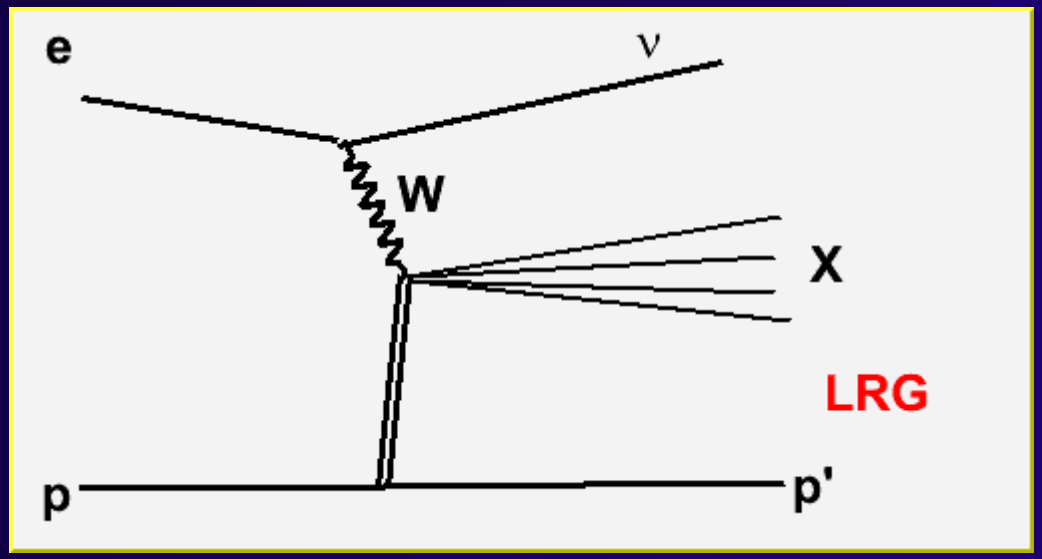
Search for rapidity gaps in CC DIS events

Leszek Adamczyk
UST Cracow



- Motivation
- MC models
- Results from HERA
- Perspectives

Motivation

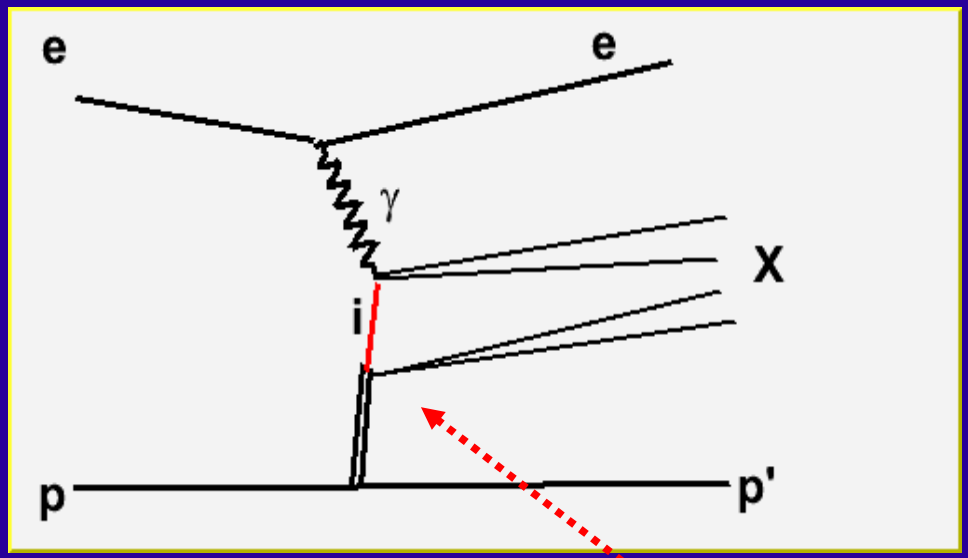
Measure diffractive PDF of the proton at high scale $100 < Q^2 < 2000$ GeV^2

