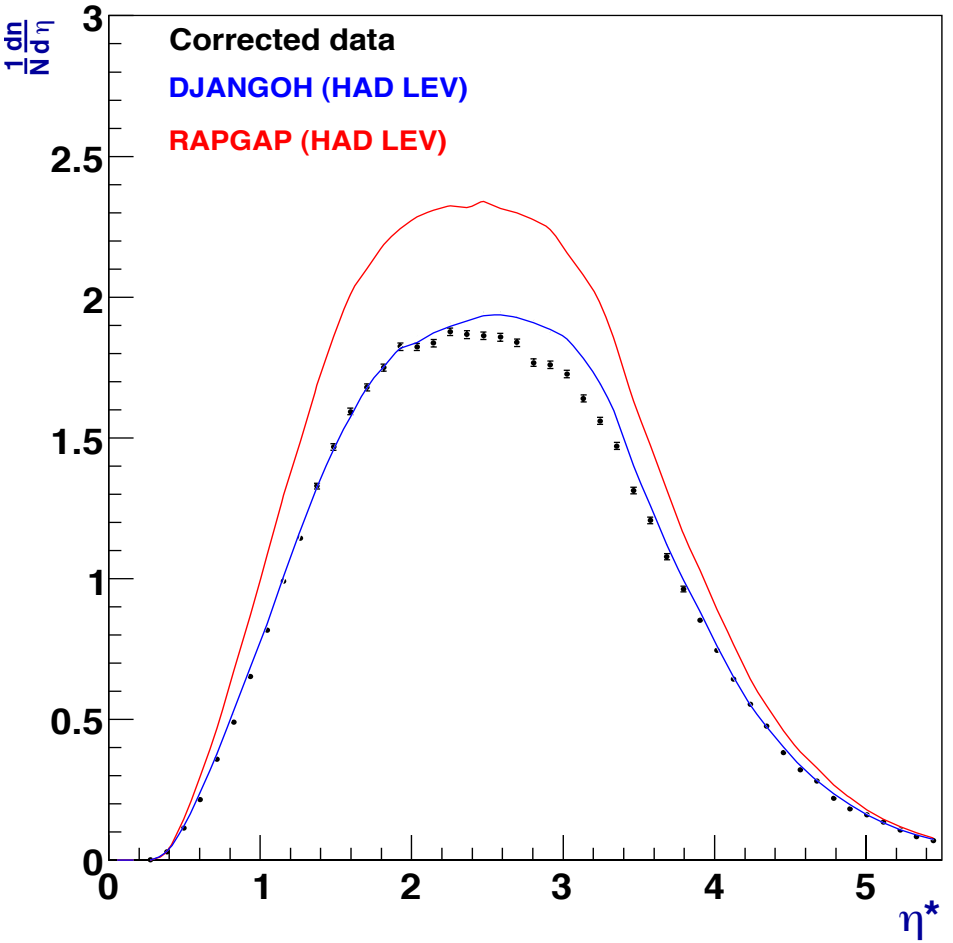
p_T spectra: DATA vs. DJANGOH/RAPGAP, $1.5 < \eta^* < 2.5$



