F_2^s using final states with K^0_S

Paweł Sopicki

Jagiellonian University, Poland

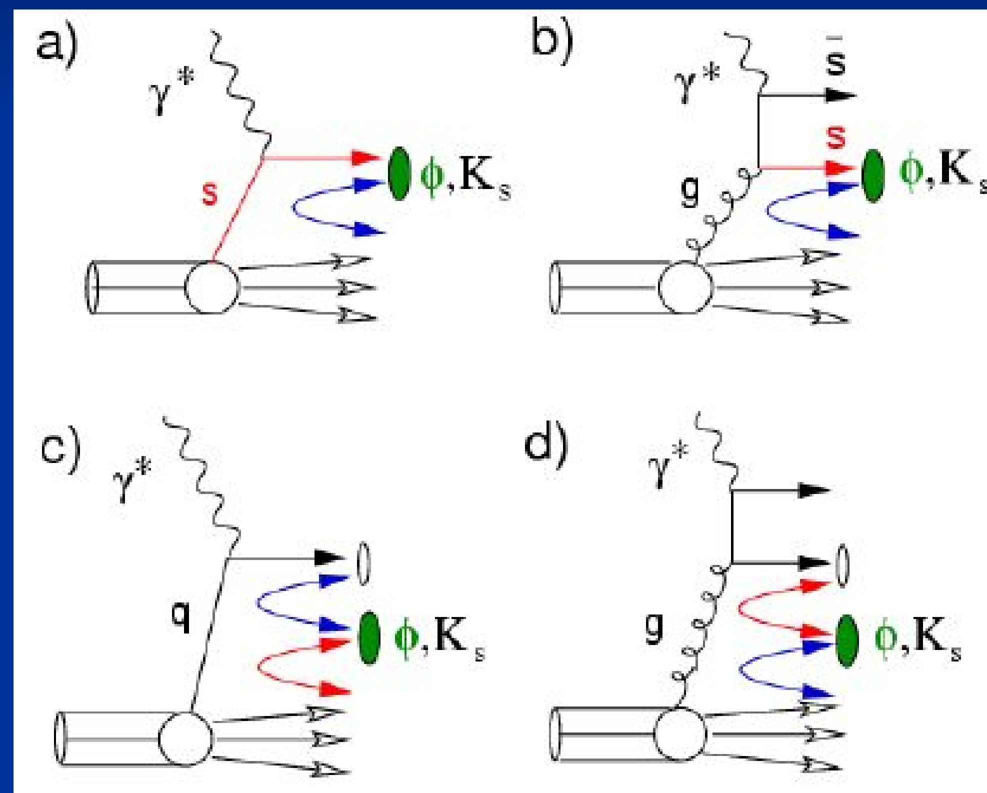
Introduction

$F_2 \rightarrow F_2^{u,d}, F_2^{s}, F_2^{c} \ldots$ $\frac{d^2\sigma}{dx\,dQ^2} = \frac{2\pi\alpha^2}{xQ^4}\left[Y_+\mathcal{F}_2(x,Q^2) - y^2\mathcal{F}_L(x,Q^2) + Y_- x\mathcal{F}_3(x,Q^2)\right](1+\delta_r(x,Q^2))$

$F_2^c \leftrightarrow D^{**}$

~~←~~

$F_2^s \rightarrow$ strange particles (eg K^0_S)



[1]

Introduction

P_s , P_o : $P_s + P_o = 1$

x: variable obtained from K^0 and Jet 4-vectors;

λ_s: strangeness suppression factor, $\lambda_s = P(s)/P(u)$

$P_{s\to K^0}(x , \lambda_s)$ – related to strange fragmentation func.

