



H1: status and prospects

- H1 detector status
- Recent H1 physics results
- Summary and conclusions



H1 detector status

Detector performance after the 2003 shutdown

- Data taking, background conditions
- First Data

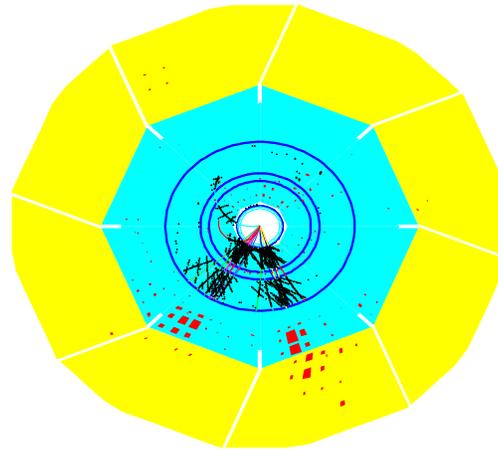
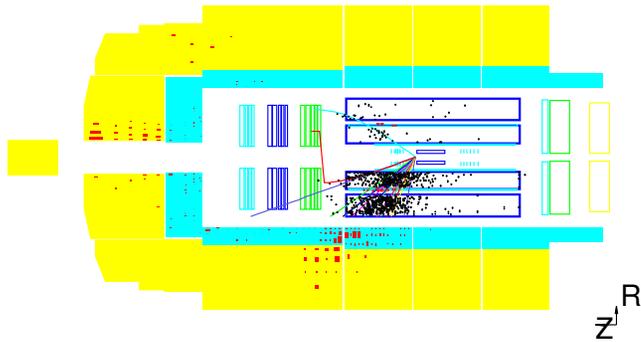
Status of repaired/new components

- CIP (Central Inner Prop. Chamber)
- VFPS (Very Forward Proton Spectrometer)
- FTT (Fast Track Trigger)



H1 high Q^2 events

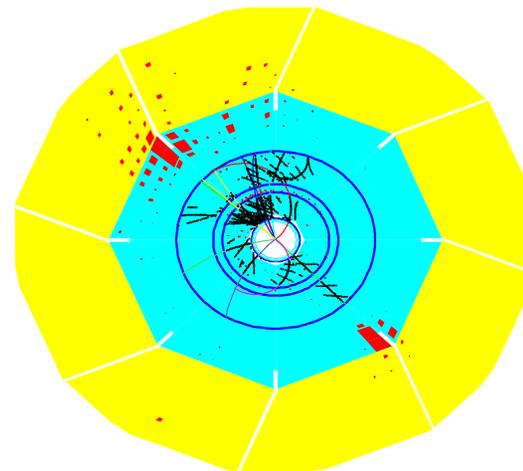
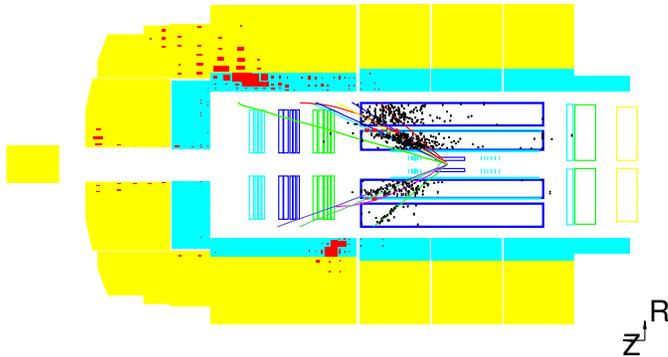
PT=50 GeV
Q2=6000 GeV²



Charged current
with 2 jets

First HERA data
at high Q^2 with
polarized positron
beam

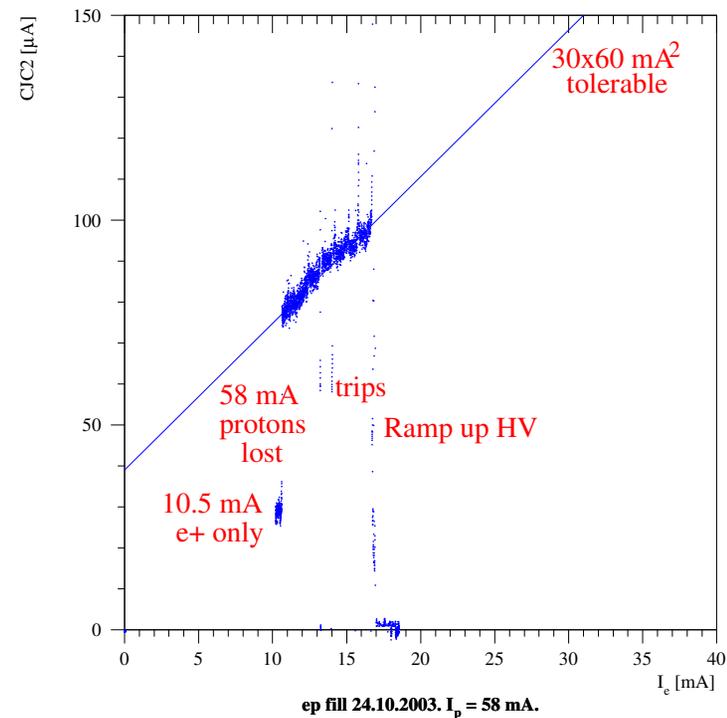
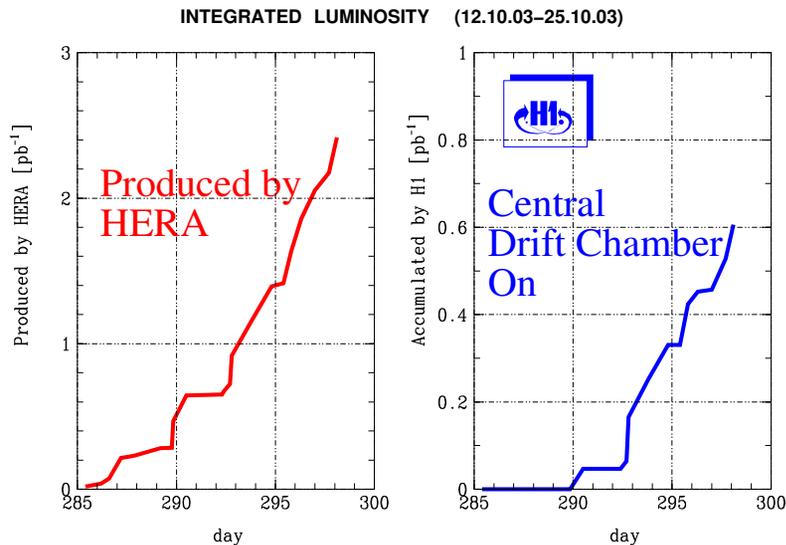
PT(e)=95 GeV
Q2=14000 GeV²



