Fitting MC for H1 measurements of D^* mezon production

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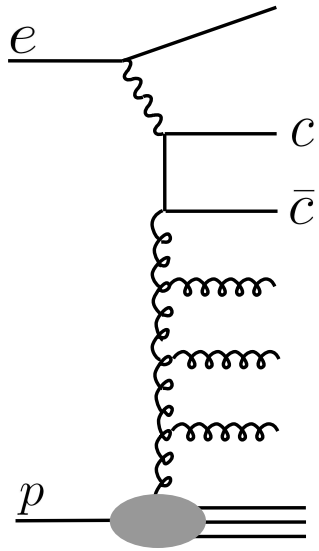
Januar 6, 2007

Process

- Boson-gluon fusion (BGF) in ep deep inelastic scattering (DIS)



- $D^{*+} \rightarrow D^0 \pi_s^+ \rightarrow K^- \pi^+ \pi_s^+$

Measurements

- HERA S. Schmidt, E. Tzamariudaki, G. Grindhammer, 'Production of $D^{*\pm}$ Mesons with Dijets in Deep-Inelastic Scattering.'

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- kinematic region
  - kinematic cuts:
    $$2 \leq Q^2 \leq 100\text{GeV}^2$$
    $$0.05 \leq y \leq 0.7$$
    $$1.5 \leq p_t^{D^*} \leq 15\text{GeV}$$
    $$|\eta_{D^*}| \leq 1.5$$
  - dijet selection:
    $$E_t^{jet1} \geq 4 \text{ GeV}$$
    $$E_t^{jet2} \geq 3 \text{ GeV}$$
    $$-1 \leq \eta_{jets} \leq 2.5$$

MC simulation

MC generator - CASCADE

- based on BGF
- CCFM evolution equation
- fragmentation option on
- parton shower