$P_{o\to K^0}(x , \lambda_s)$

Aim! To find a variable for which this part is most sensitive

$$N_{K^0}(x_i) = [\ P_{s\to K^0}(x_i , \lambda_S)P_s + P_{o\to K^0}(x_i , \lambda_S)(1\text{-}P_s)\ ]\ N$$

Variables

Two types: global and jet variables

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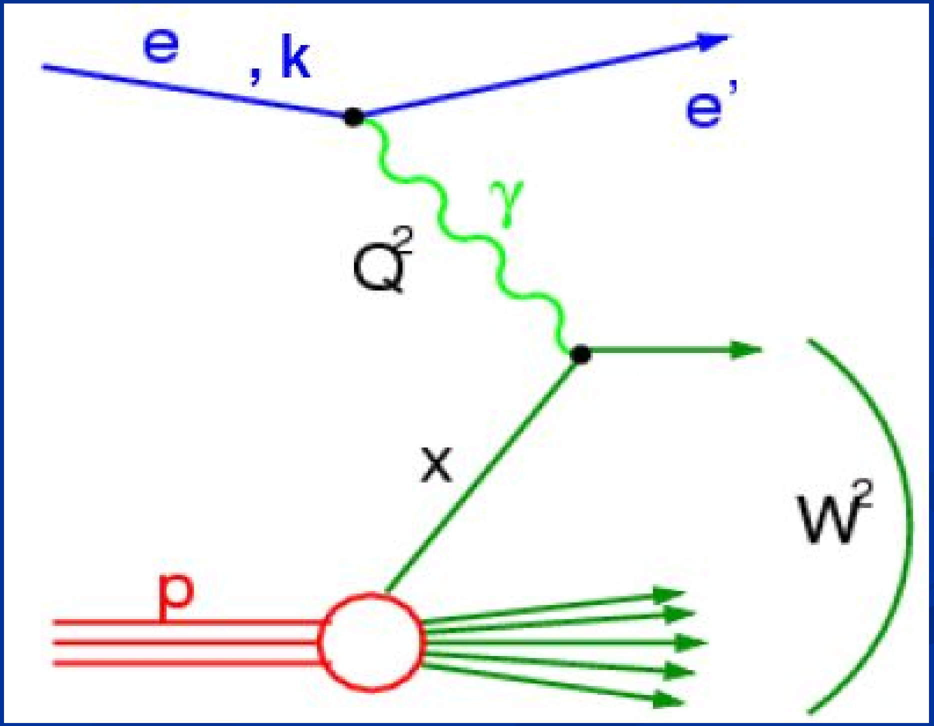
Frames:

HCMS

CMS of p,γ which are aligned



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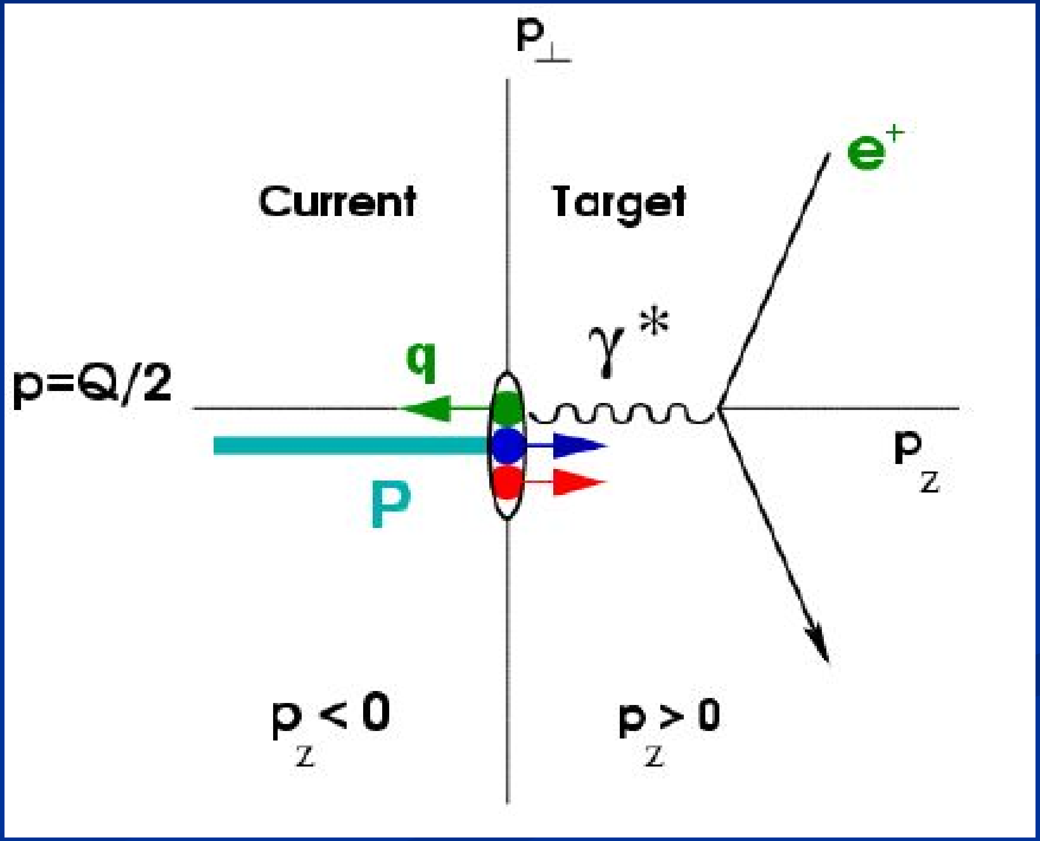
Variables