Neutral current



Data taking, background conditions

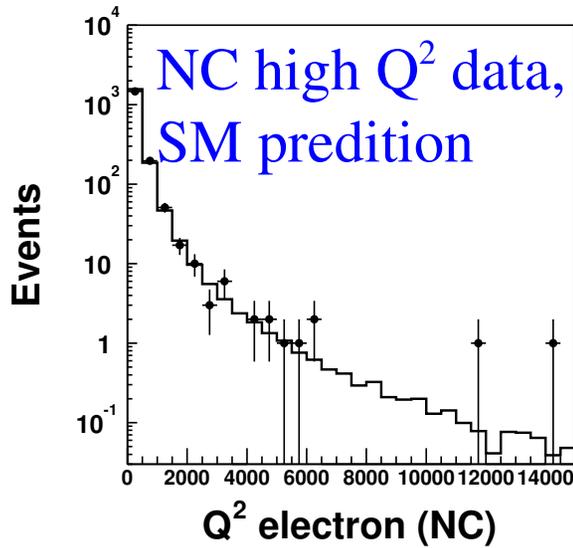


- Data taking has started
- Background similar to Feb 2003
 - Vacuum conditioning worked
- Background is dominated by p-beamgas
- Present limit: $30 \times 60 \text{ mA}^2$

- Extrapolate CJC currents: factor 3 improved vacuum needed to run at HERA II design currents