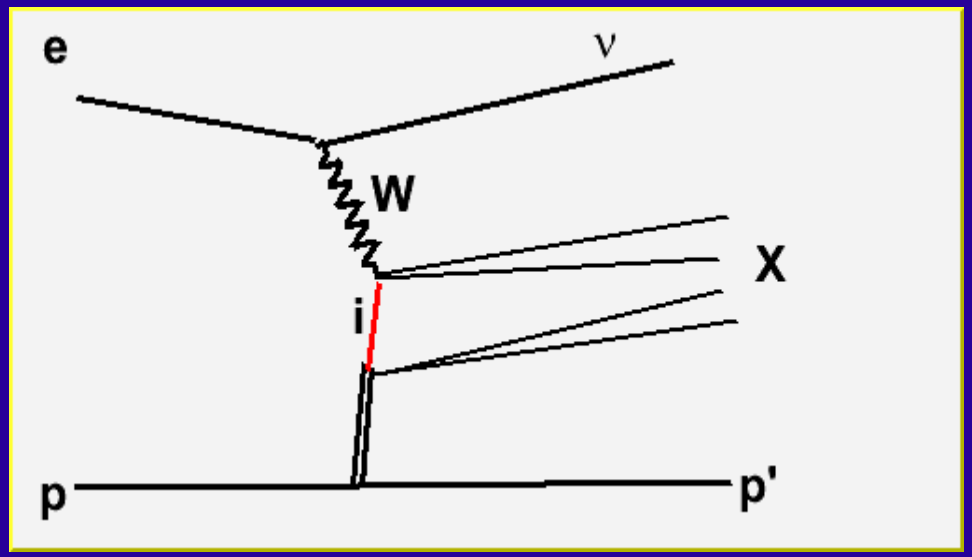
Di-jet rate sensitive to the gluon content of the proton via BGF W gluon -> ud (sc)

LHC – predictions for diffractive Higgs production need diffractive PDF at scale $1 < Q^2 < M_H^2$