Two types: global and jet variables

Frames:

Breit Frame

p, boson and q aligned



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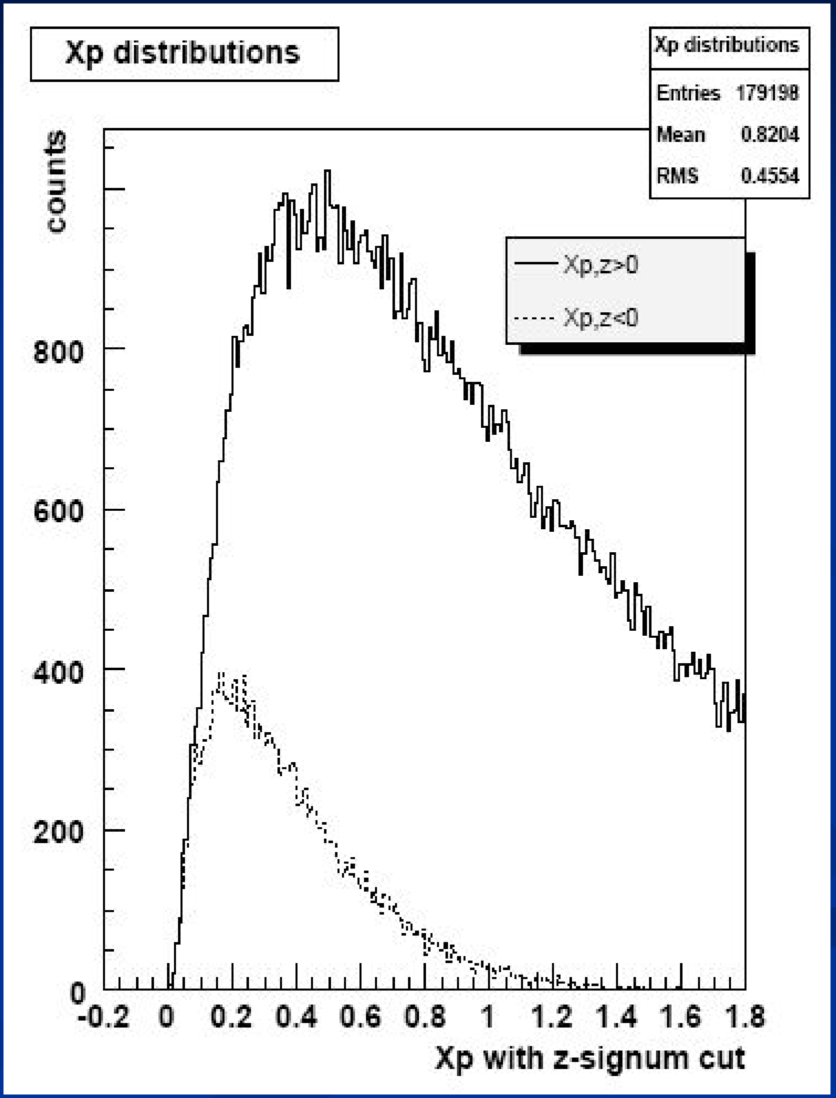
Variables

Two types: global and jet variables

Frames:

