Unintegrated Gluon Densities in Heavy Flavour Production:
Comparisons of Tevatron Data and CASCADE Predictions

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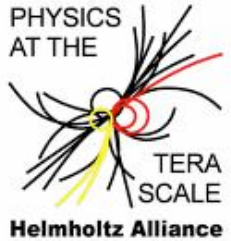
26.01.2010



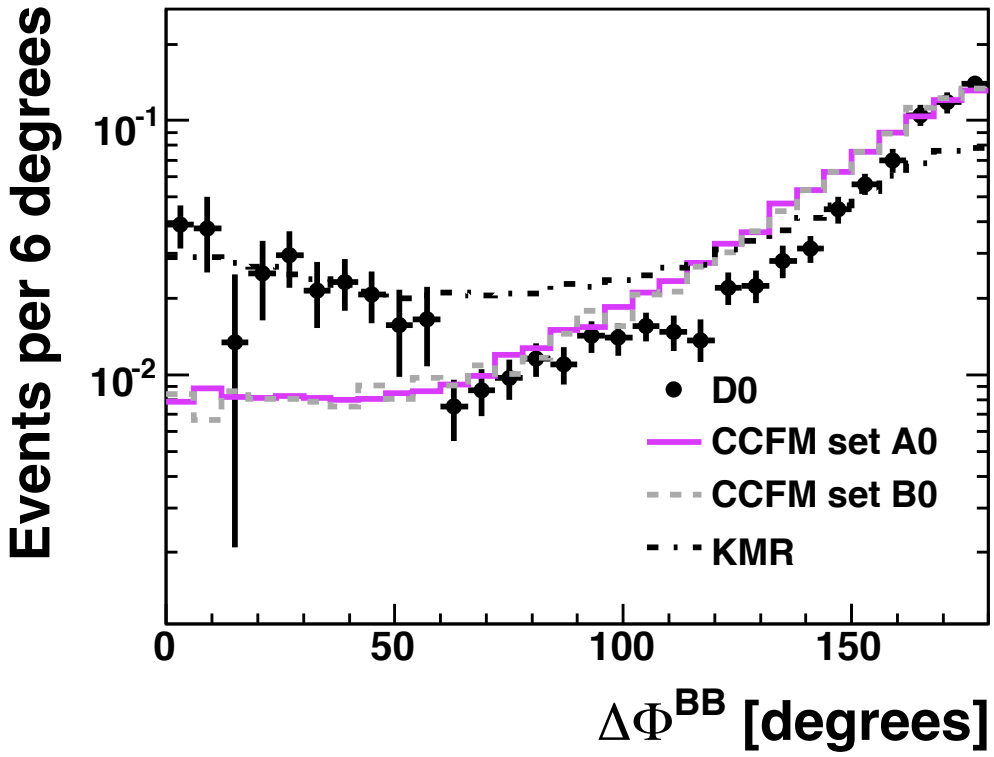
Introduction

- Compare Tevatron beauty and charm analyses with CASCADE
- CCFM for non-collinear gluon evolution in the proton
- Used different unintegrated gluon densities: set A0, set B0 and KMR
  - A0 and B0 obtained from CCFM evolution equations
  - KMR: Kimber-Martin-Ryskin prescription, no resum. of small x logs
- Peterson Fragmentation Function with $\epsilon_c = 0.06, \quad \epsilon_b = 0.006$
- Scale: $\mu^2 = m^2 + p_{t,q}^2$
- Quark masses: $m_c = 1.5\mathrm{GeV}, \quad m_b = 4.75\mathrm{GeV}$
- Technical reasons: used different (and not yet enough) statistics

Beauty Tevatron Analysis I

hep-ex/0412006v2

- bbbar measurement at Tevatron CDF Run Ib
- Event Sample: at least one muon or electron with $p_T > 8\mathrm{GeV}$
- Identification: large lifetime of B Hadrons