Motivation

Test of factorization in diffractive scattering



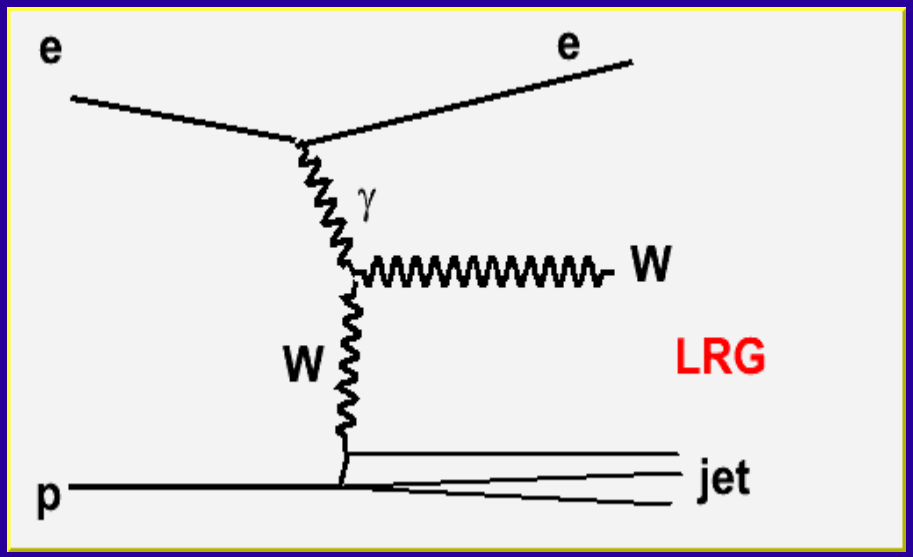


Apply NC diffractive pdf to predict CC diffractive cross section

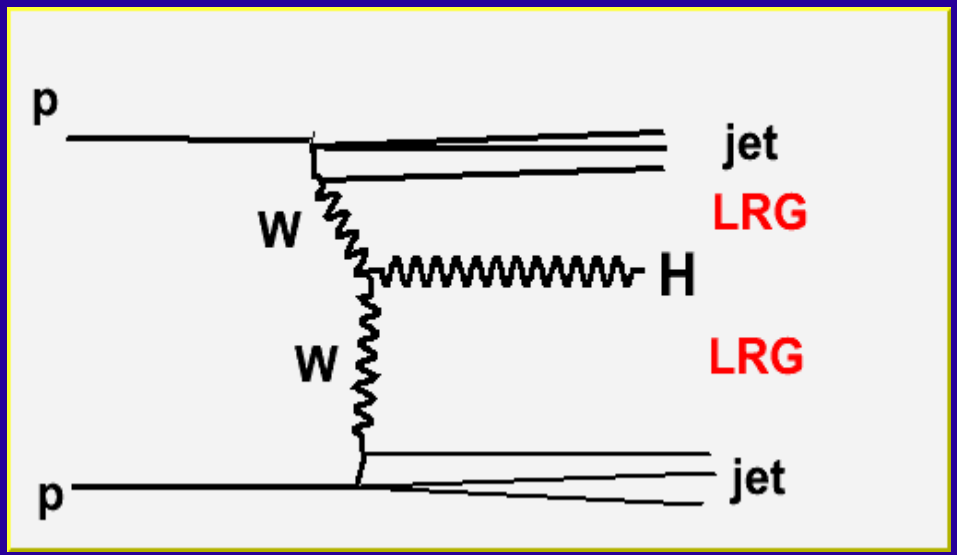
LHC – constrain models of possible factorization breaking

Motivation

Search for backgroung events, which looks like CC



LHC – possible implication for Higgs production via WW fusion



MC models

- RAPGAP – diffractive CC events ep->nu p X
- Assume factorization
- Use diffractive PDF from H1 fit 2 (NC data)
- Pomeron – light quarks (uds) and gluons
- Predicted diffractive CC cross sections

