D* in photoproduction in HER, MER, LER

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Outline

- Data samples and cuts
- D* distribution
- Control plots without acceptance corrections
- σ_{total} without corrections
- Matching and reweighting procedure
- η reweighting
- η and p_t reweighting
- σ_{total} after corrections

Motivation

◆ To study kinematic parameters behavior dependence on center-of-mass energy

◆ To calculate cross sections and compare them (ideally we hope to expect equal σ_{total} for all energy ranges)

◆ To study reweighting influence on variables distribution and cross-sections

Data samples, cuts

v04b Common Ntuples data 0607p with following luminocities:
145.9 pb^{-1}(HER), 7.77 pb^{-1}(MER), 13.18 pb^{-1}(LER)
v02f, v02e PYTHIA Inclusive Charm in Photoproduction Monte Carlo Sample (HER)
v05b PYTHIA Inclusive Charm in Photoproduction Monte Carlo Sample with D* filter for LER & MER (thanks to Volodymyr Nestorak)

Decay channels: $D^{*\pm} \rightarrow D0\pi_s^{\pm} \rightarrow (K\pi)\pi_s^{\pm}$

PHP selection:

No good SINISTRA electron with probability > 0.9 and E>5 GeV

Energies	W, GeV^2
HER	[130;285]
MER	[100;235]
LER	[85;205]

D* selection cuts:

- $|\eta(D^*,K,\pi,\pi_s)|<1.6$

- $1.9 \text{ GeV}<p_T(D^*)<20 \text{ GeV}$; $p_T(K,\pi)>0.4$; $p_T(\pi_s)>0.12$;

- $p_t/E_t > 0.12$;

- $1.83 \text{ GeV} < M(D^0) < 1.90 \text{ GeV}$

- Trigger chain: HFL01 (charm in PHP) || HFM01 (**D* -> Kππ**)

- For HER MC cut all events with no D* (to apply "D* filter" also for HER)

D* distribution

Data(HER):N(D*)=12557   Data(LER):N(D*)=941   Data(MER):N(D*)=505

MC(LER)

MC(MER)
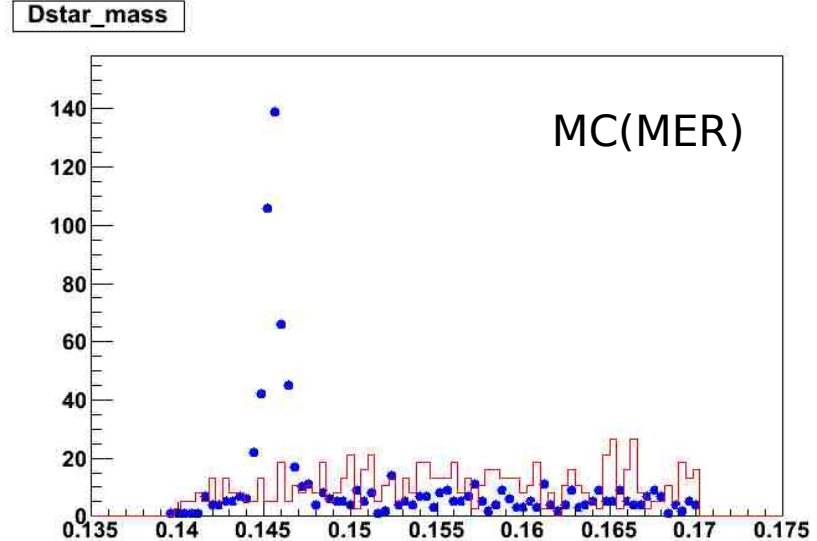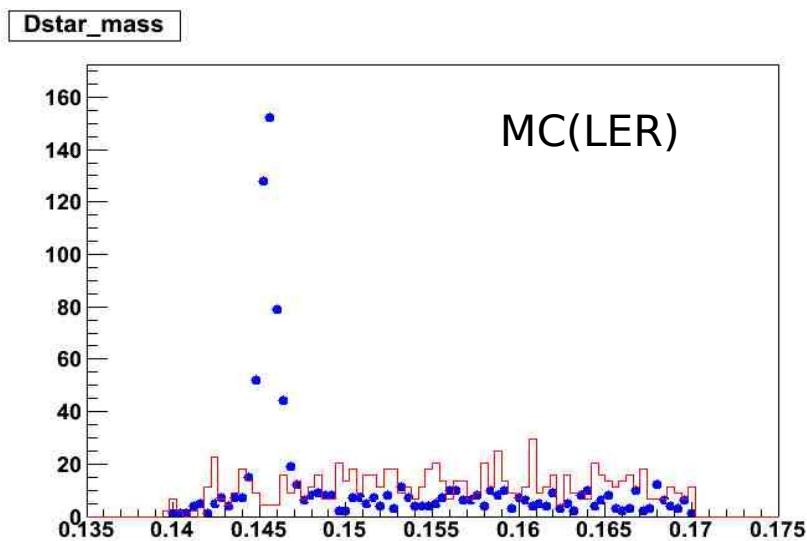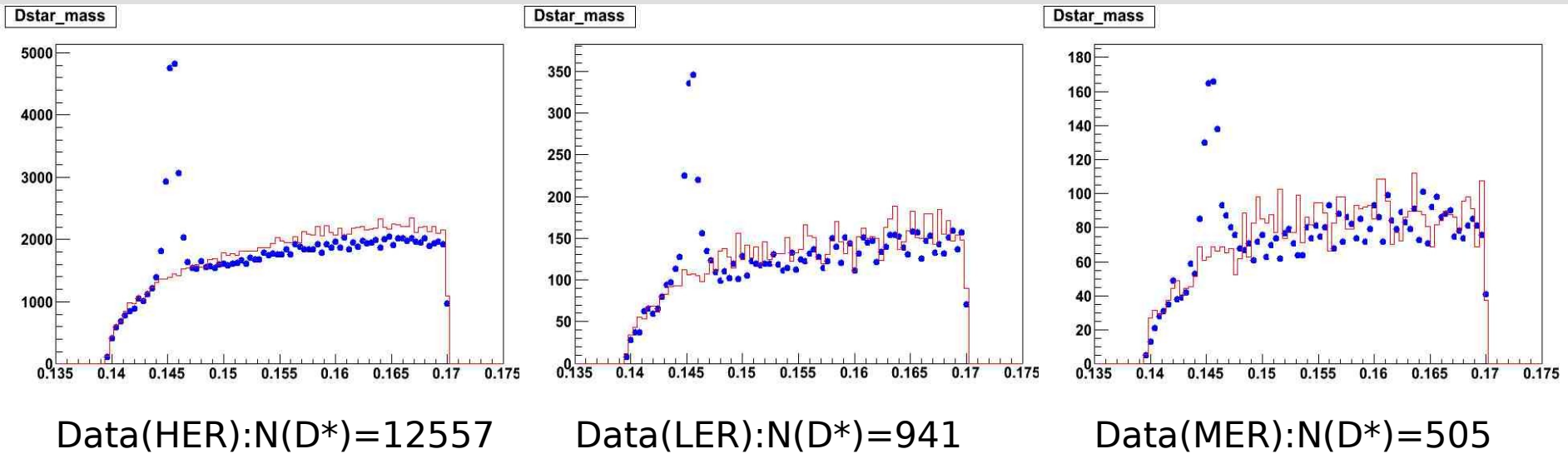
Only $p_T(\pi_s)$ corrections

Control plots in bins of η(D*)