Breit Frame



Variables

Two types: global and jet variables

Frames

Global variables. Definitions:

in HCMS:

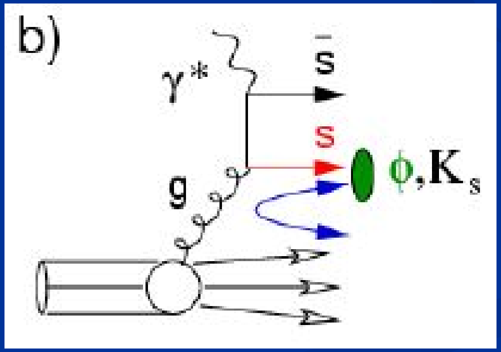
$$X_f = \frac{\overrightarrow{K^0_z}}{W/2}$$

in Breit Fr.:

$$X_p = \frac{|\overrightarrow{K^0}|}{Q/2}$$

Variables

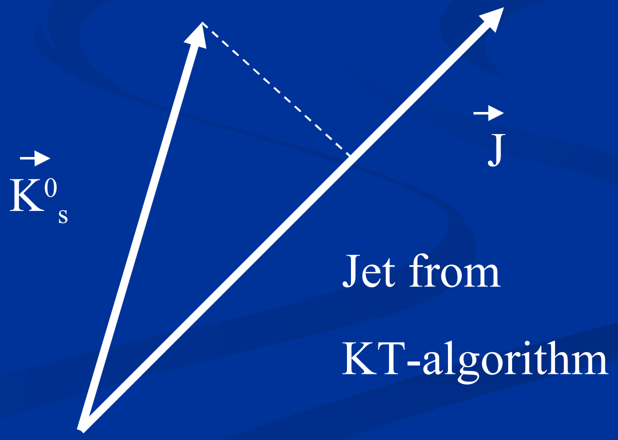
- Two types: global and jet variables
- Frames
- Global variables
- Jet variables – computed in each frame separately



Variables

- Two types: global and jet variables
- Frames
- Global variables
- Jet variables – computed in each frame separately

$$X_{rel} = \frac{\overrightarrow{K^0}\overrightarrow{J}}{|\overrightarrow{J}|^2}$$