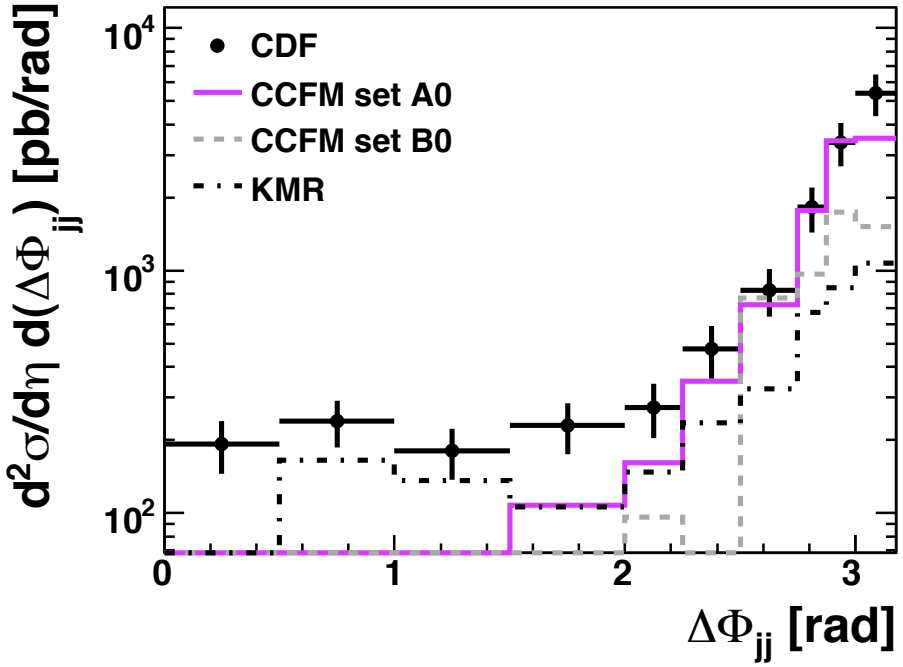
- Sensitive to higher order contributions
- gluon splitting, flavour excitation
- very different predictions of A0, B0, KMR

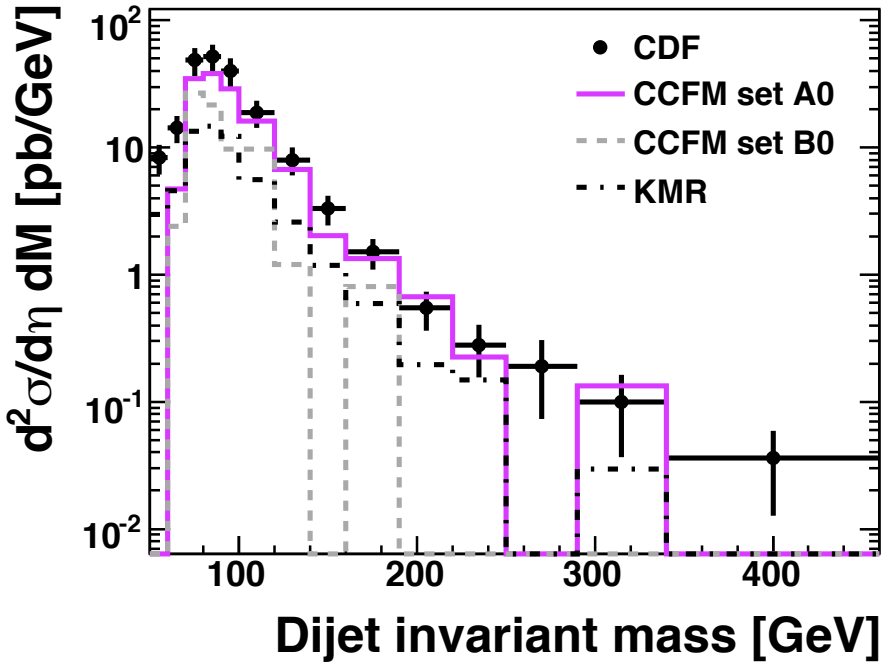
Beauty Tevatron Analysis II

PhD Thesis: S. Vallecorsa, University of Geneva

$$|\eta_{1,2}| < 1.2, \quad E_{T,1} > 35\mathrm{GeV}, \quad E_{T,2} > 32\mathrm{GeV}$$