η(D*) for HER

η(D*) for LER

η(D*) for MER

8
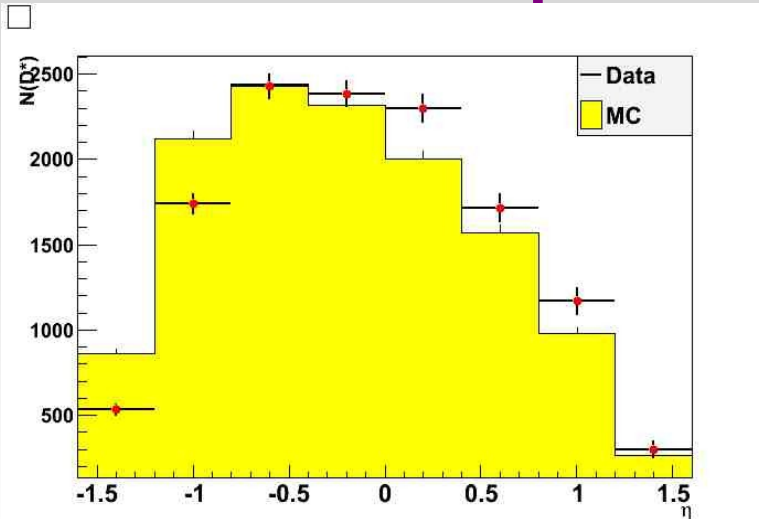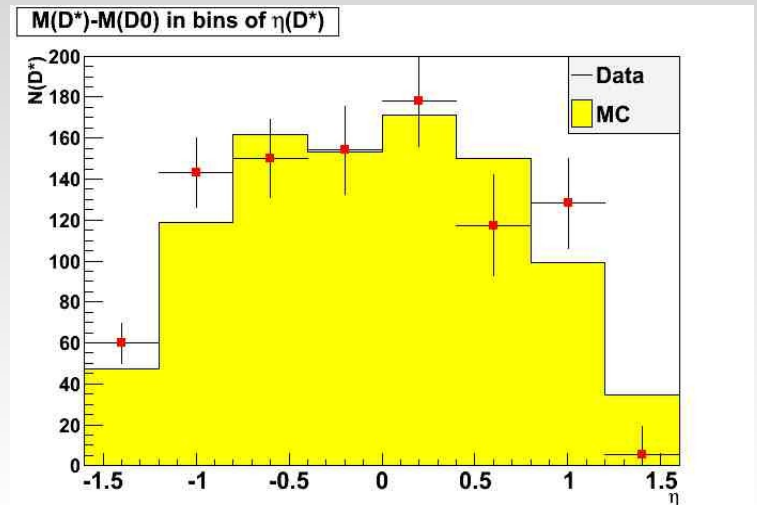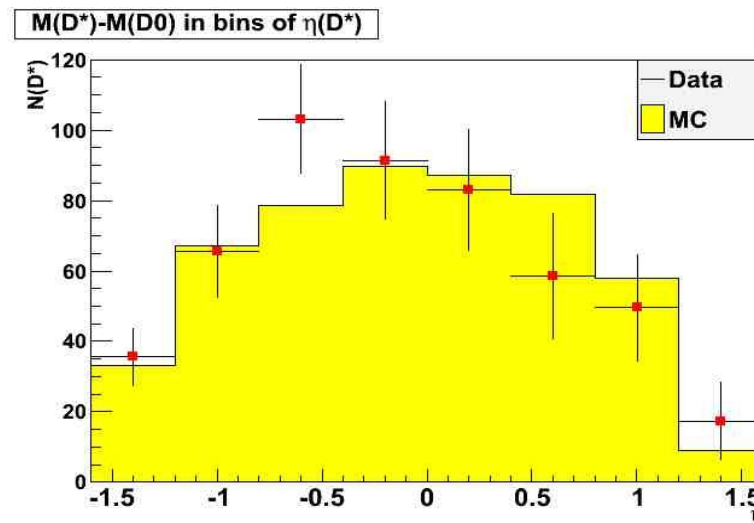
Control plots in bins of p_T (D*)
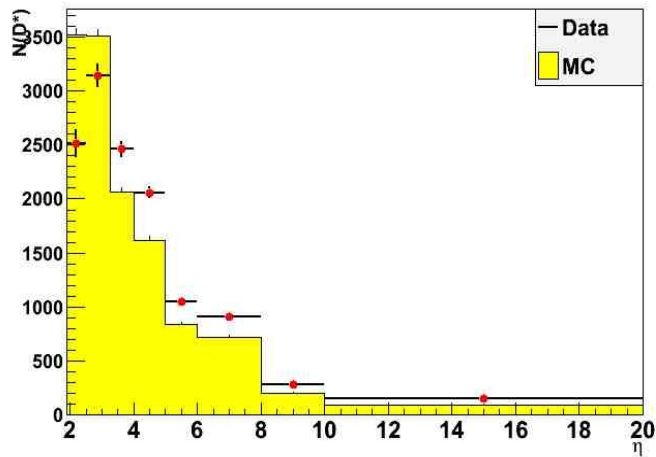
p_T(D*) for HER
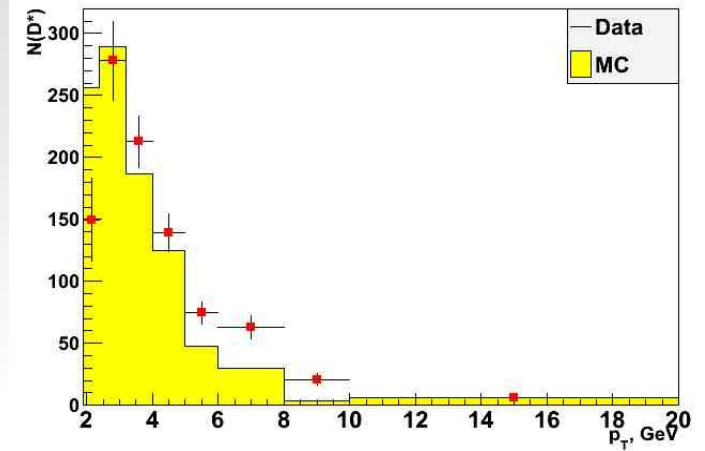
p_T(D*) for LER
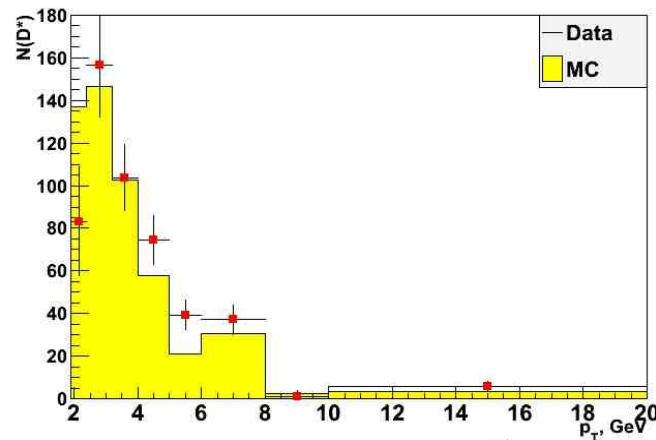
p_T(D*) for MER