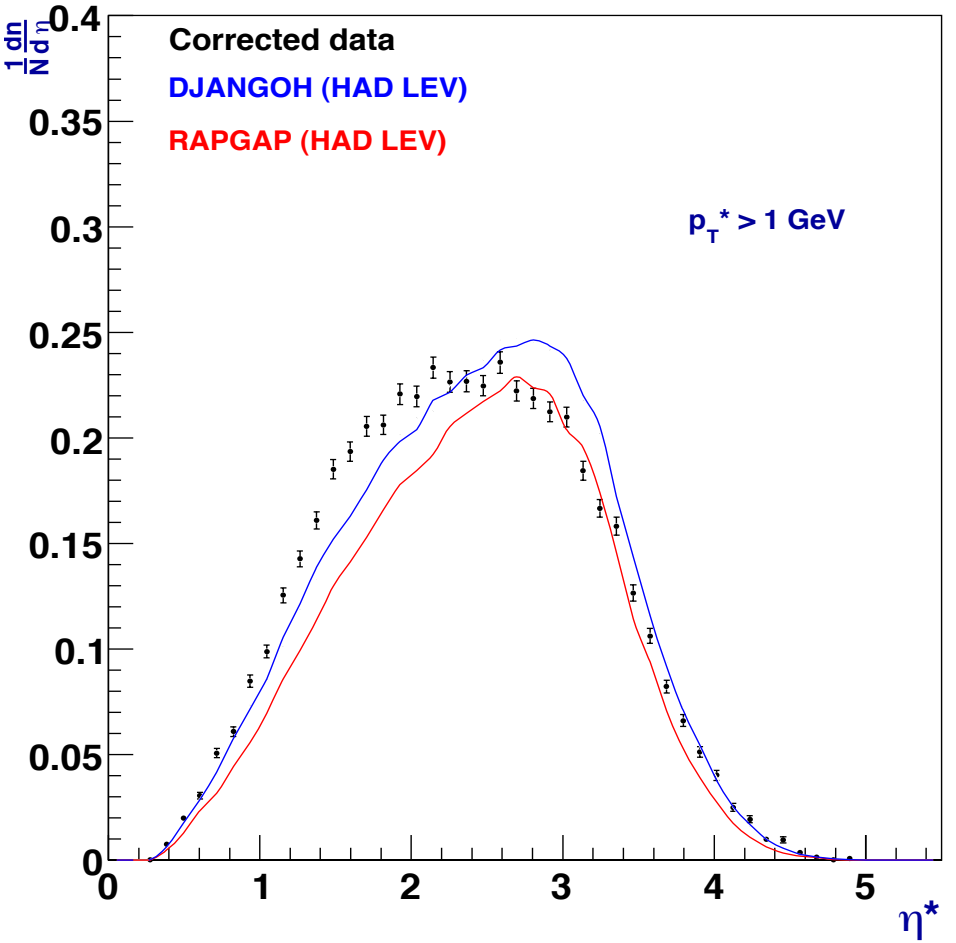
- $p*$ and η^* for the (γ^*, p) rest frame
- DJANGOH describes data for whole p_T spectra
- RAPGAP is above the data for $p_T < 1$ GeV and below the data for $p_T > 2$ GeV

η - distributions

All charged particles:



Charged particles with $p_T^* > 1$ GeV:



Professor tune

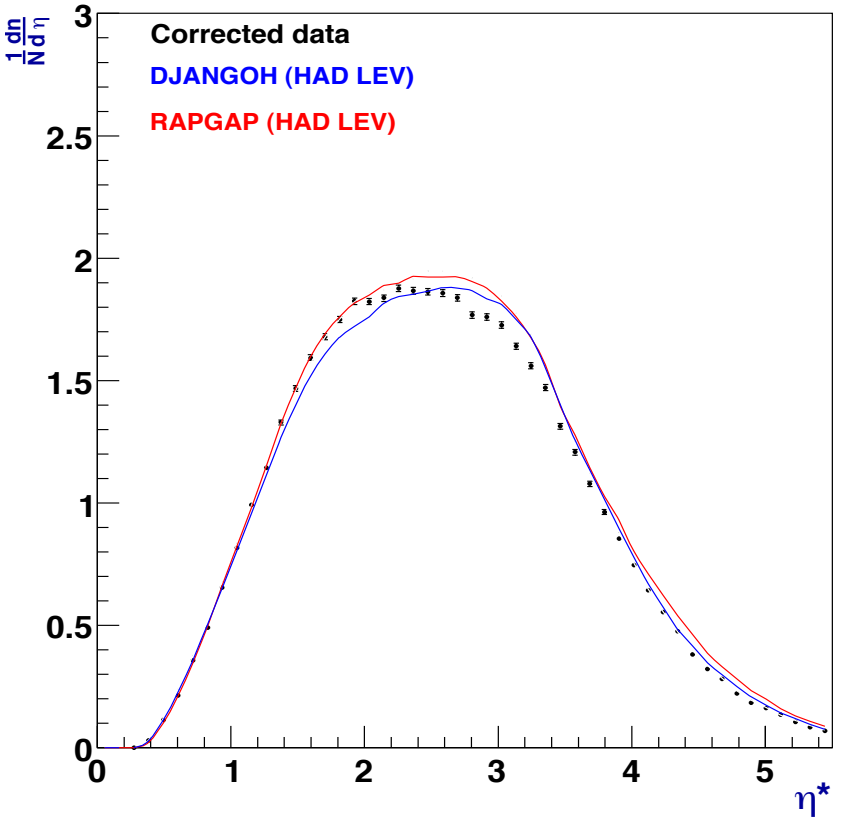
Production ranges:

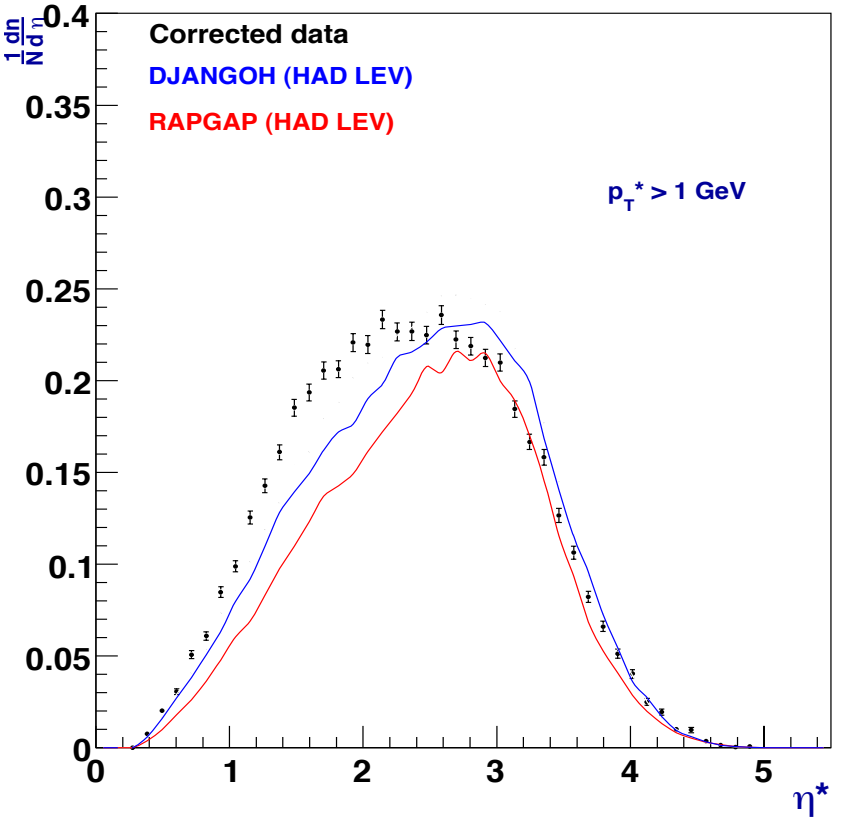
Parameter	range	
PARJ(21)	0.2 - 0.45	σ_q
PARJ(41)	0.1 - 1.8	a of the symmetric Lund fragmentation function
PARJ(42)	0.2 - 2.5	b of the symmetric Lund fragmentation function
PARJ(81)	0.2 - 0.3	Λ_{QCD} for parton shower
PARJ(82)	0.4 - 2.5	shower cut-off

Settings:

Parameter	default	tune	
MSTJ(11)	4	5	frag. function
PARJ(21)	0.36	0.13	σ_q
PARJ(41)	0.3	0.49	a of the symmetric Lund fragmentation function
PARJ(42)	0.58	1.2	b of the symmetric Lund fragmentation function
PARJ(81)	0.29	0.257	Λ_{QCD} for parton shower
PARJ(82)	1.	0.8	shower cut-off

η - distributions: PYTHIA tuning





	Prof-tune	Additional settings	
PARJ(81)	0.257	0.2	Λ value in running α_s for parton shower (only for RAPGAP)
PARJ(82)	0.8	2.5	parton shower cut-off (only for RAPGAP)