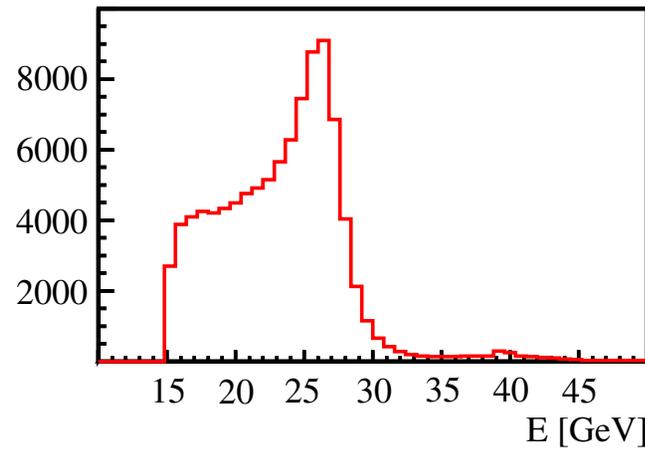
First data



LAr calorimeter

H1 Detector is
well prepared for
HERA II data

Kinematic peak



SpaCal

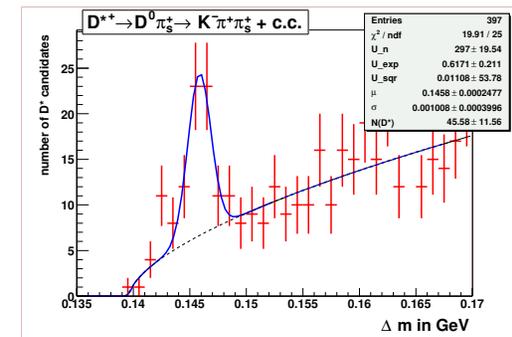
Silicon detectors S/N

BST: 34

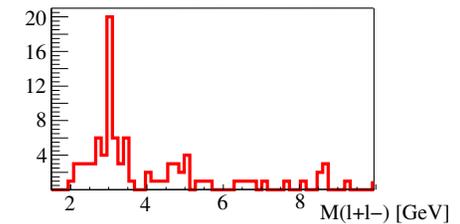
CST: 20

FST: 32

D^* reconstruction



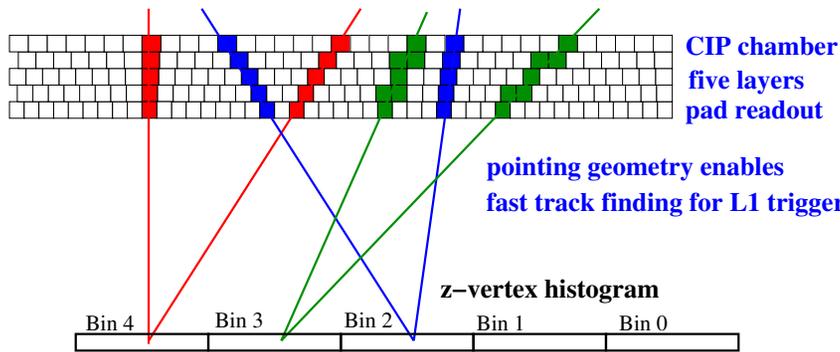
J/ψ from e^+e^- and $\mu^+\mu^-$



Tracking detectors



CIP: status after shutdown

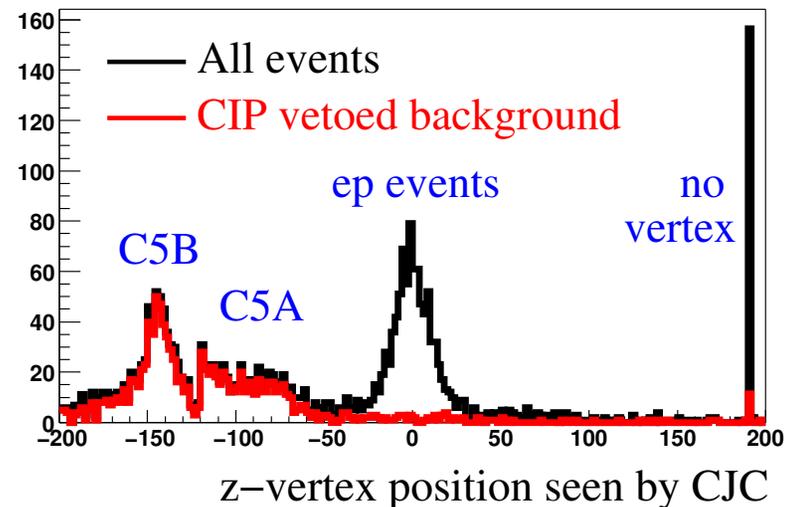


Reconstruct vertex position for L1 trigger,
separate ep collisions from background

Chamber and readout (optical links, FPGA
based trigger) working well, hit
efficiency close to 100%

CIP vertex trigger is used to trigger ep
events and to veto non-ep events
from collimators C5a, C5b

Repair was a success — CIP has
become a vital part of the H1 trigger



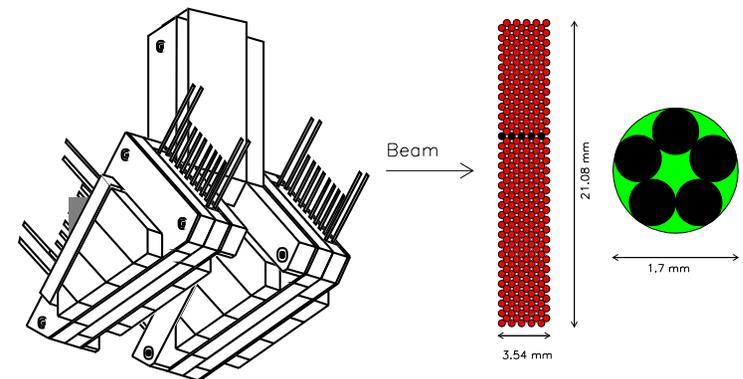
VFPS installation



Very Forward Proton Spectrometer installed in HERA tunnel (at 220 m).

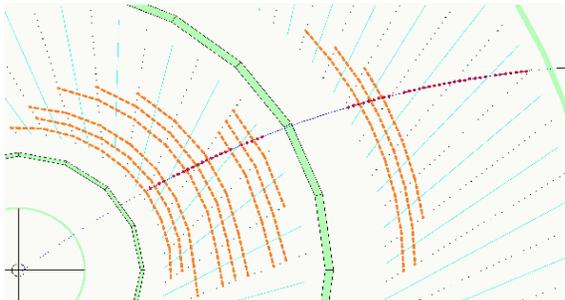
Build for precise measurements of diffractive reactions

Data taking started last week.
Commissioning with proton beam ongoing.



Fast Track Trigger

FTT: reconstruct tracks
from 12 layers of CJC wires



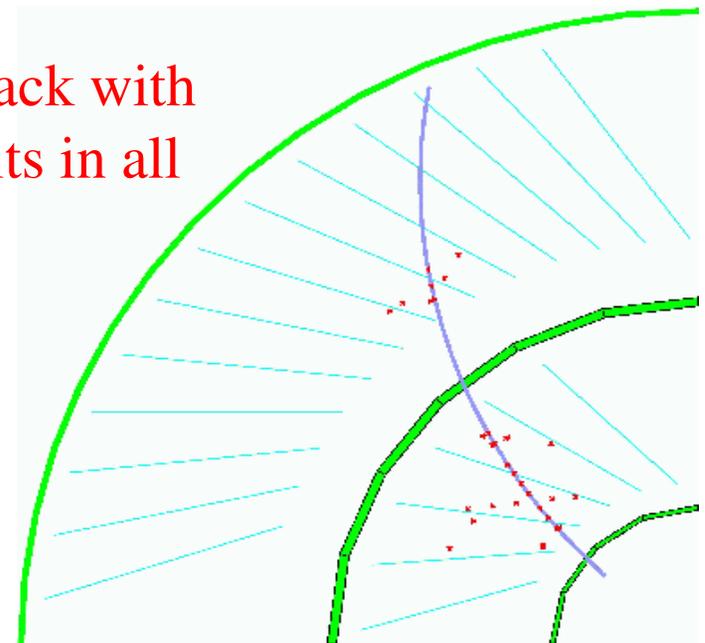
FTT hardware installed, **readout working**