Control plots in bins of W
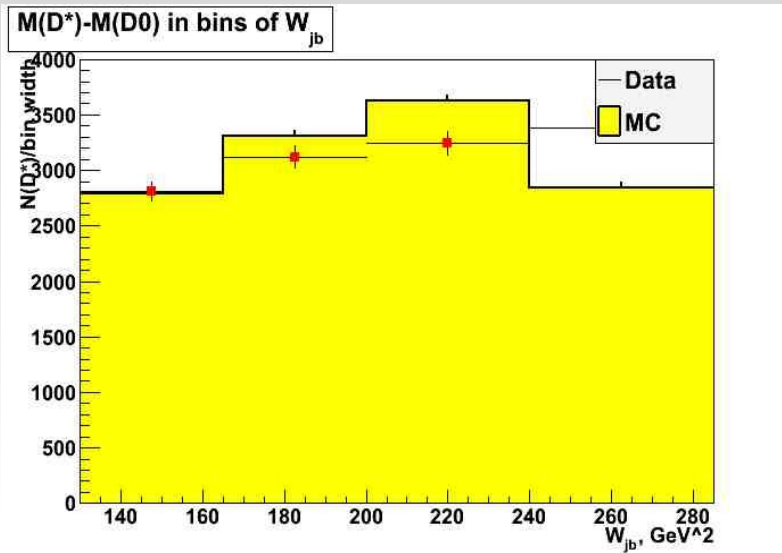
W for HER
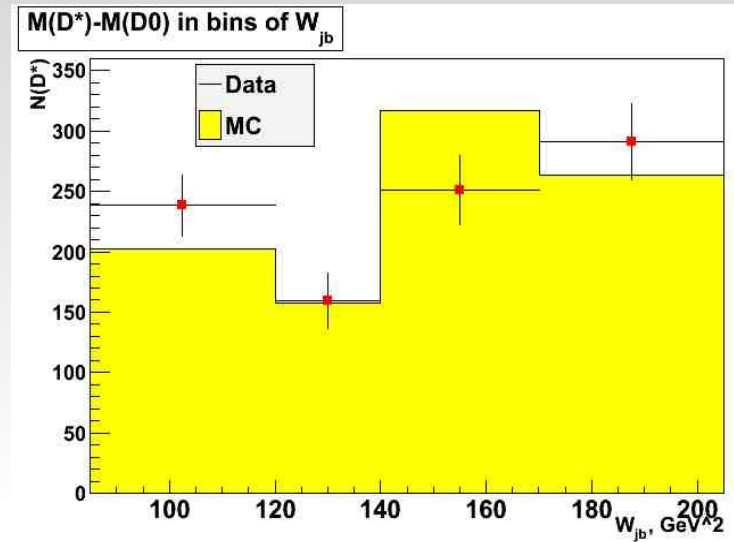
W for LER
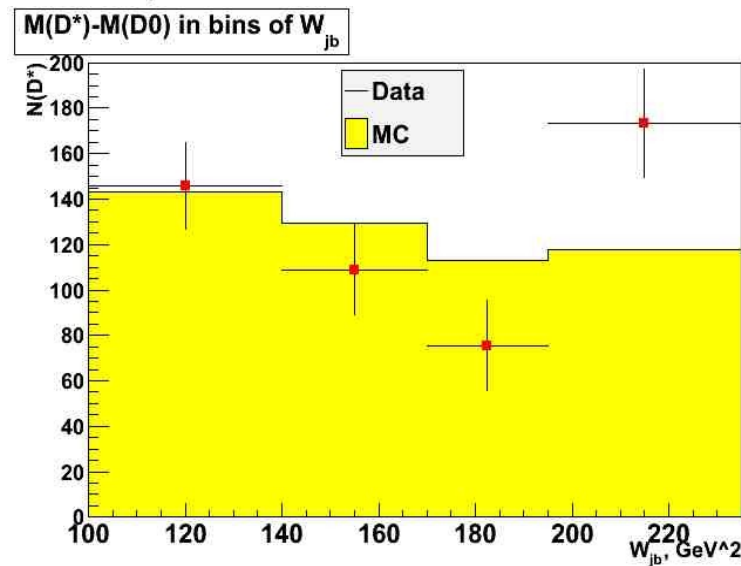
W for MER

Cross sections without acceptance corrections

0607p	HER	LER	MER
σ, in pb	26918 ± 251	27931 ± 1437	26013 ± 1504

Matching & reweighting

Kinematic matching conditions *:

$$\Delta R^2_{(K,\pi)} = (\Delta\varphi)^2 + (\Delta\eta)^2 \quad \Delta R^2_{\pi s} = (\Delta\varphi/0.14)^2 + (\Delta\eta/0.22)^2$$

$$\Delta R_{(K,\pi)} < 0.034 \,\&\&\, \Delta R_{\pi s} < 0.3$$

- Use bin-by-bin reweighting:

$$f_i = N_i^{Data}/N_i^{MC}$$

- Use reweighting only for matched reconstructed D*

  * Different kinds of matching and reweighting were analyzed by Andrii Salii, HFL, 27.04.2011