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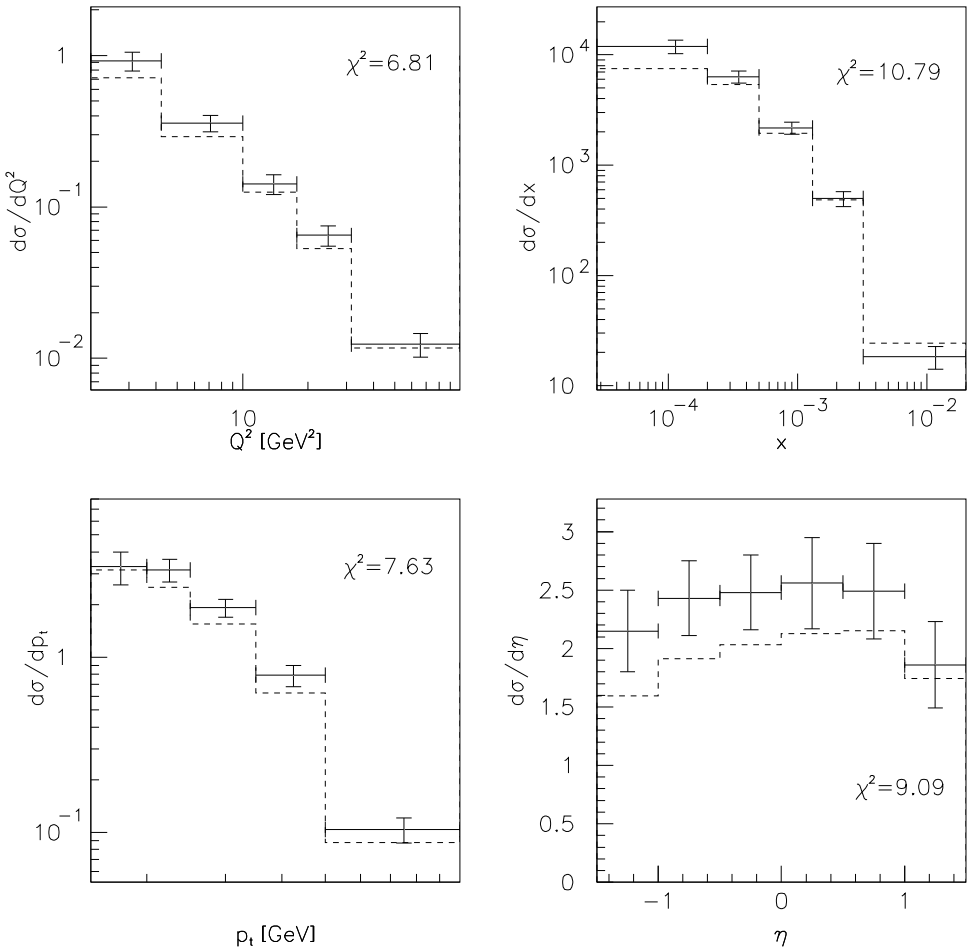
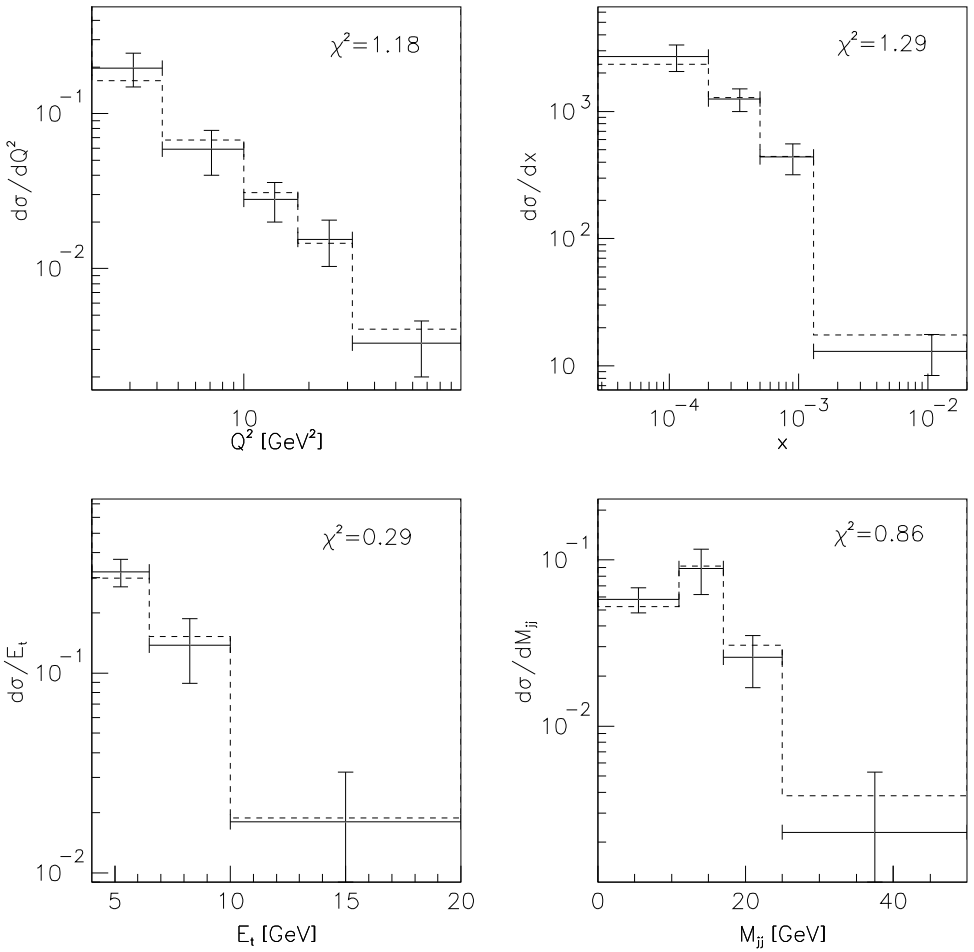
Inclusive differential cross section for D^* production



Differential cross section for D^* production in **two jet case**



How fitting works

1. choose variables which are used to fit
2. calculate χ^2 for each variable
3. add achieved χ^2
4. minimalise this value

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Fitting with normalisation

Fitting MC to data using as a parameter normalisation of achieved CASCADE histograms