- bbbar dijet cross sections, CDF Run II
- Identification: large lifetime of B Hadrons
- too low stat., but tendency of set A0 to provide best prediction





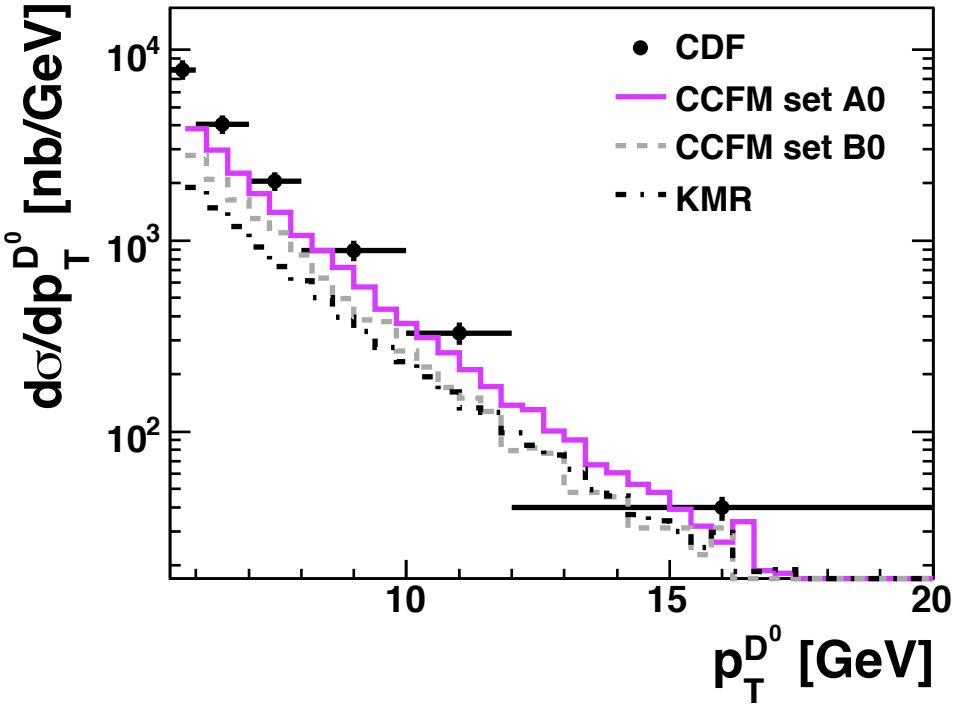
Charm Tevatron Analysis I

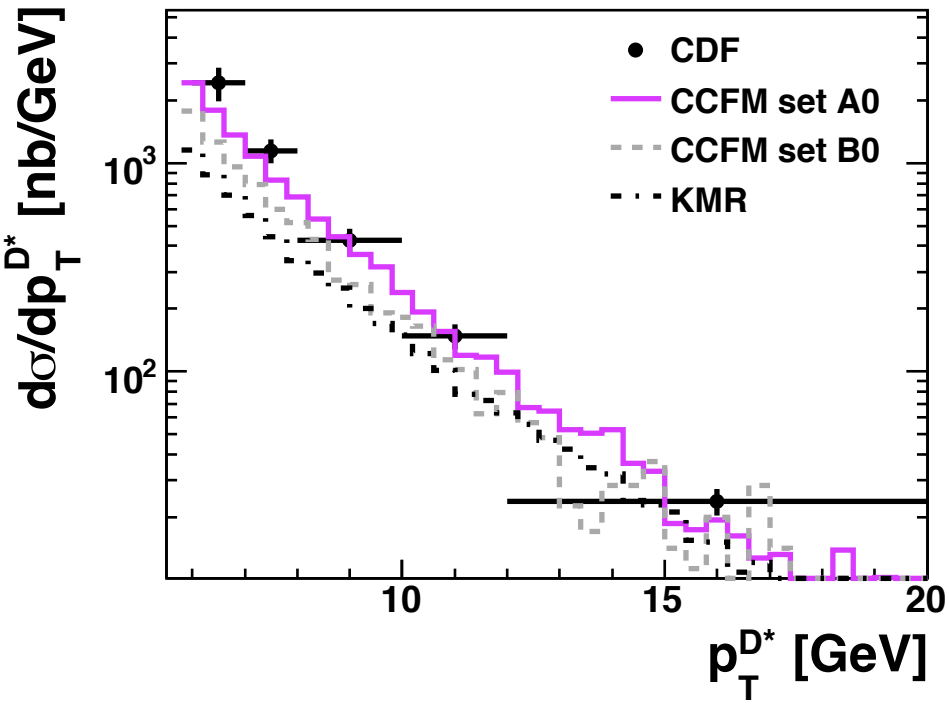
hep-ex/0307080v2

$$|y| \leq 1$$

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

- Tevatron CDF Run II
- Identification: long lifetime
- similar shape for A0, B0, KMR