Use η reweighting

Control plots for LER
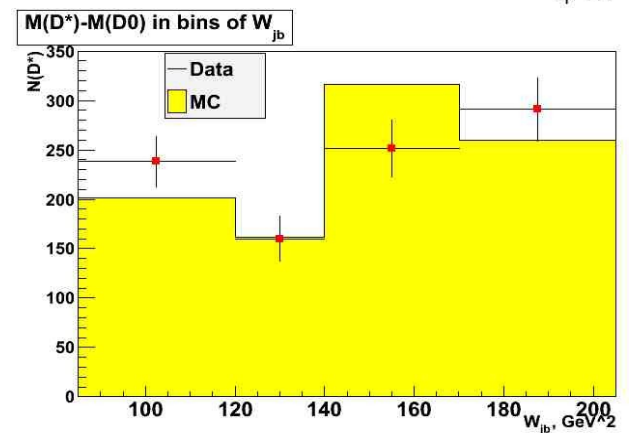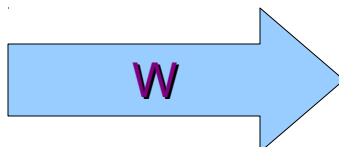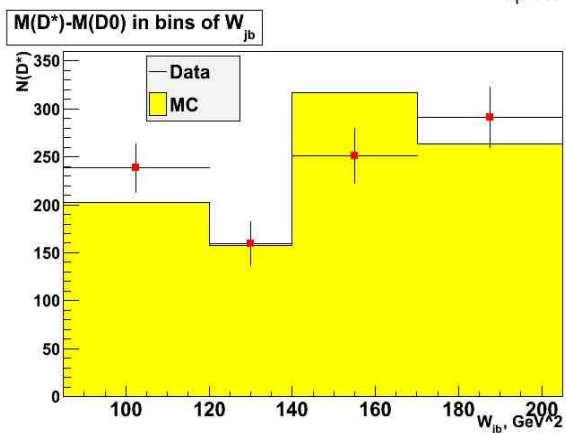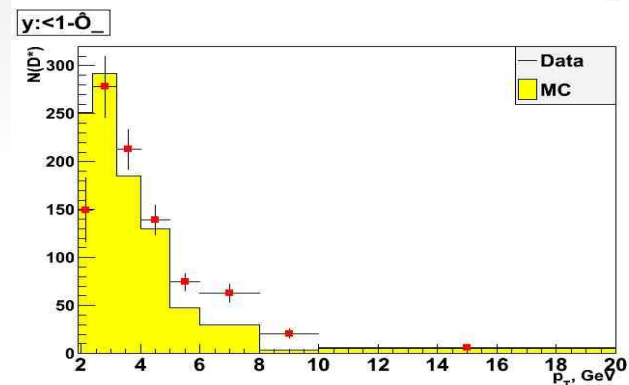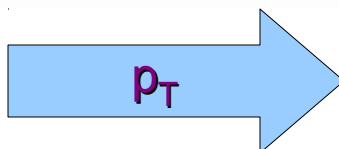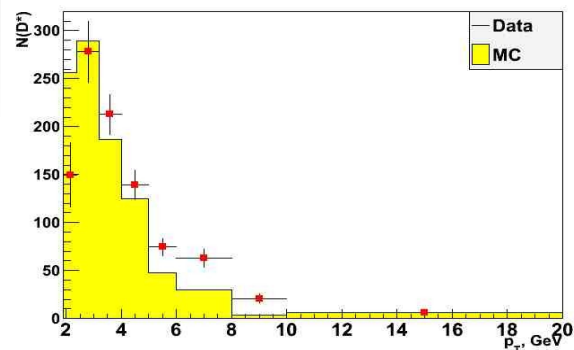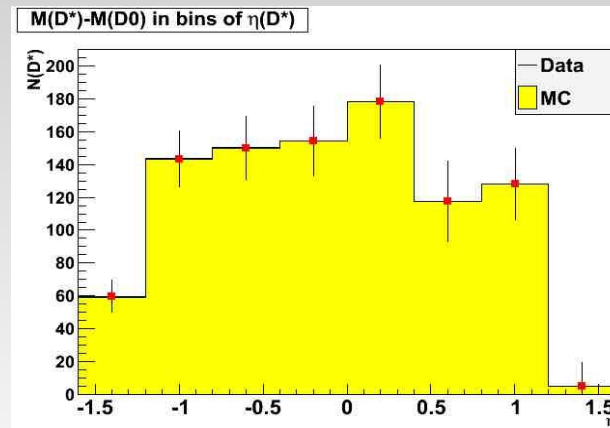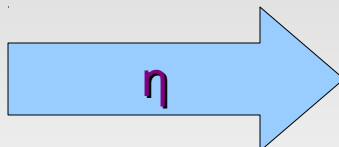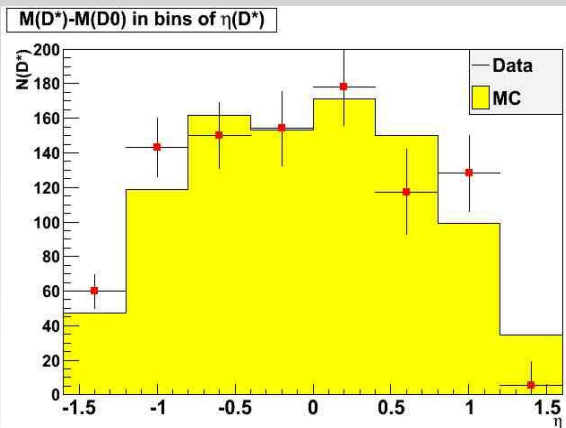
Control plots for MER
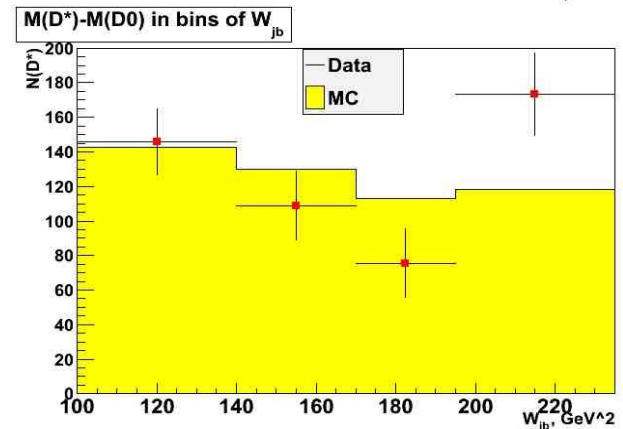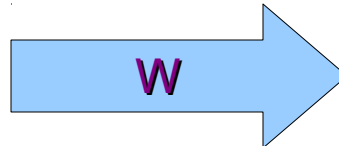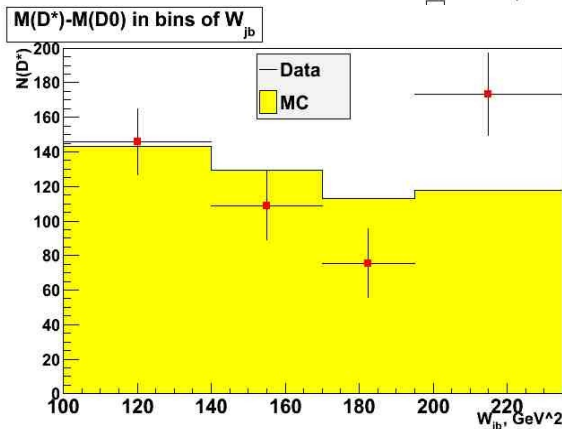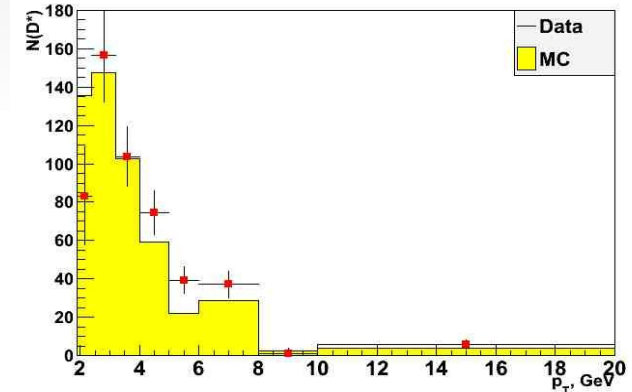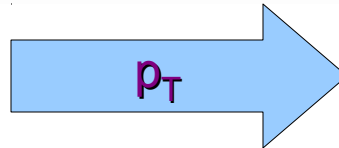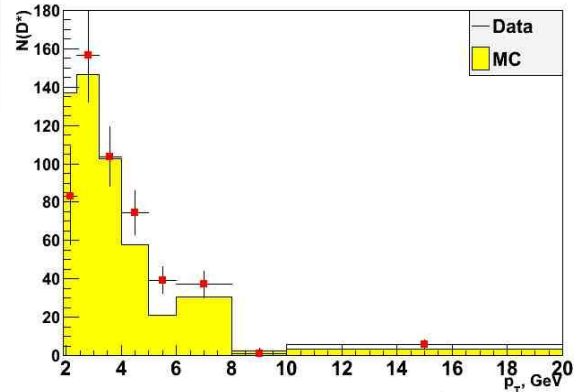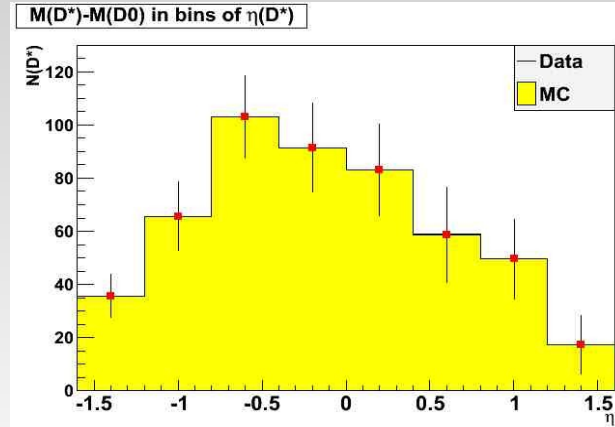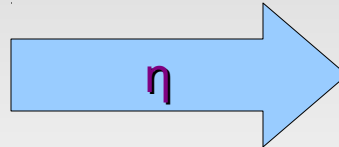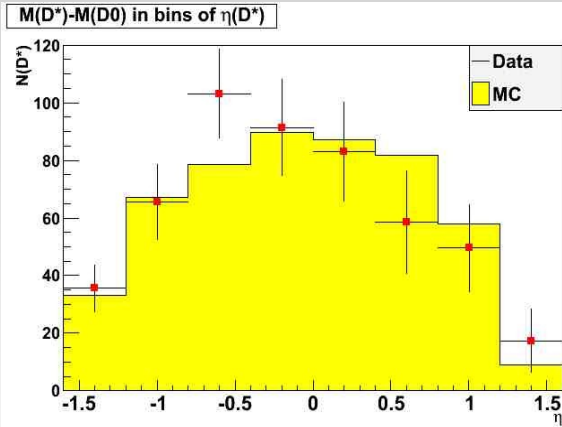
Control plots for HER
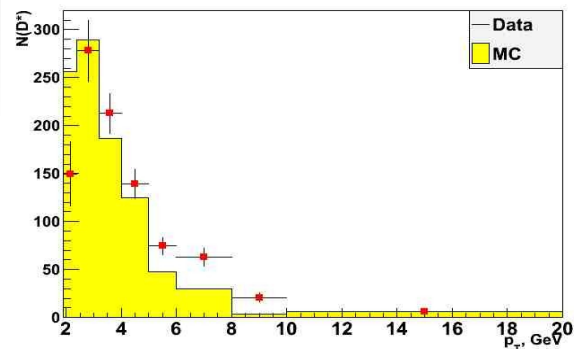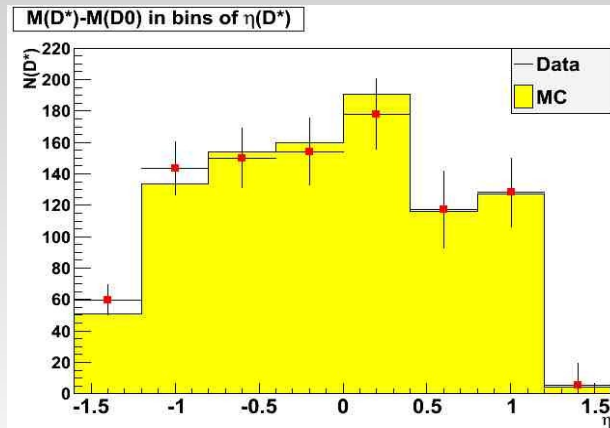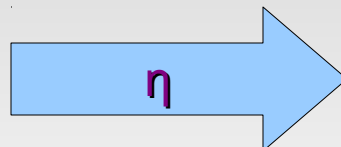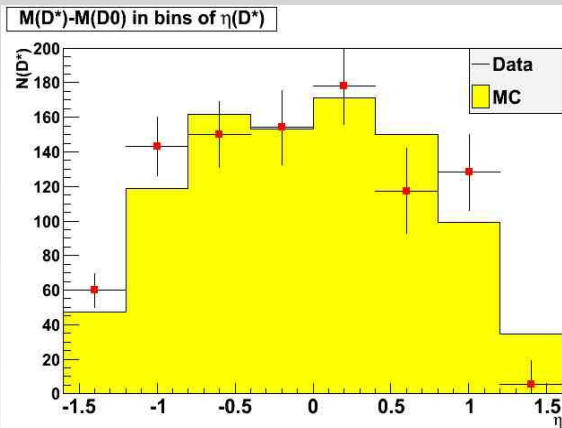