- it shows if there is a shift between MC and data

Fitting with normalisation

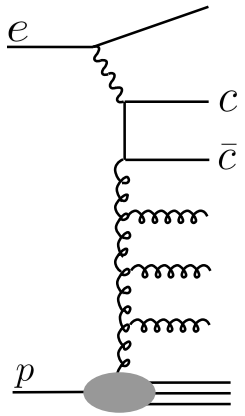
histogram	χ^2 $norm = 1$	χ^2 $norm = 1.11$
$d\sigma/dQ^2$	6.81	2.02
$d\sigma/dp_t$	7.63	2.40
$d\sigma/dx$	10.79	8.79
$d\sigma/d\eta$	9.09	3.01
$d\sigma/dQ^2$ dijet	1.18	2.27
$d\sigma/dx$ dijet	1.29	2.63
$d\sigma/dE_t$ dijet	0.29	0.47
$d\sigma/dM_{jj}$ dijet	0.86	1.44

Initial gluon distribution

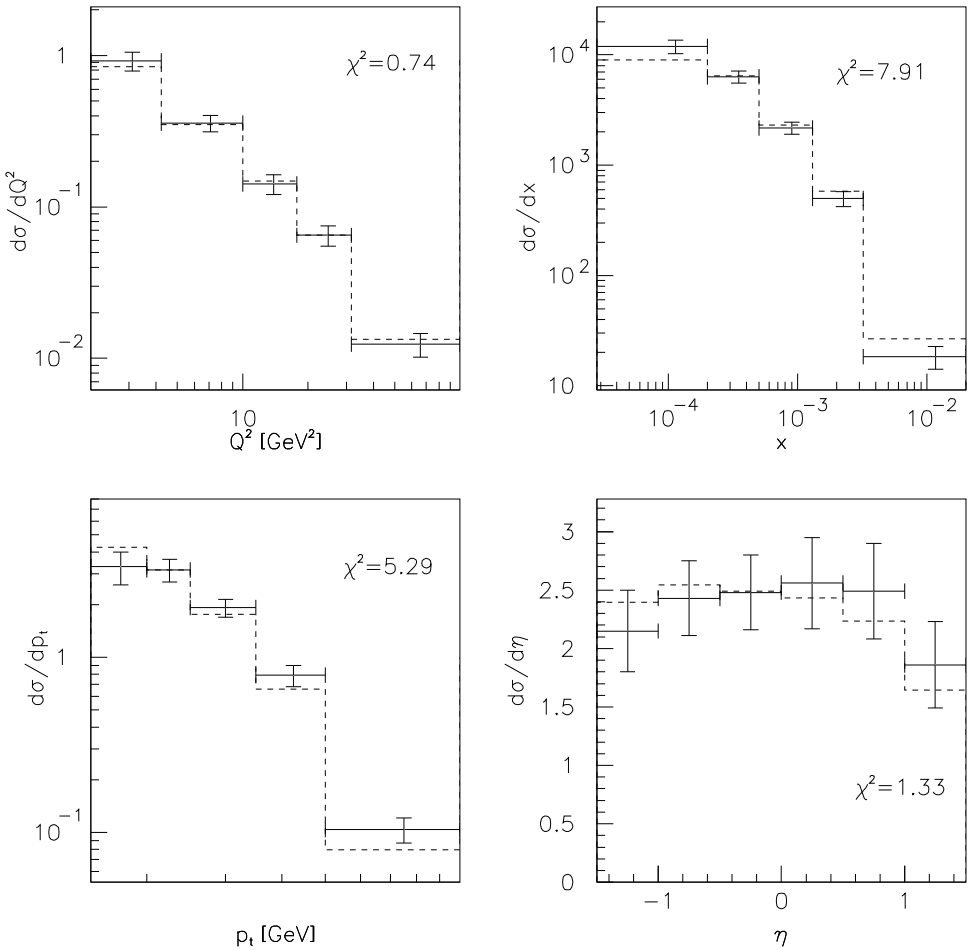
Fitting parameters - parameters of initial gluon distribution function