Trigger programming (FPGA, DSP) ongoing

Provide Trigger information on

- L1 ($2\mu\text{s}$): coarse tracks
- L2 ($20\mu\text{s}$): vertex-fitted tracks
- L3 ($100\mu\text{s}$): invariant masses

CJC track with
FTT hits in all
layers





Recent H1 physics results

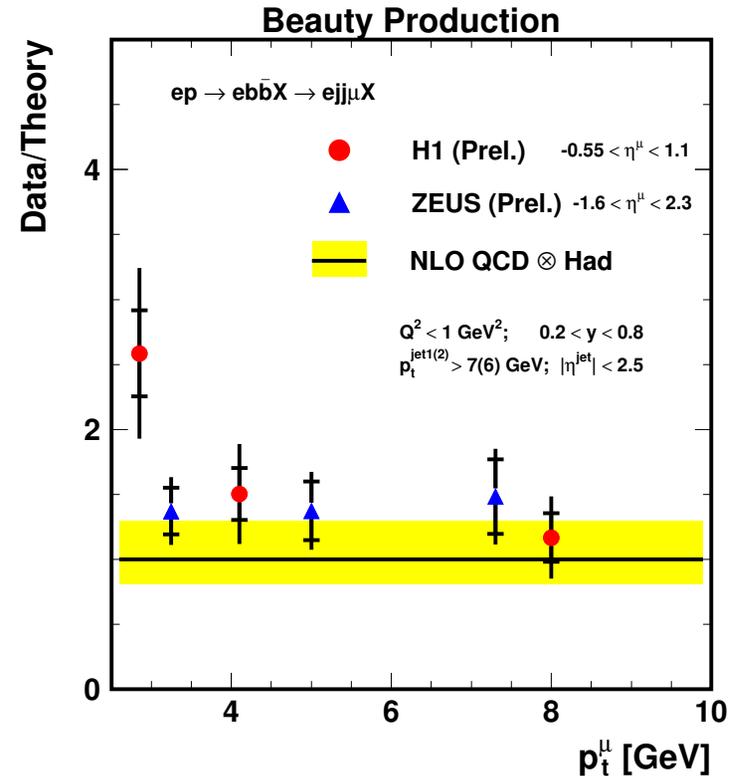
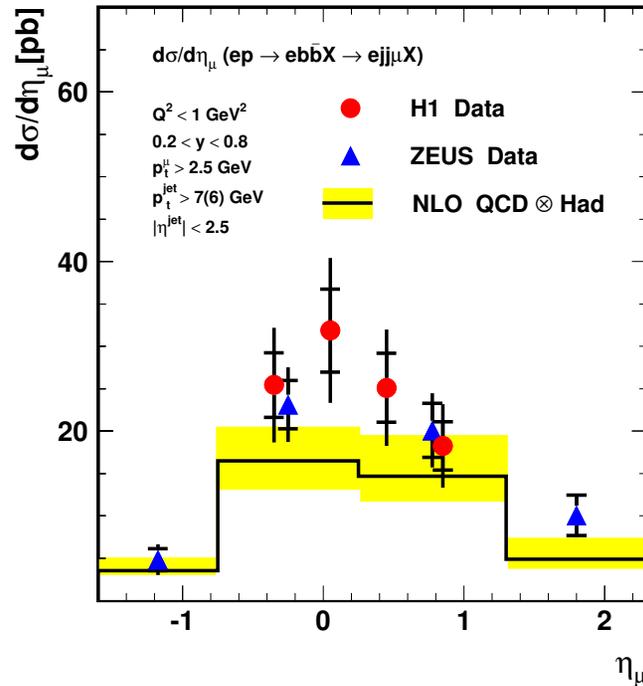
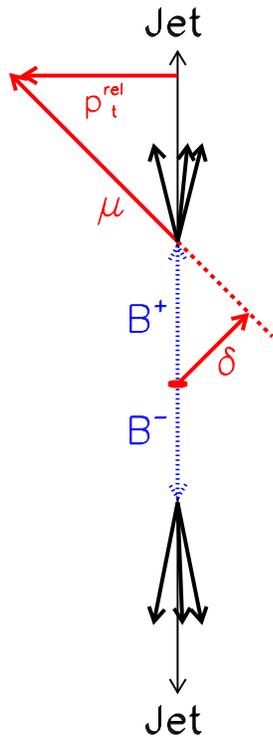
53 papers sent to EPS 2003 — HERA I data still providing many new results

New results and publications since the last PRC

- $\gamma p \rightarrow \gamma Y$ at high lt
- DVCS
- Beauty in photoproduction
- NLO treatment of diffractive final states
- Event Shapes in DIS
- Squarks in R-parity violating SUSY
- Generic Search for new physics
- Search for superlight gravitino
- Search for Contact Interactions
- Diffractive J/ψ Production at high lt
- Multi-electron production
- Search for Single Top
- Dijets and azimuthal decorrelations at low x
- Multi-muon production