η

p_T

W
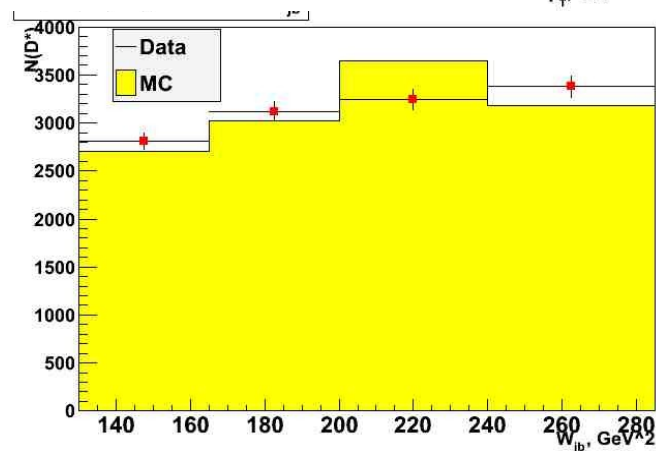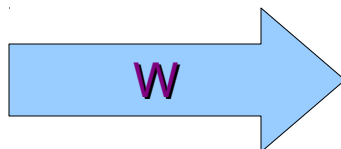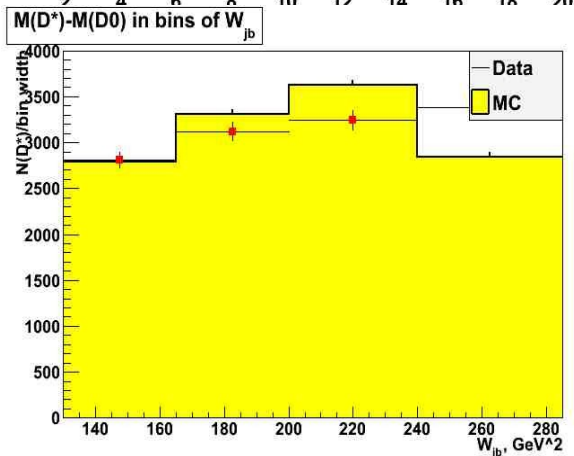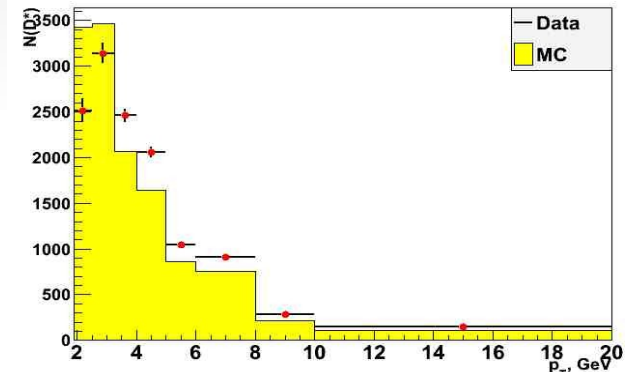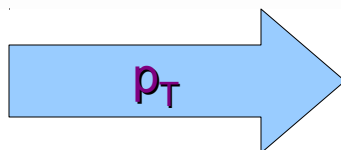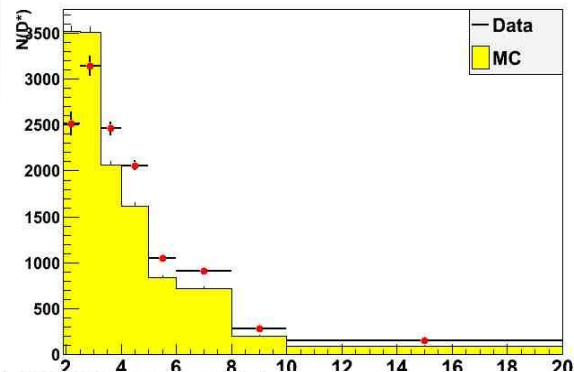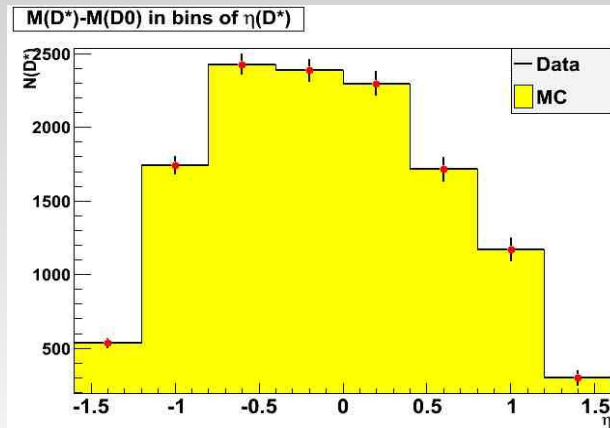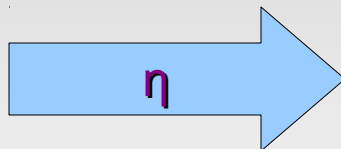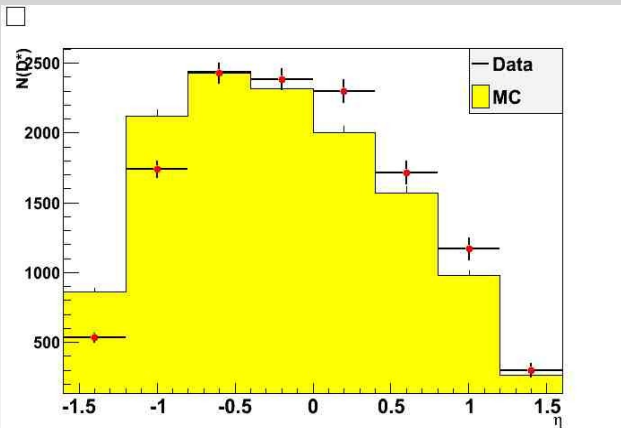
Use p_T & η reweighting

