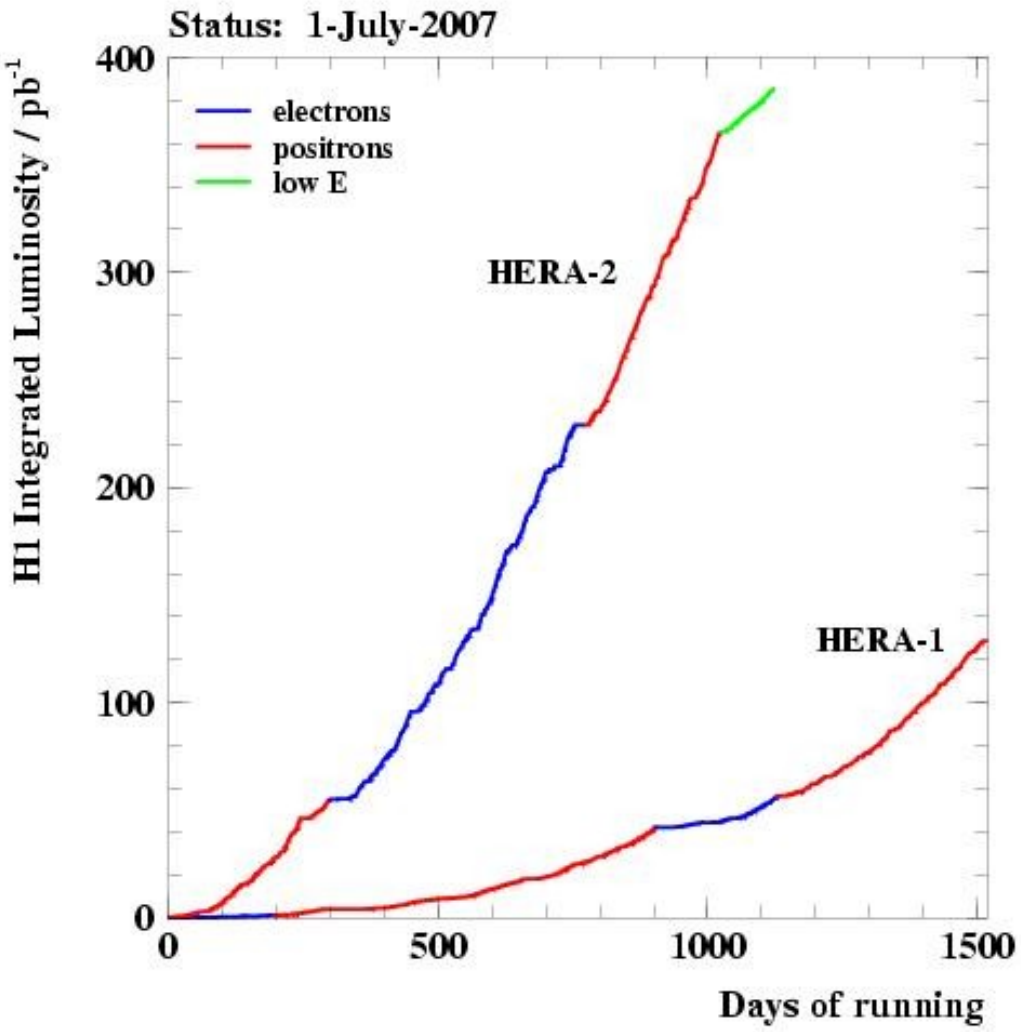
64th DESY PRC Meeting
8th -9th November, 2007, DESY Hamburg

H1 Status report

Dmitry Ozerov (ITEP, Moscow)

- End of data taking
- Recent physics results
- Preparation for final analyses

The final H1 data samples



High energy (Ep = 820, 920 GeV) :