$$A_0 = N x^{-pow1}(1-x)^{pow2}$$

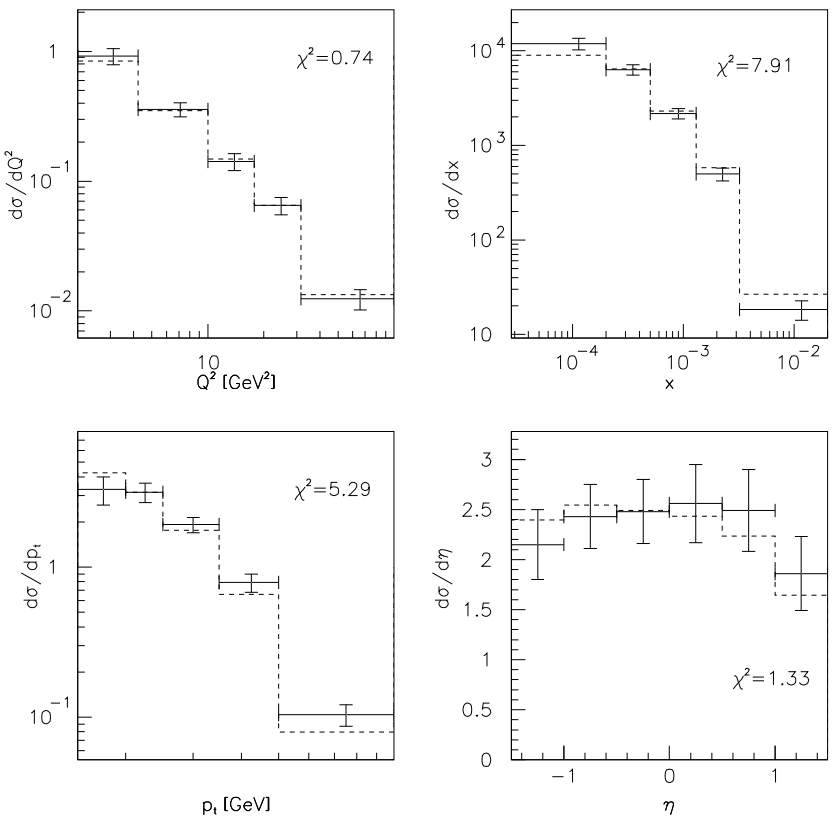
- N
- $pow1$
- $pow2$ - not important for small x



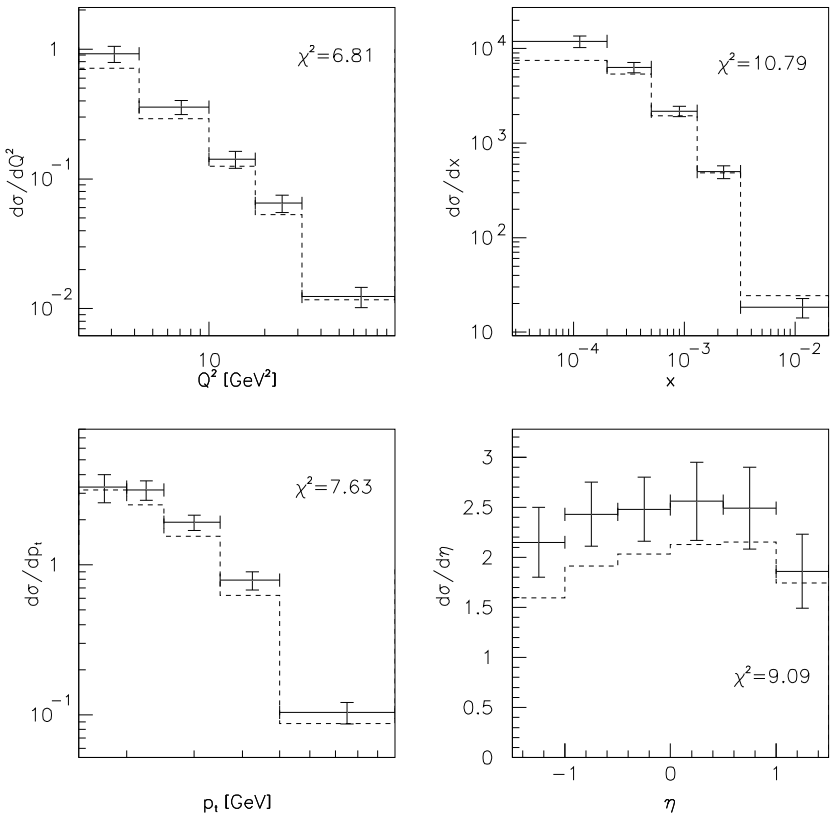
Fitting with the parameters of initial gluon distribution