Control plots for MER
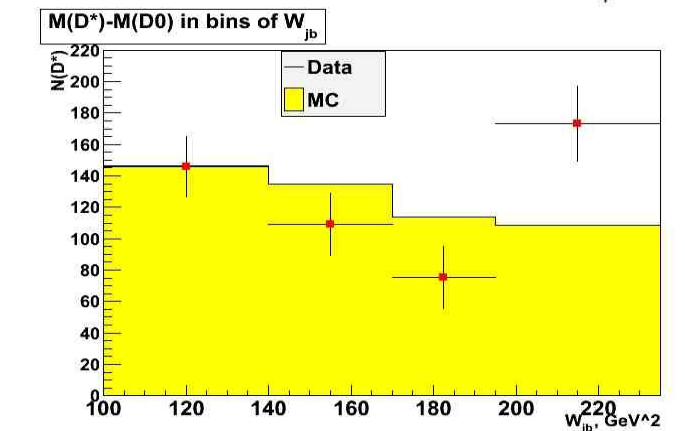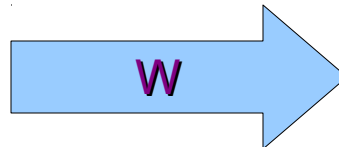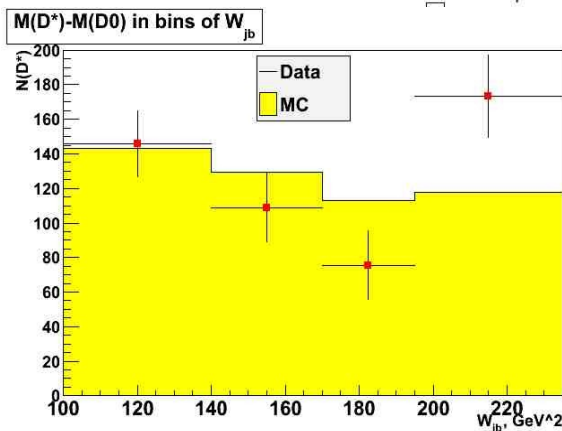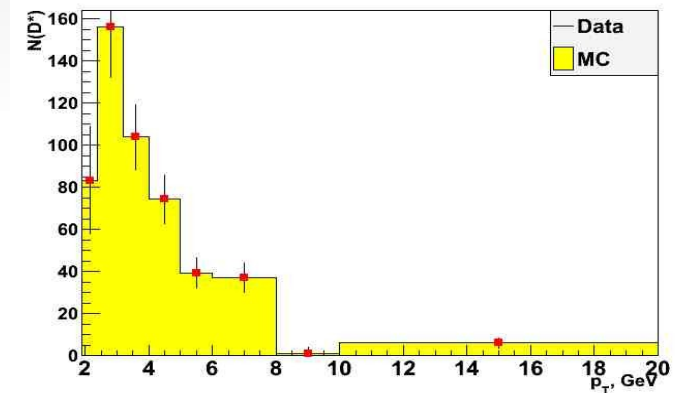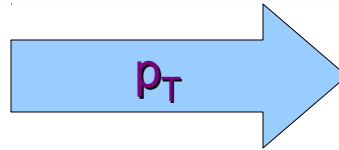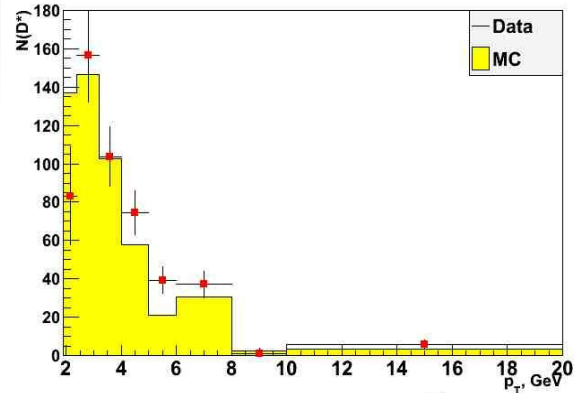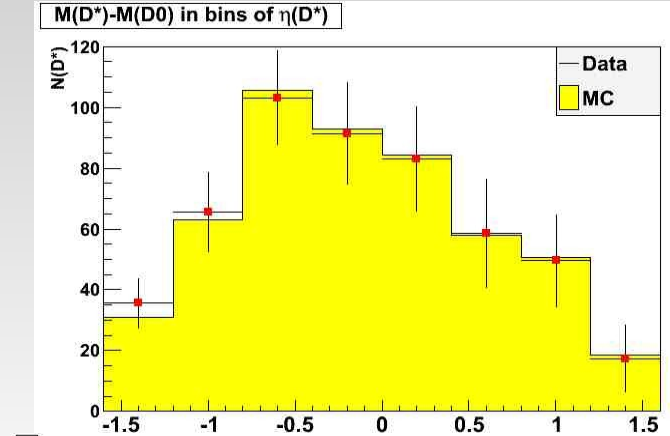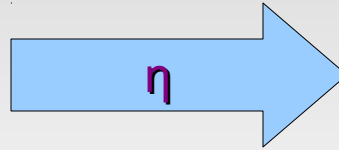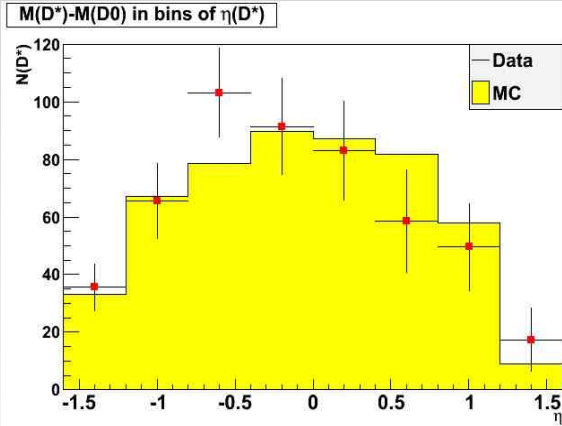
Control plots for LER
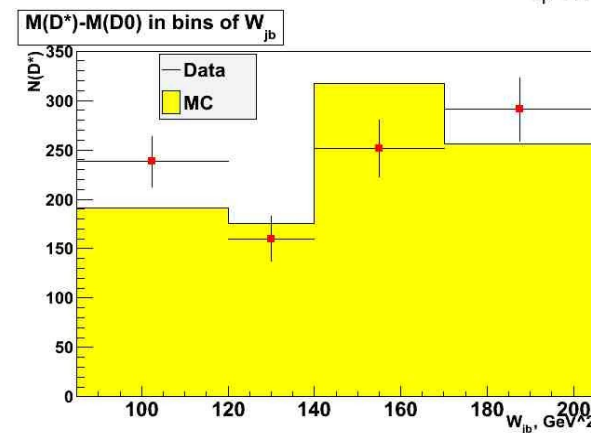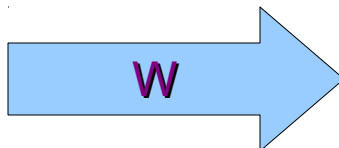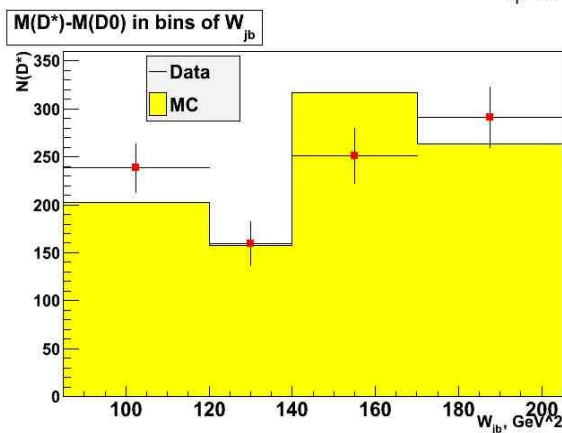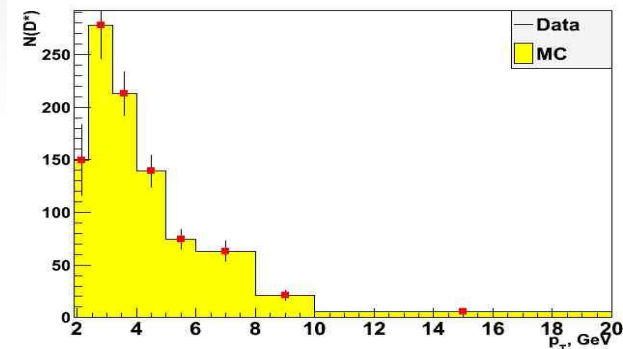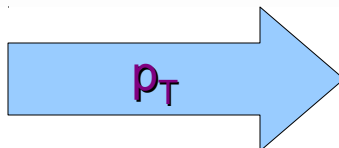
Cross sections before and after p_T and η reweighting
(only statistical errors!)