Beauty in photoproduction

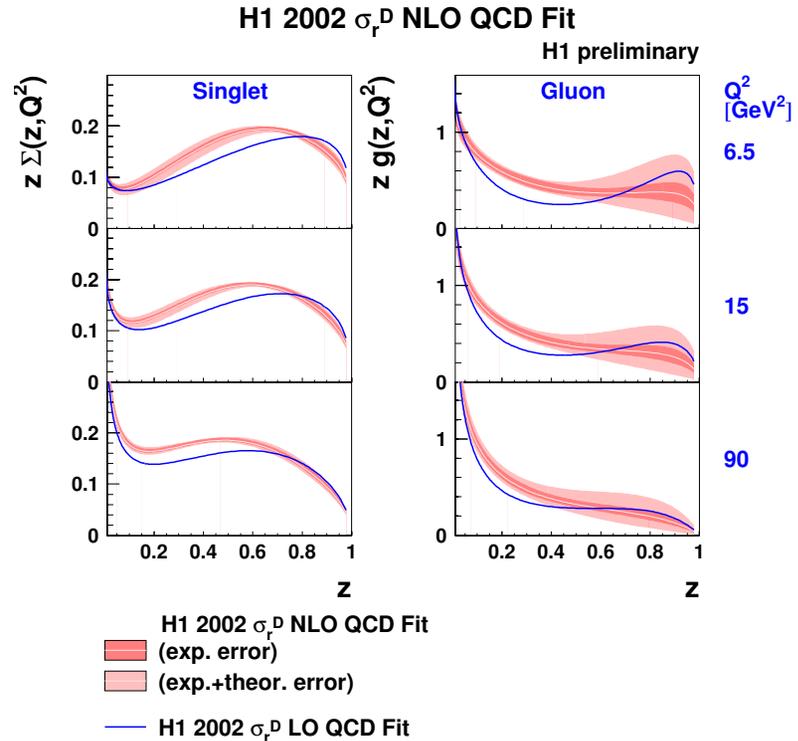
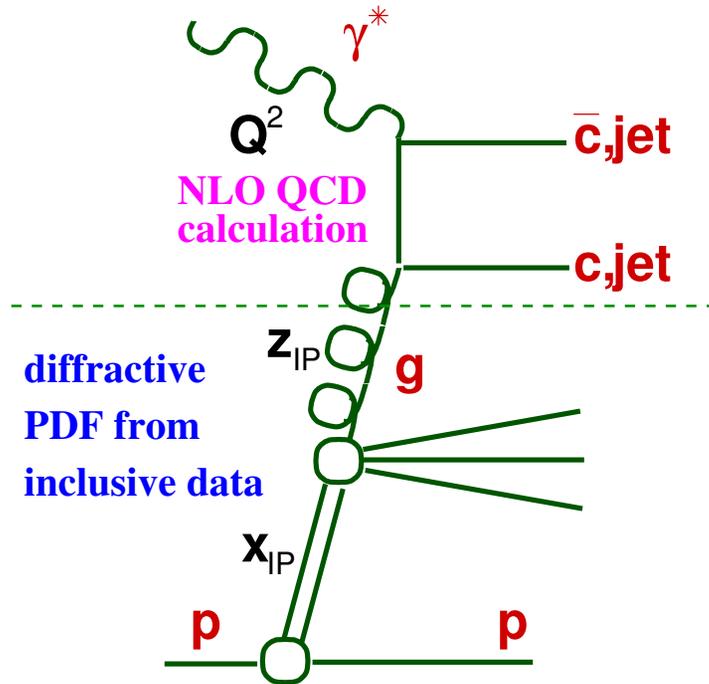


B-identification based on p_T^{rel} and lifetime information (CST).

Progress: precision, differential distributions

H1 and ZEUS in agreement. Data 1.8σ above NLO.

Diffraction and NLO QCD in DIS



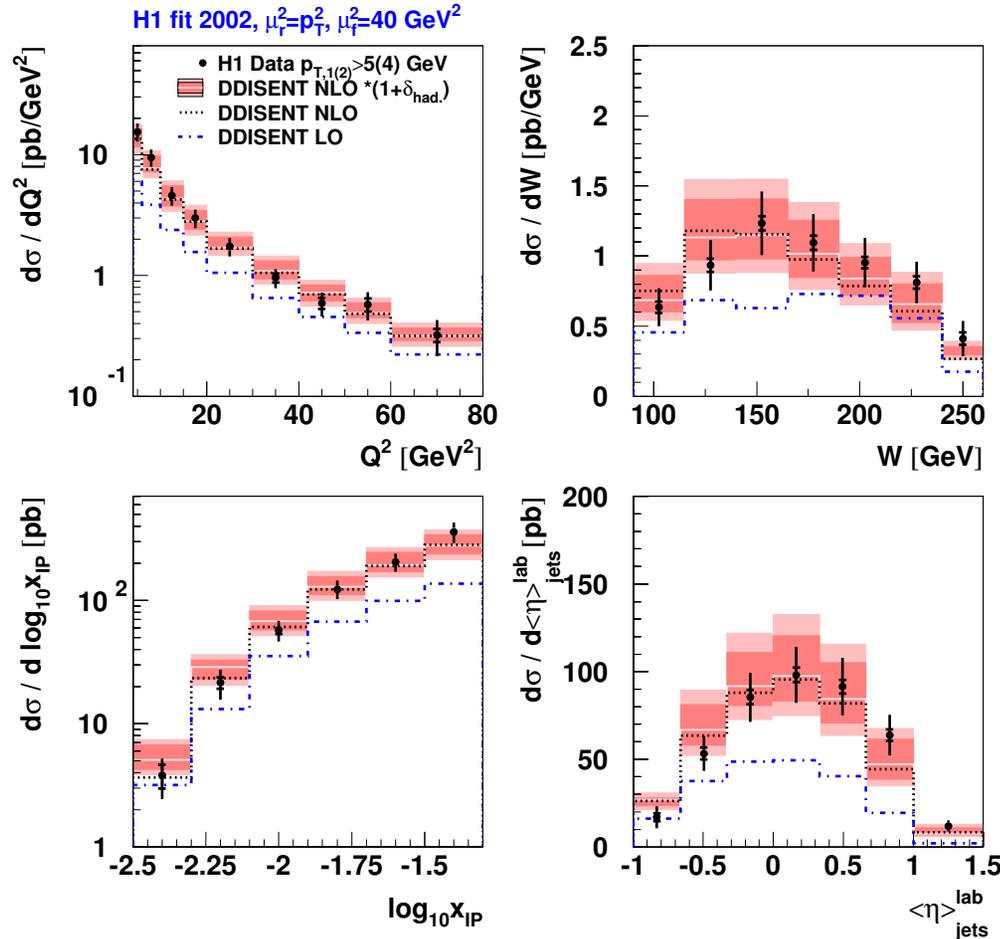
Diffractive PDFs extracted from F_2^D assuming factorisation + NLO QCD