  Q2 > 10 GeV2 – 2 pb

  Q2 > 100 GeV2 – 1.5 pb

  Q2 > 200 GeV2 – 1.2 pb

MC models

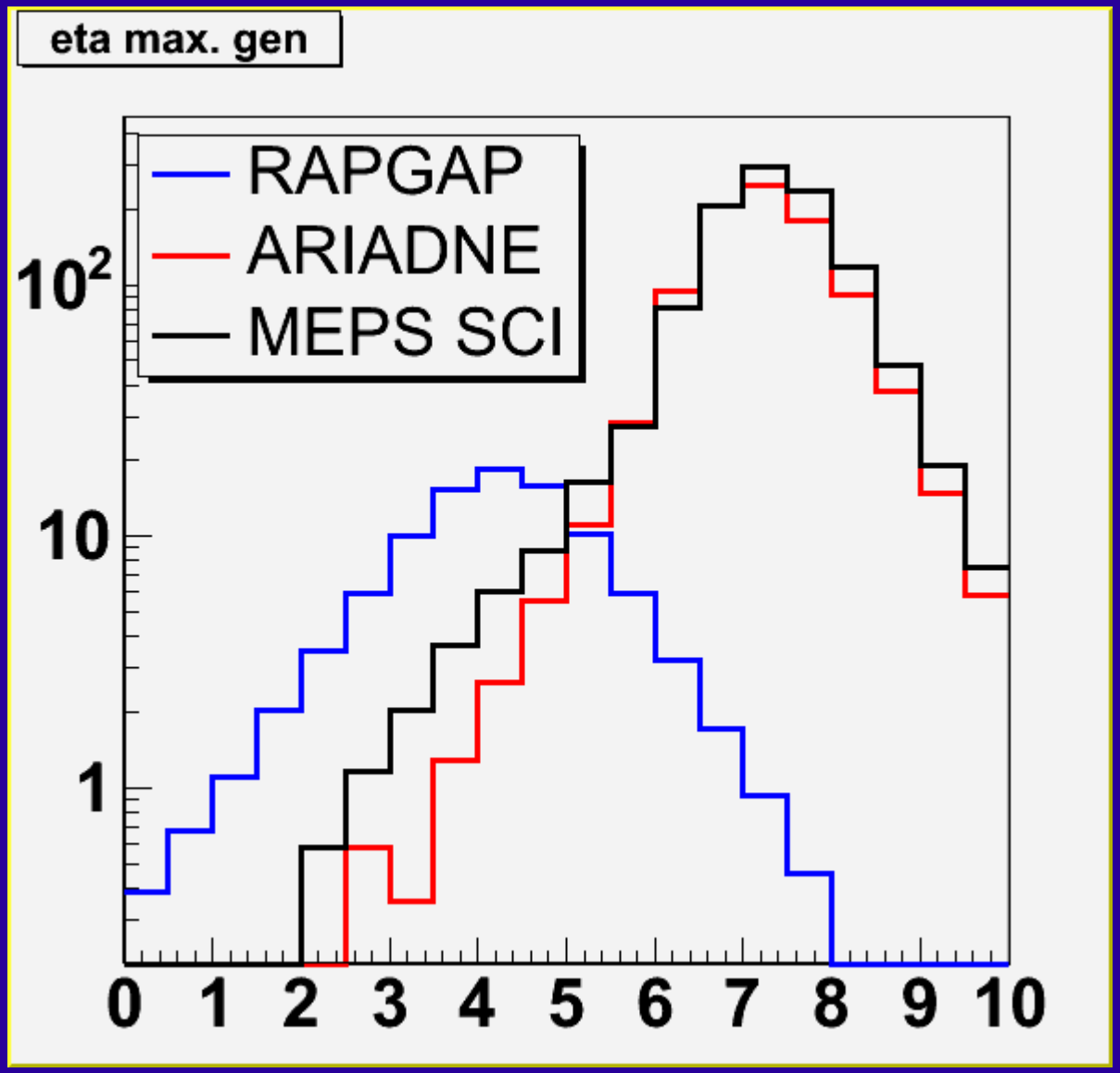
- Non-diffractive CC events
- Django with Ariadne (colour dipole model)
- MEPS (parton shower) version of LEPTO

MEPS with Soft Colour Interaction as the alternative model that give rise to rapidity gap