| 0607p	HER	LER	MER
σ, in pb	26918 ± 251	27931 ± 1437	26013 ± 1504
σ, in pb	26907 ± 250	27901 ± 1440	26090 ± 1429

Summary

◆ Was checked recently generated MC samples for MER and LER
◆ Cross sections were calculated. As we expected, cross sections are in good agreement within the limits of statistical errors
◆ We can notice, that reweighting slightly changes our cross sections
◆ On the other hand, influence of reweighting on controlplots of non-reweighted variables is quite visible, especially in LER and MER against a background of small statistic (both, data and MC)

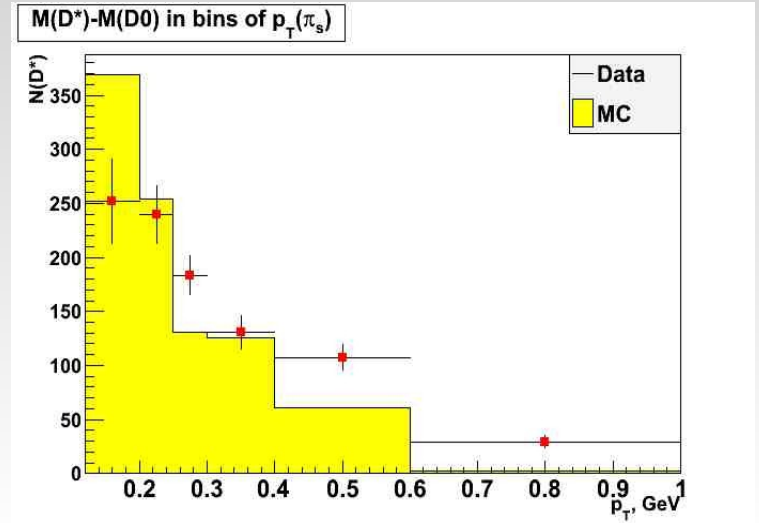◆ Was not applied p_t and η reweighting

Future plans

- NLO prediction, comparison with received cross sections
- Applying p_t and η reweighting
- "To play" with binning for LER and MER (to receive better controlplots)
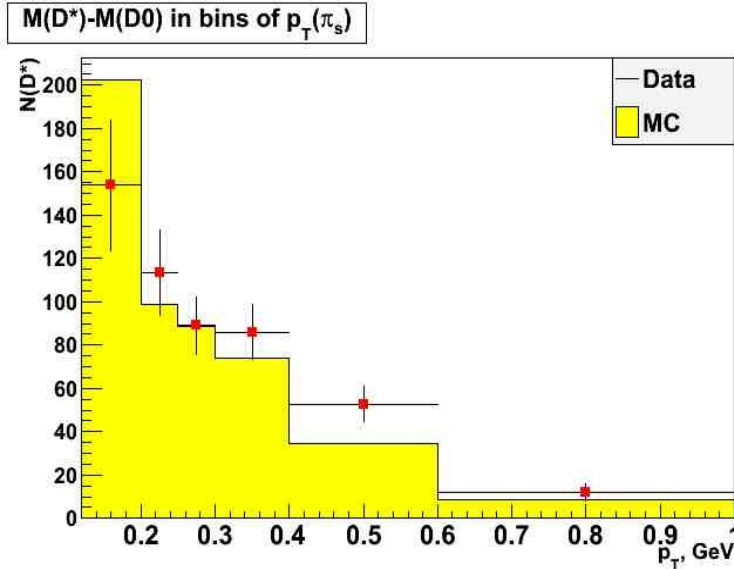- ? Doing some trigger investigations