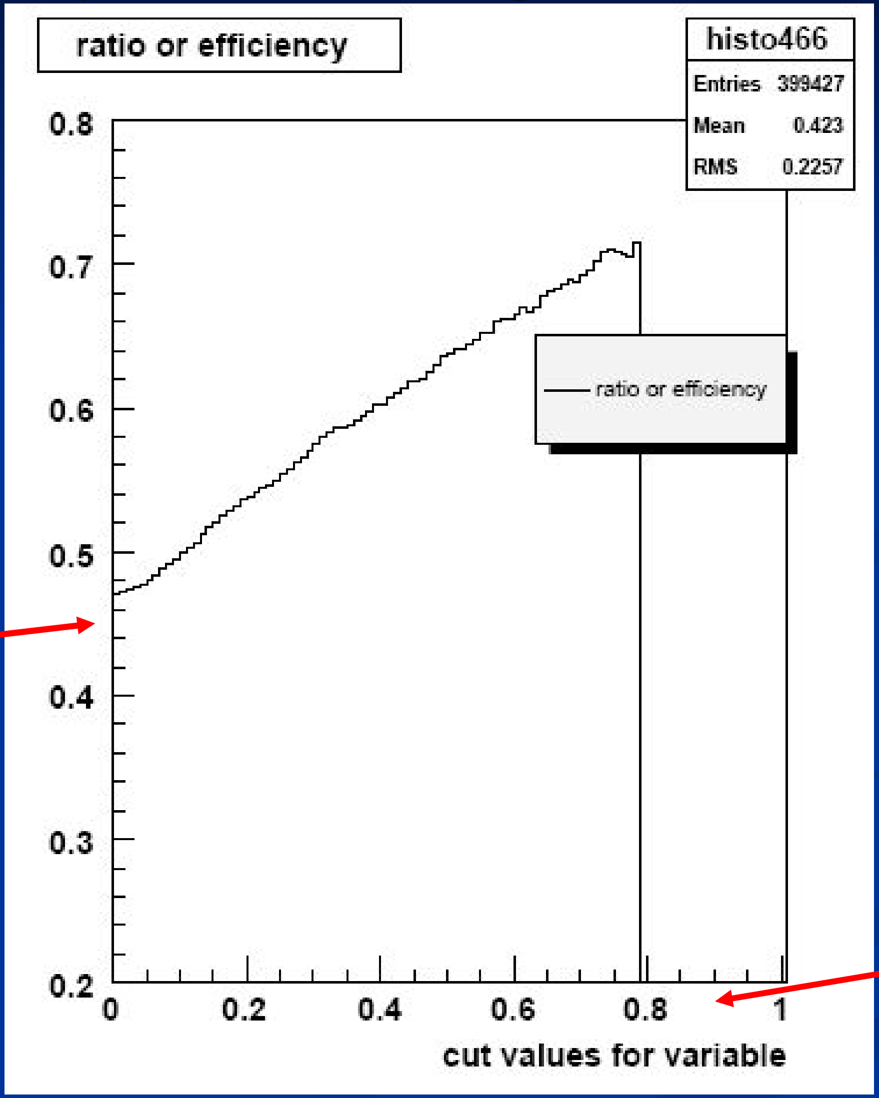
Analysis using RAPGAP

Signal: K^0 in events with hard s-quark

$5 < Q^2 < 200$

$0.05 < y < 0.8$

Integrated 'Signal to All ratio' or 'Efficiency' for given variable

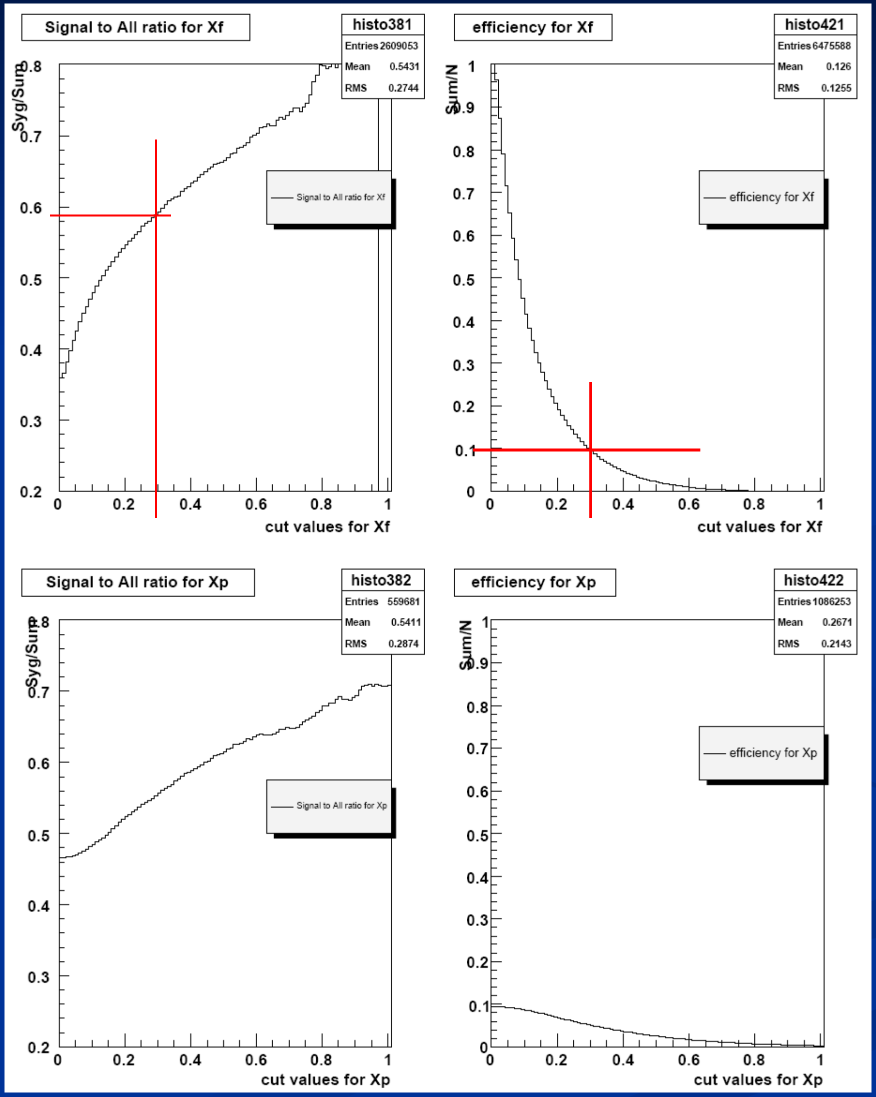


Cut values for a given variable

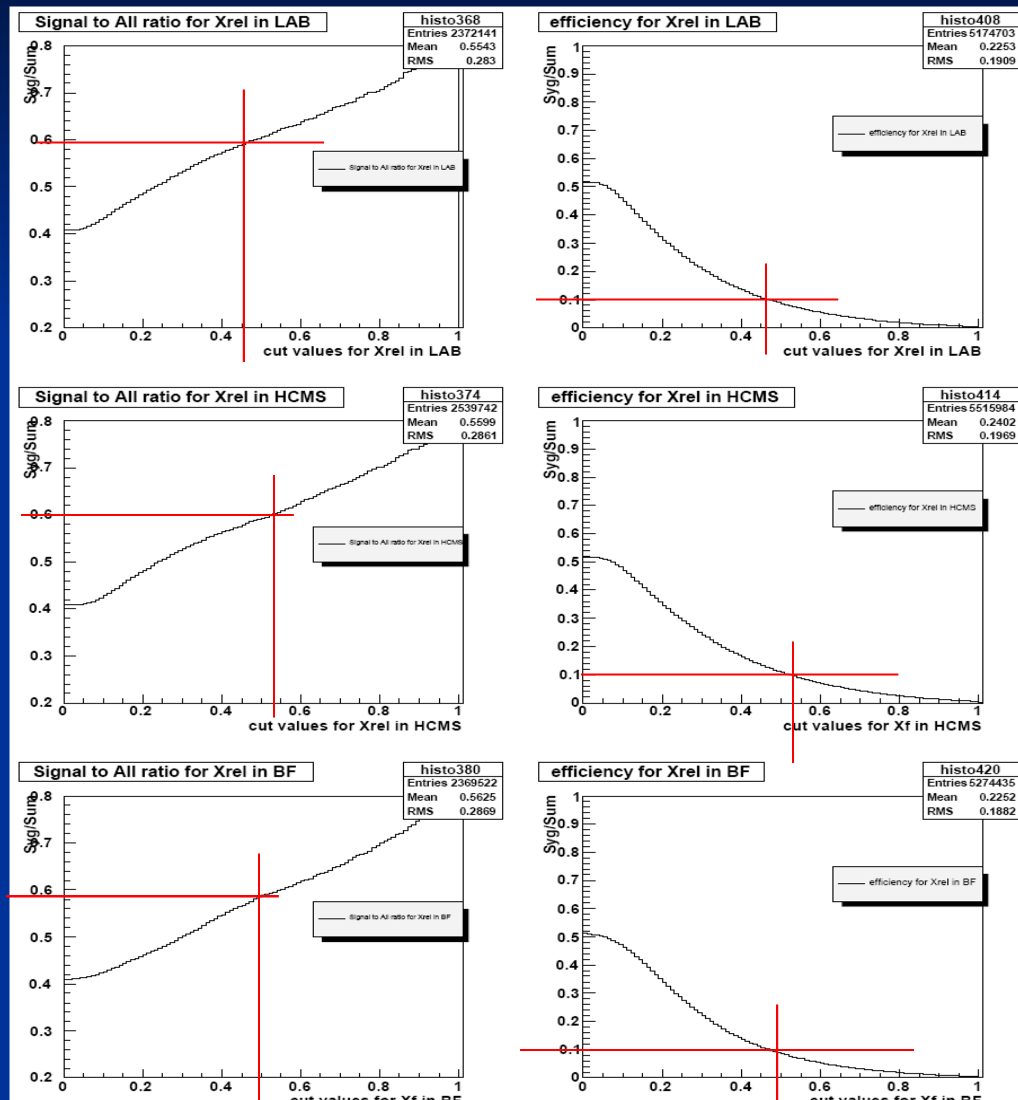