MC models

L=60 pb-1

Q2>200 GeV2



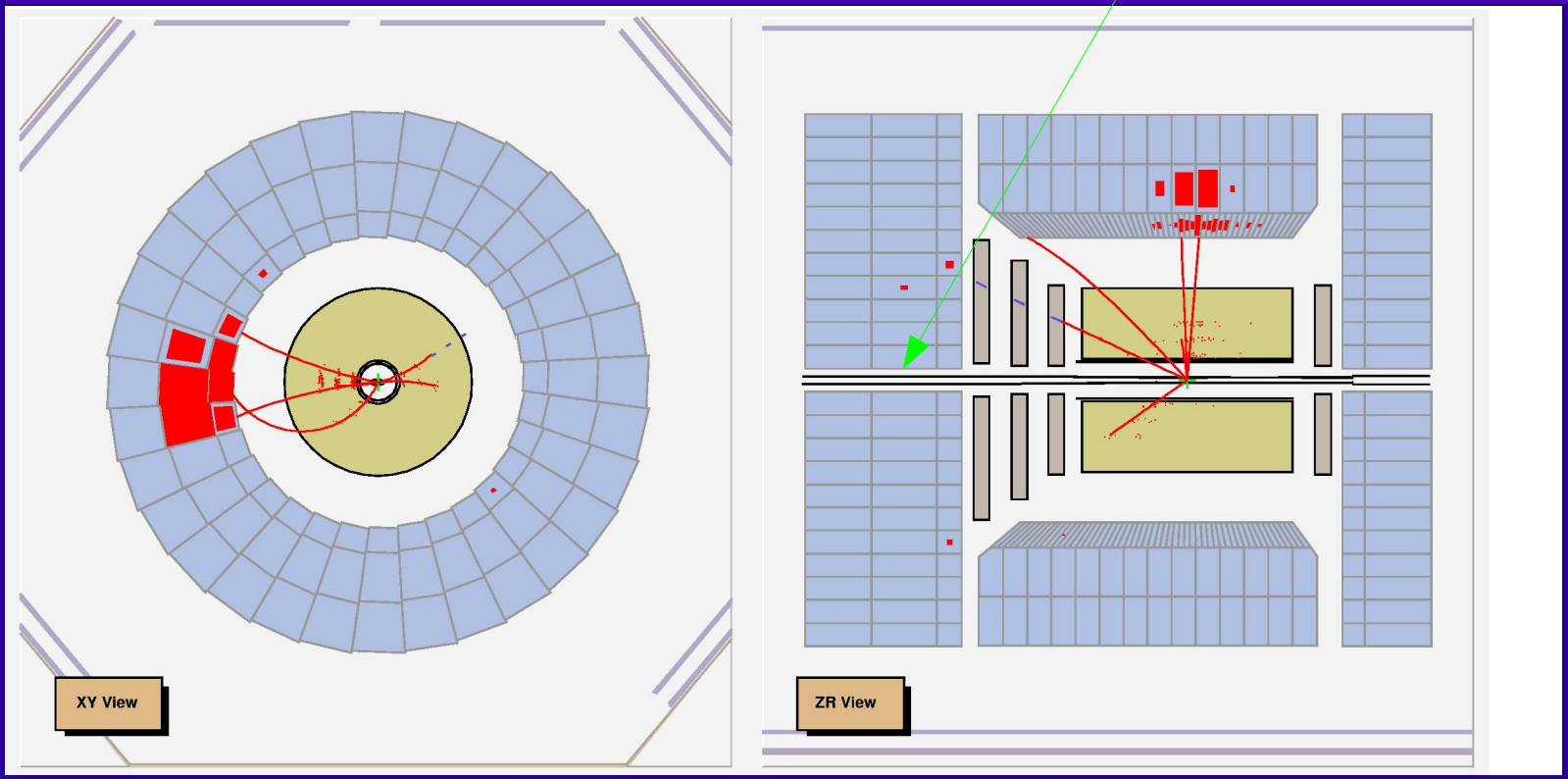
ZEUS Detector : eta< 5

- 2 unit for gap

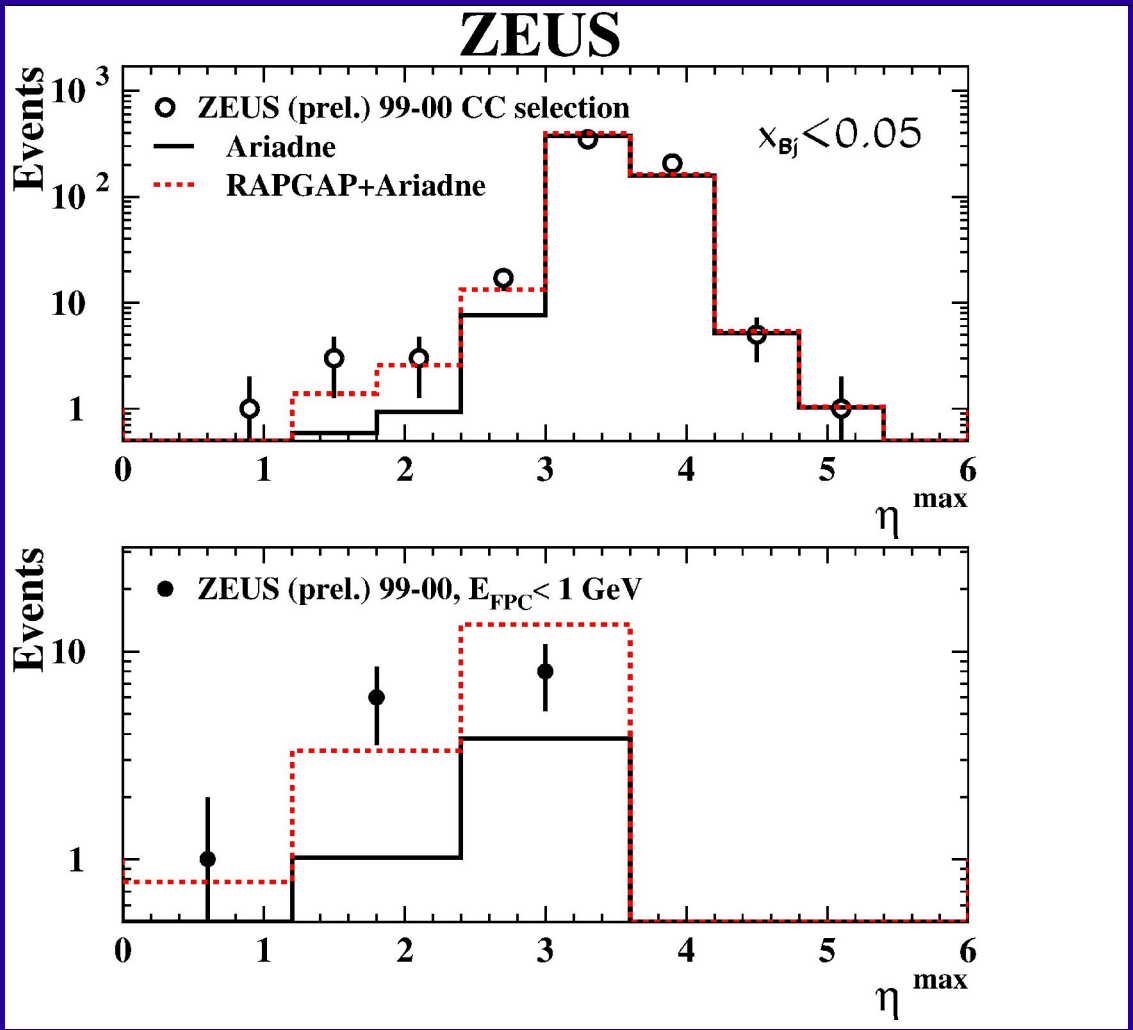
Low acceptance

Preliminary results

CC event with rapidity gap : E fpc < 1 GeV eta_max<2.9



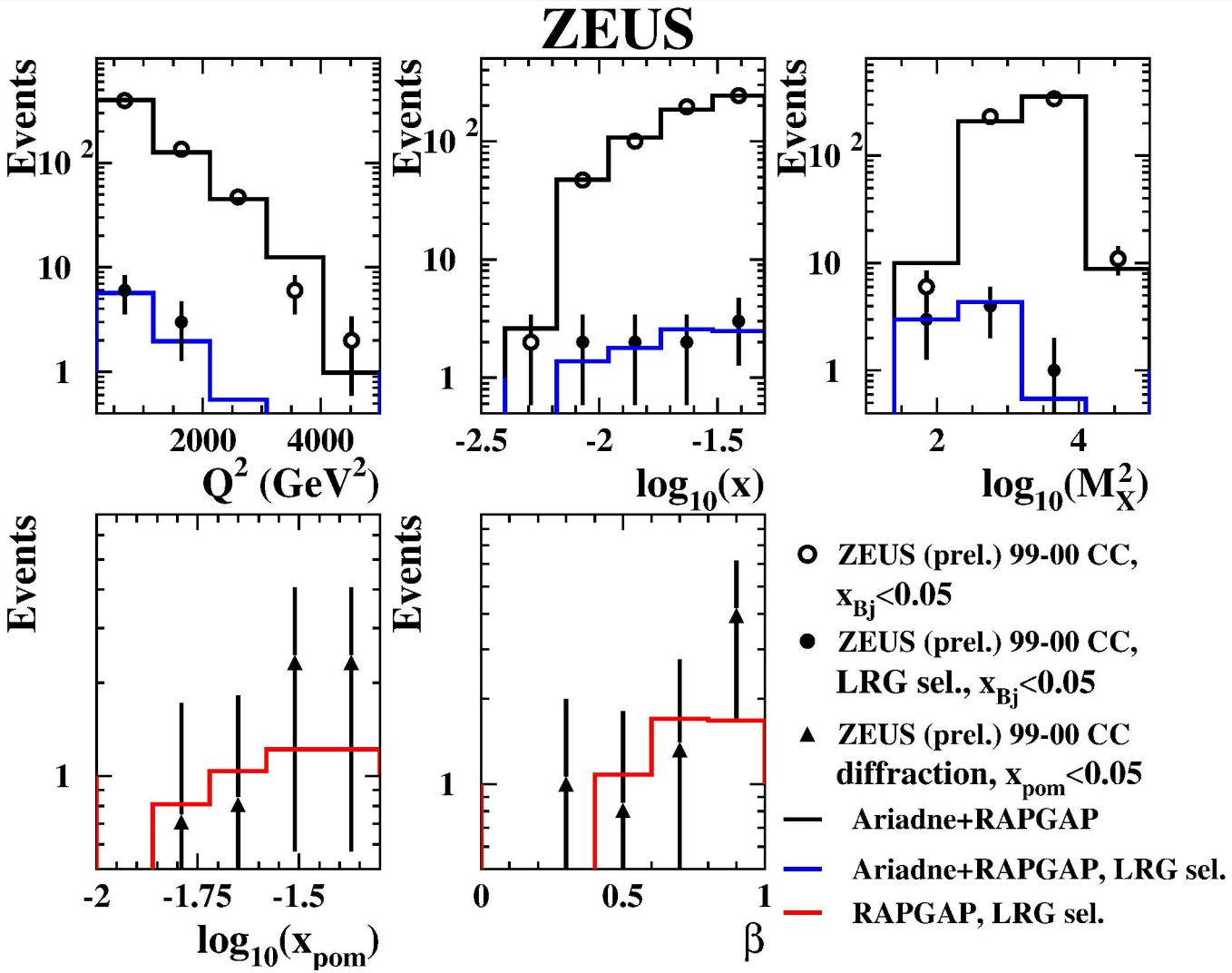
Preliminary results