Does it describe diffractive dijet and charm production?

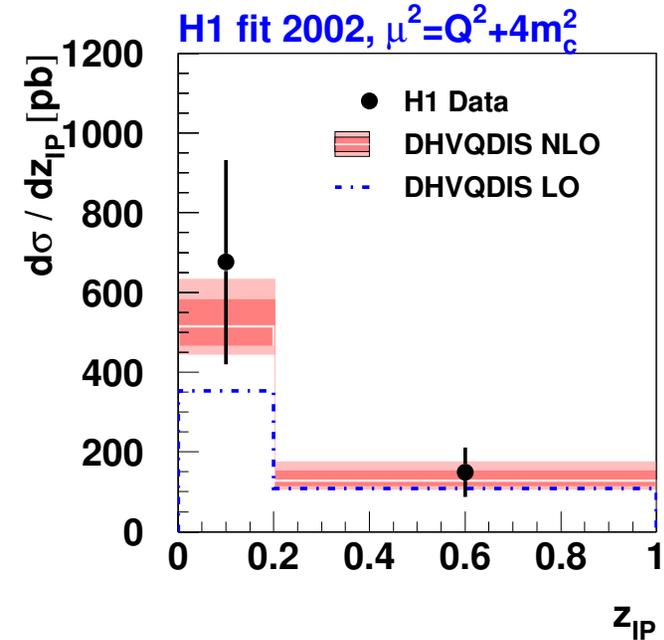


Diffraction and NLO QCD in DIS

H1 Diffractive Dijets (prel.)



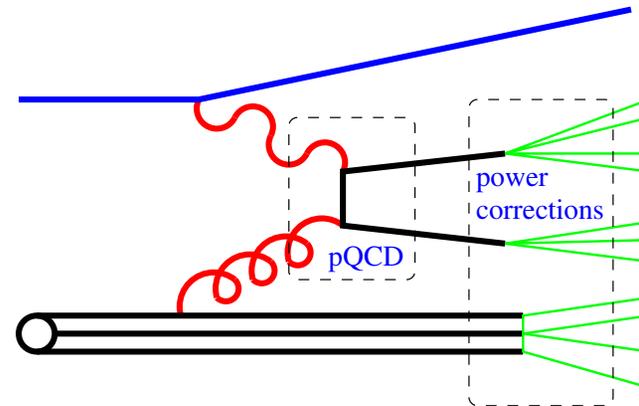
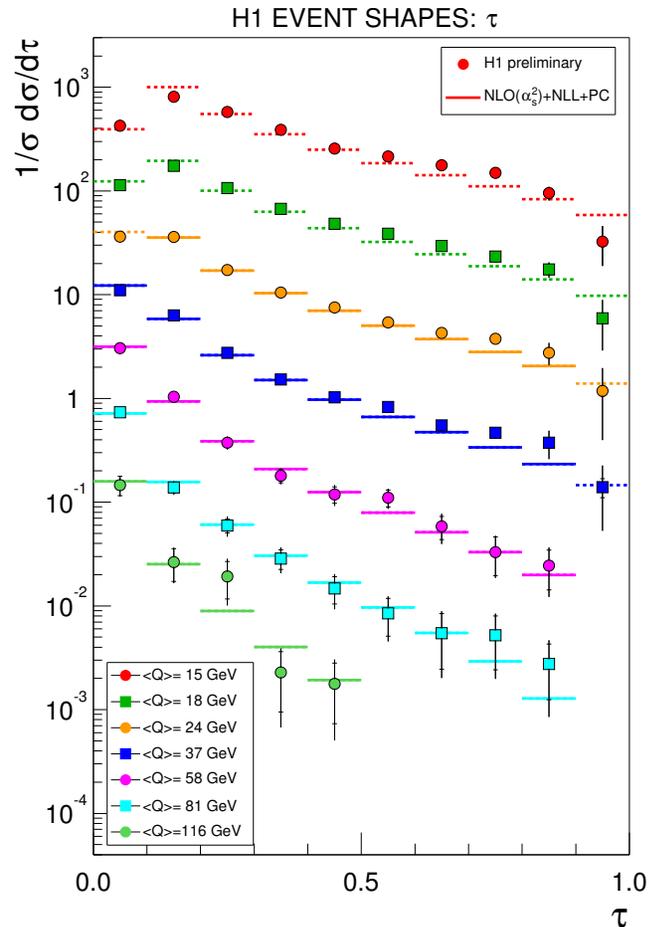
H1 Diffractive D^* (prel.)