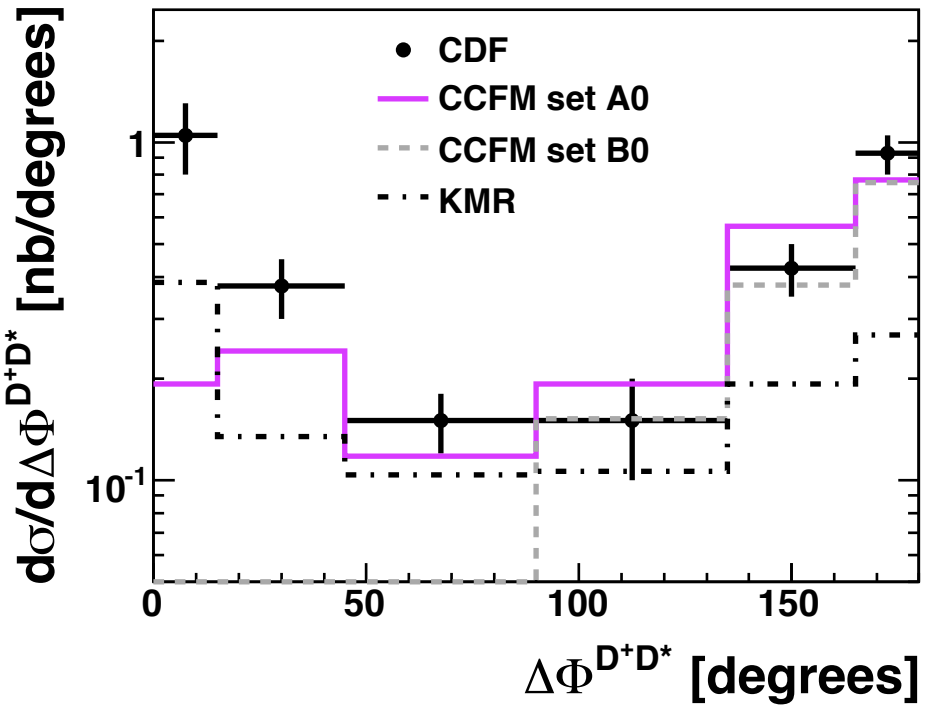
Charm Tevatron Analysis II

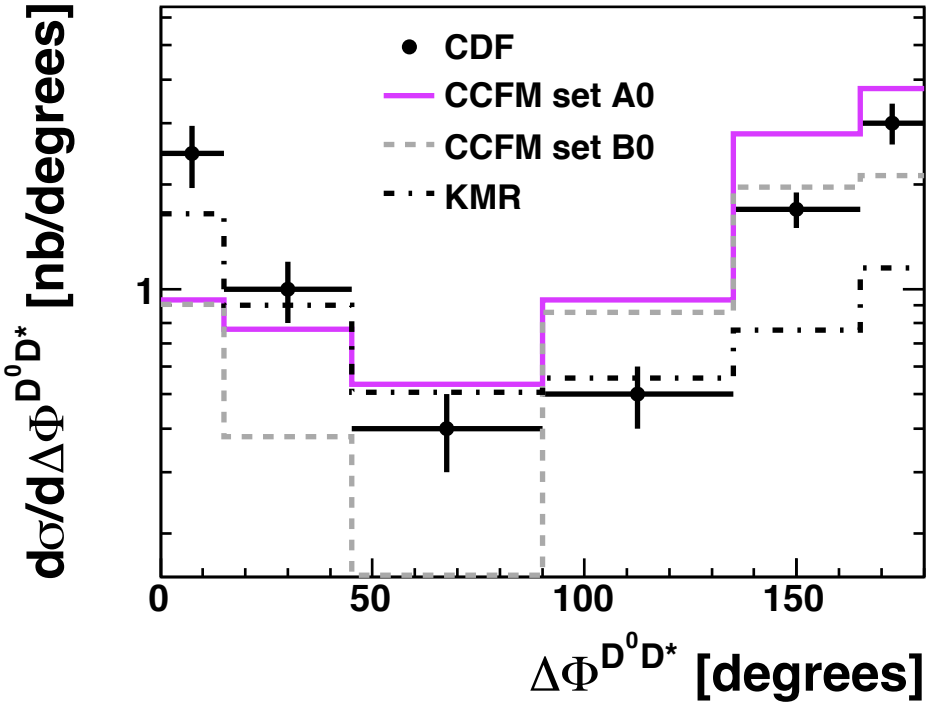
arXiv : 0711.4375v1

$$|y^{D^0}| < 1, \quad 5.5\text{GeV} < p_T^{D^0} < 20\text{GeV}$$
$$|y^{D^*}| < 1, \quad 5.5\text{GeV} < p_T^{D^*} < 20\text{GeV}$$

- sensitive to non-collinear gluon ev. in p
- KMR describes data best at low $\Delta\Phi$
- but: no final state radiation in cascade