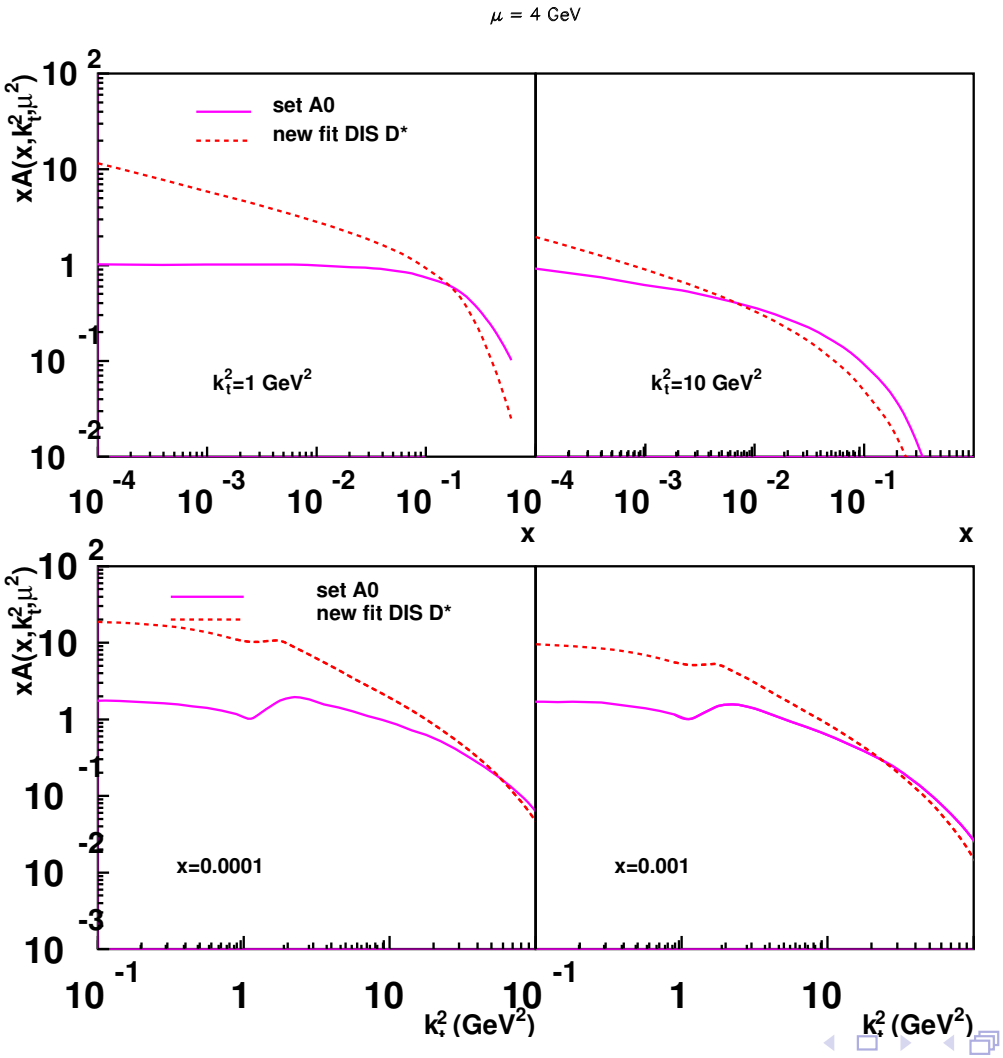
fitting



Cascade



Gluon densities before and after fitting procedure



Summary

How the fitting procedure improves the MC predictions?

	CASCADE	fitting with parameters of gluon density
χ^2/ndf	1.48	0.92

Obtained cross sections are not sensitive for changing gluon distribution in region of small x.