Data described by NLO QCD
+ diffractive PDFs

QCD factorisation works
in DIS (and γp)

Event shapes in DIS



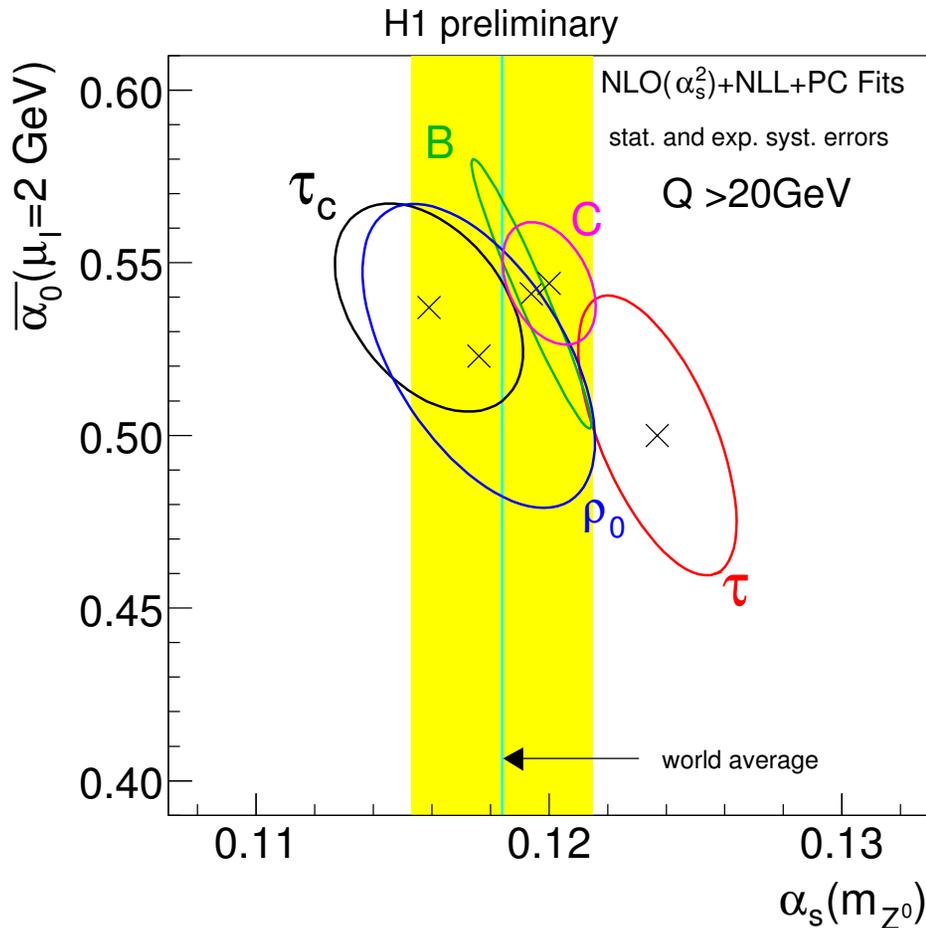
Sensitive to α_s and hadronisation effects $\bar{\alpha}_0$

Example: $\tau = (1\text{-thrust})$

H1 analysis: fit differential distributions with
NLO + NLL + PC



Event shapes in DIS



Fit differential event-shapes to
NLO + NLL + PC

Fit result:

PC parameter $\bar{\alpha}_0$

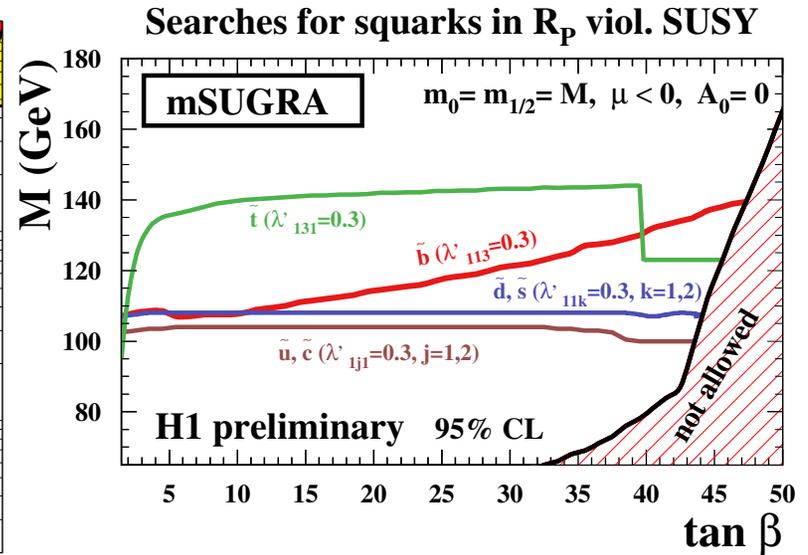
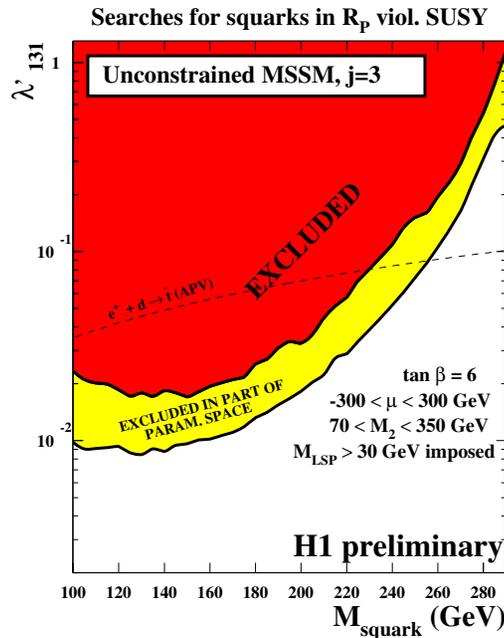
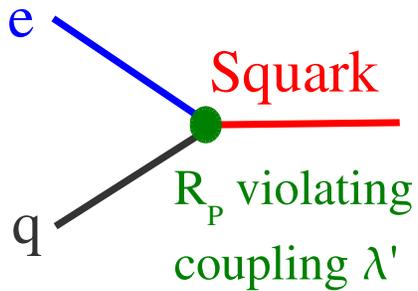
strong coupling constant α_s