CDF Run II





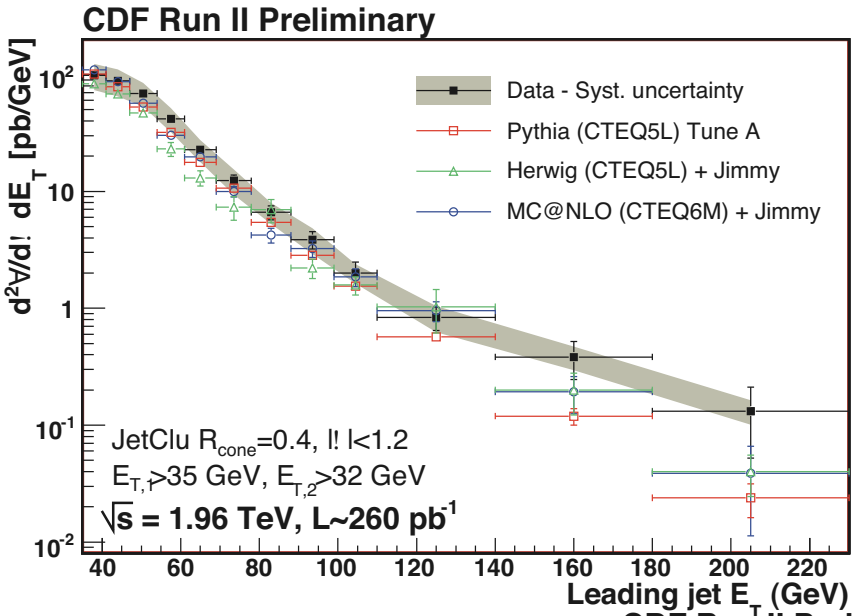
Summary and Outlook

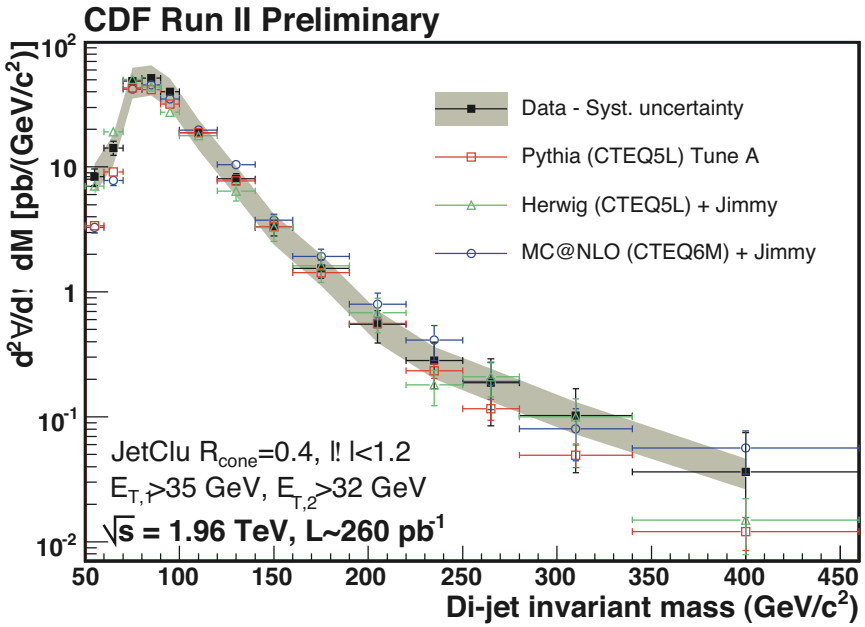
- Summary:
  - presented CASCADE predictions for some charm and beauty Tevatron analyses
  - differences of unintegrated gluon densities clearly visible in variables sensitive to higher order contributions
  - ➡ better fits of unintegrated gluon densities in a proton necessary