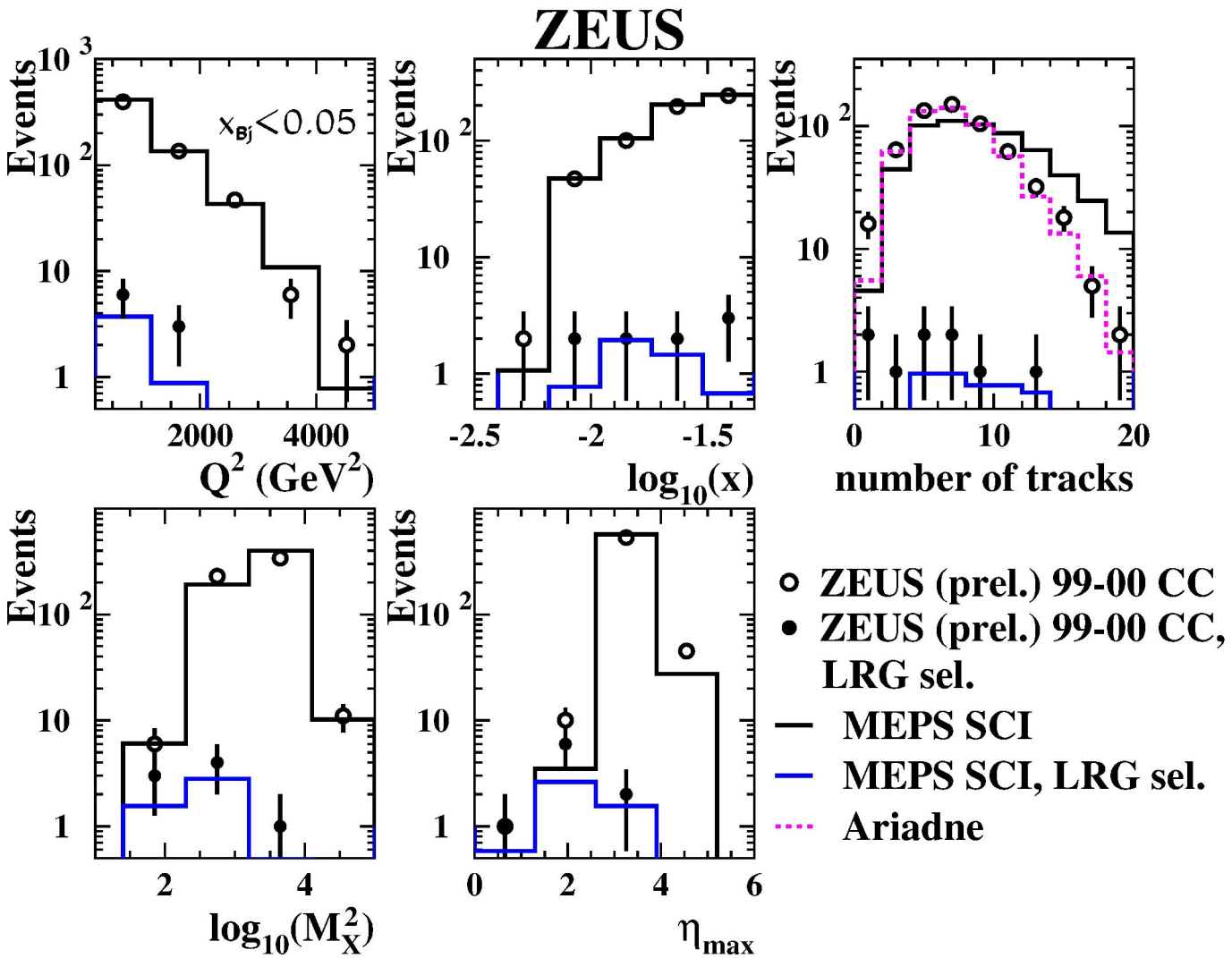
Q2 > 200 GeV2
eta_max<2.9
Efpc < 1 GeV

9 events with rapidy gap of at least 2 units

Preliminary results



Preliminary results



Preliminary results

9 events with a large rapidity gap in 99/00 data

RAPGAP predicts 5.6 +/- 0.7 events

ARIADNE+GRAPE predict 2.1 +/- 0.4 events

MEPS including SCI predicts 3.9 +1.0 - 0.7 events

sigma-cc diff(Q2>200 GeV2, xpom<0.05)=

0.49 +/- 0.20 (stat.) +/- 0.13 (syst.) pb

sigma-cc diff(Q2>200 GeV2, xpom<0.05)/sigma-cc tot(Q2>200 GeV2, xjb<0.05)=

2.9 +/- 1.2 (stat.) +/- 0.8 (syst.) %

Perspectives with HERA I data

- Optimize selection cuts for diffractive CC
- Use all HERA I data (96-98)
- Use dedicated diffractive CC triger Q2>80 GeV2

Hope to increase statistical significance of the results
- 20 CC events with LRG

Perspectives with HERA II data

L = 700 pb-1

Expect ~200 CC with LRG

- Measure differential cross section Q2, x_pom, beta
- Study exclusive diffractive events (di-jet)