Good agreement for different
event shapes.



R_p violating SUSY — squark search

Squark production



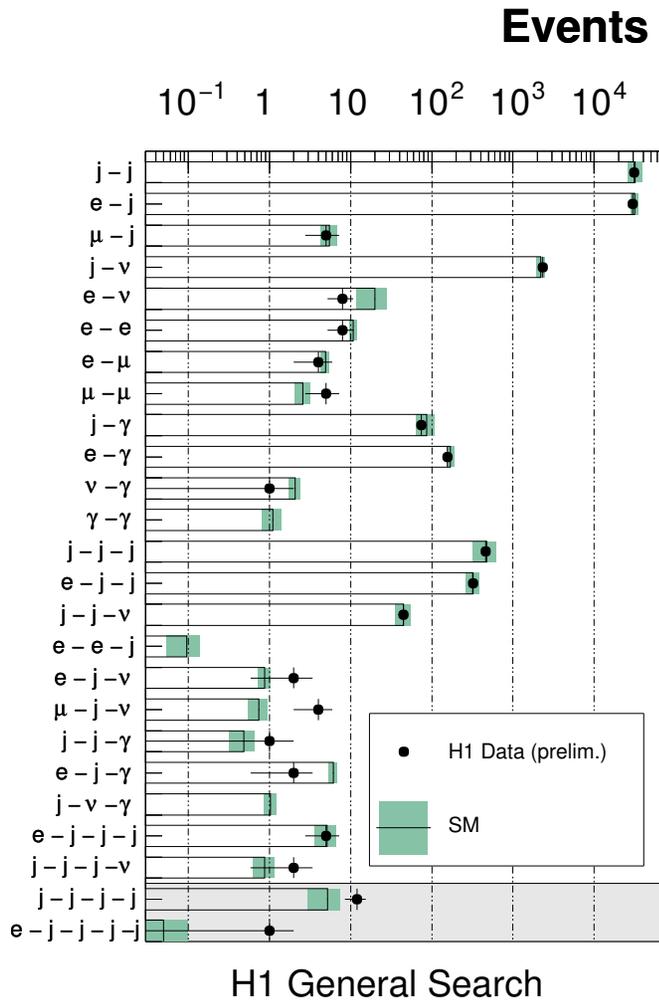
Coupling of em strength: exclude squark up to 275 GeV.

All e^+p and e^-p data at CM-energy 320 GeV included.

New: perform scan in $\tan(\beta)$ for mSUGRA model



Generic search for new physics

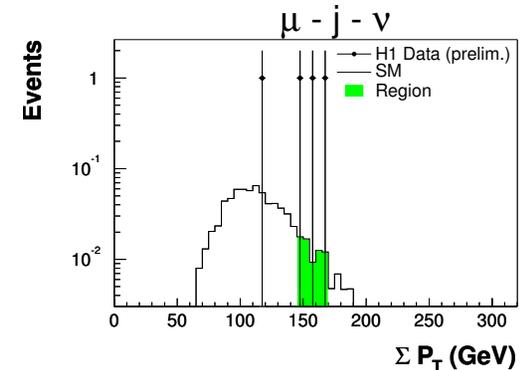


Reconstruct high- p_T objects ($e, \gamma, \mu, \nu, \text{jet}$)

$p_T > 20 \text{ GeV}, 10^\circ < \theta < 140^\circ$

Scan invariant mass and sum of transverse momenta, find “most interesting” region

Use full HERA I
luminosity: 115 pb^{-1}
Overall good
agreement with SM
in 25 search channels



Model-independent search confirms excess
in $\mu - \nu - \text{jet}$ channel studied in other analyses.



Summary and Conclusions

- Detector working well – first data looks good
 - Congratulations to HERA for the promising startup
- HERA I data still is a rich source for new analyses (e.g. QCD tests, searches for new physics)
- Exciting physics program has started with HERA II:
 - New detector components
 - High luminosity and polarisation
- Goal: exceed HERA I luminosity before next big shutdown
- Long-term goal: collect 1 fb^{-1} of data + low energy run



H1 CJC currents history