BACKUPS

Control plots in bins of p_T (π_s)
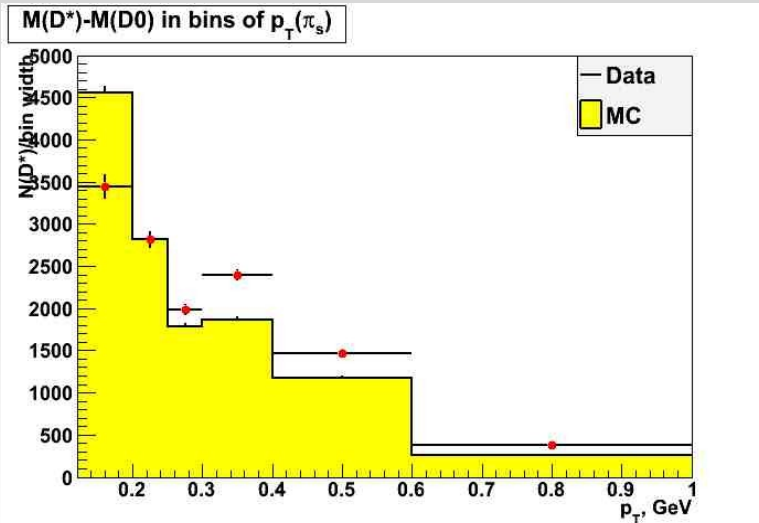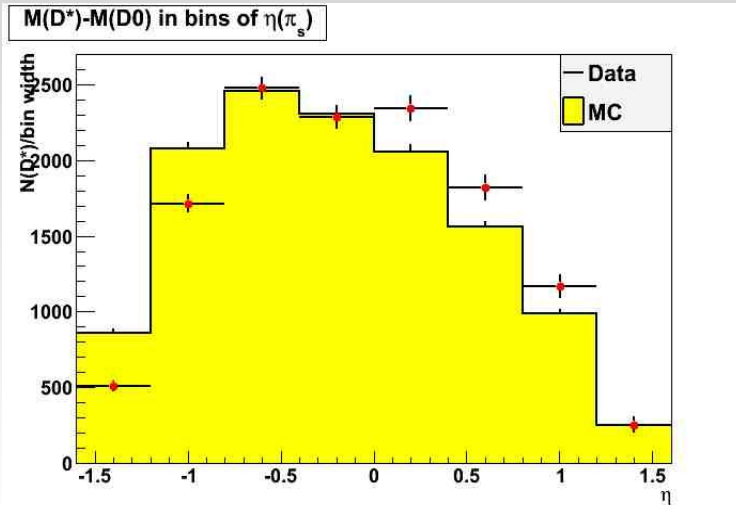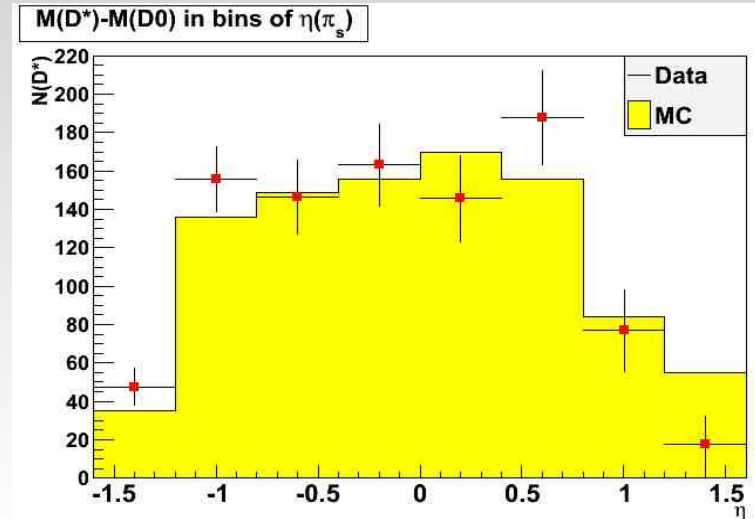

$p_T(\pi_s)$ for HER

$p_T(\pi_s)$ for LER

$p_T(\pi_s)$ for MER
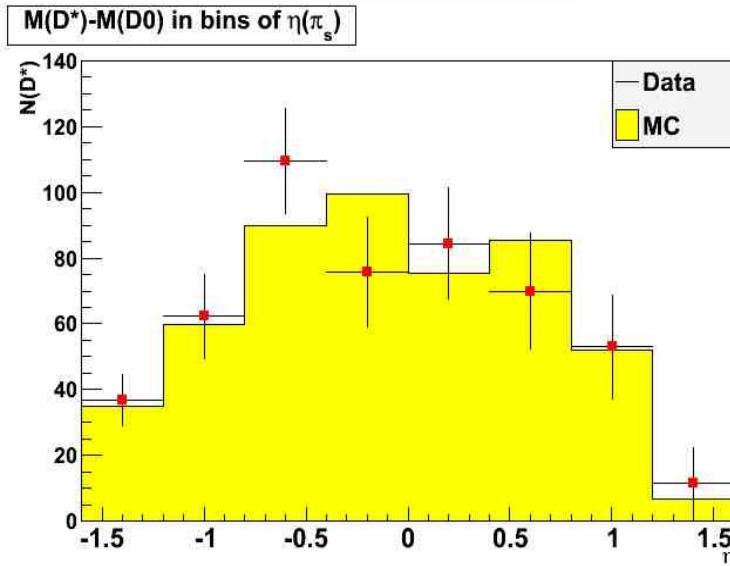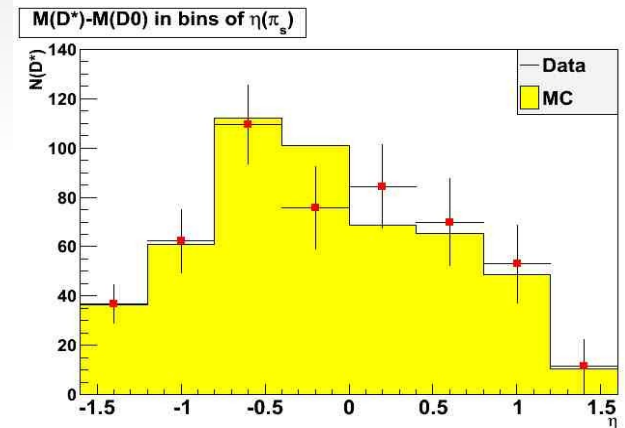
Control plots in bins of η(π$_s$)
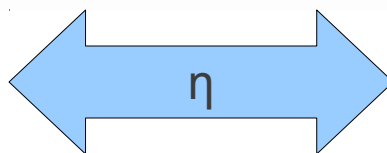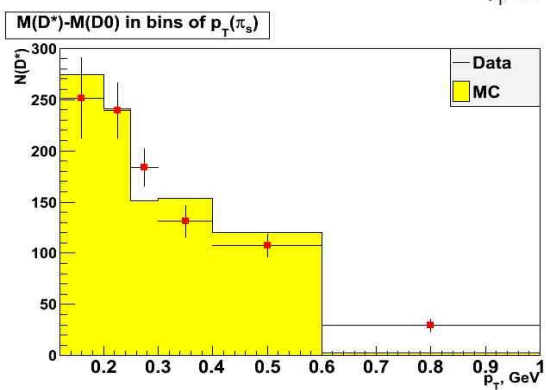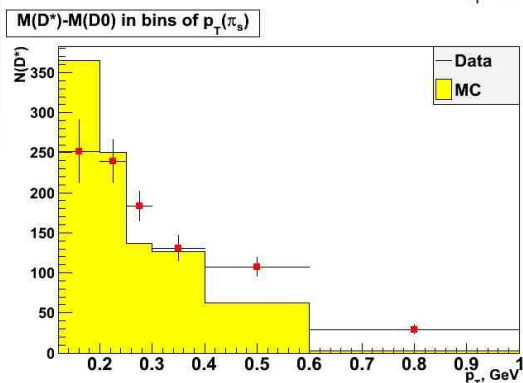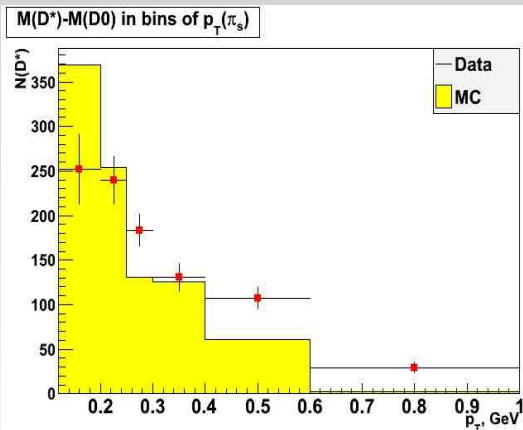

η(π$_s$) for HER

η(π$_s$) for LER

η(π$_s$) for MER

Control plots for MER

Control plots for LER

Control plots for LER