- Outlook:
  - try to improve description
  - solve technical problem -> higher statistics
  - study systematic uncertainties

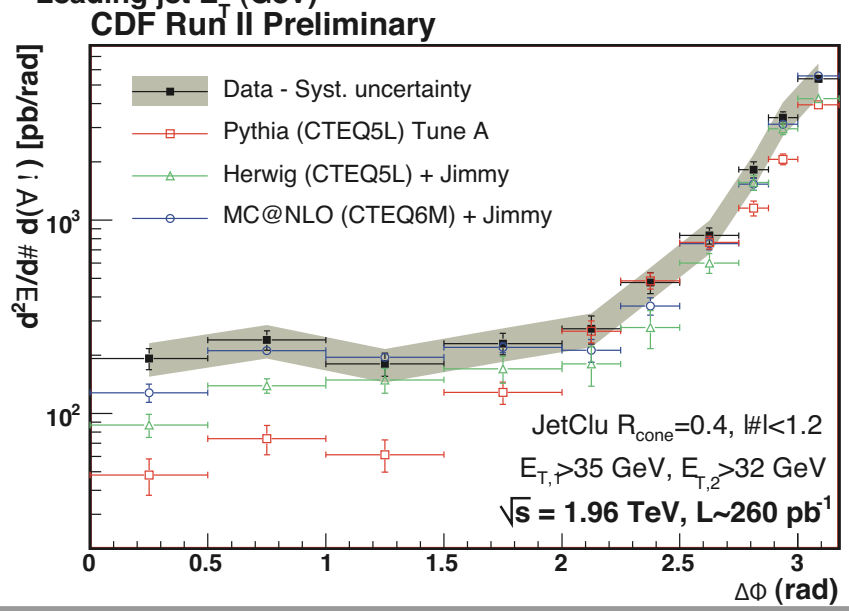
Backup

Beauty Tevatron Analyses

PhD Thesis: S. Vallecorsa, University of Geneva







Charm Tevatron Analyses

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