Global variables: X_f and X_p

X_f

X_p



X_{rel} in different frames



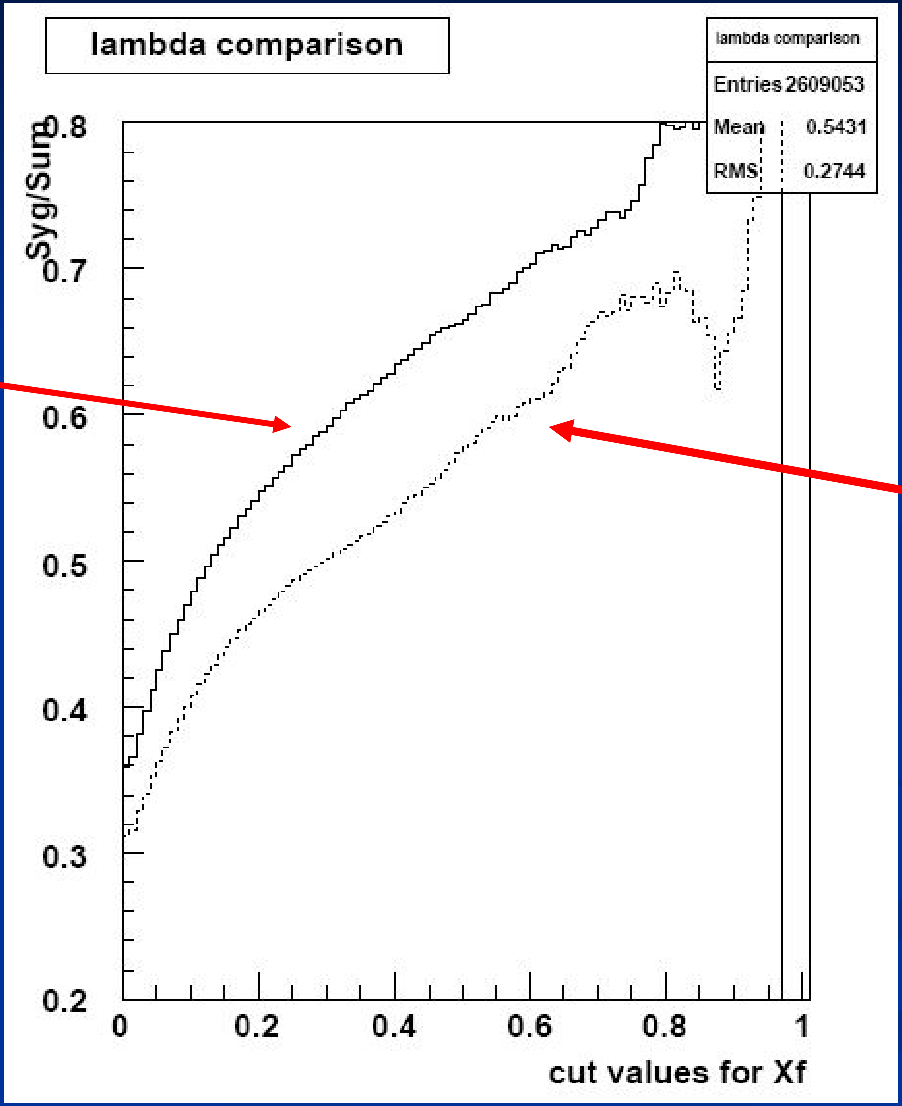
LAB

HCMS

Breit Fr.

λ_s dependancy

Ratio for X_{rel} with $\lambda_s = 0.2$



Ratio for X_{rel} with $\lambda_s = 0.3$

Summary

X_f (HCMS) gives the best purity at the given efficiency

X_{rel} in HCMS frame gives the best purity at the given efficiency

Bibliography

[1] ”Photo- and Electroproduction of single hadrons and resonance”, F. Corriveau, 2003

[2] ”Lorentz transformations in DIS”, J.Turnau, Summer Students Tutorials, 2006

[3] ”Brief introduction to HERA physics”, C.Risler, Summer Students Tutorials, 2006