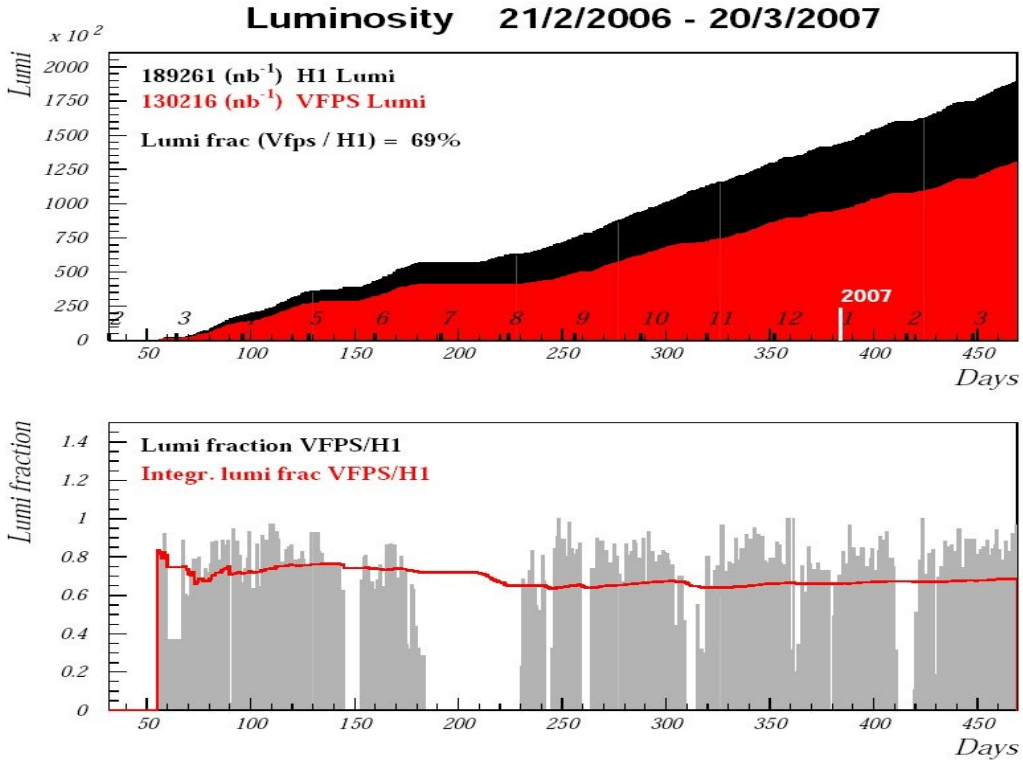
e^+p : 294 pb^{-1}
e^-p : 184 pb^{-1}
total : 478 pb^{-1}

Low energy :

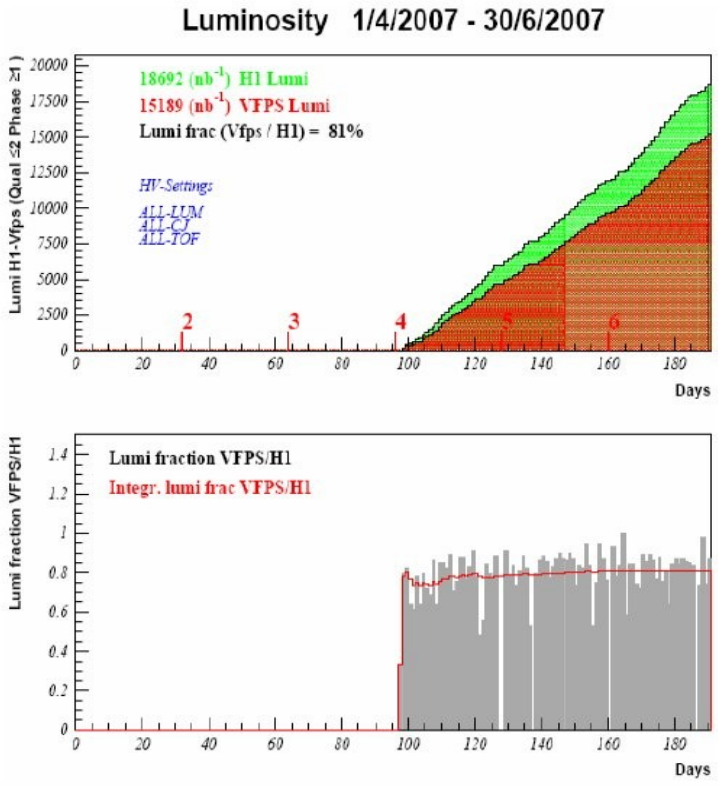
460 GeV : 12.3 pb^{-1}
575 GeV : 6.5 pb^{-1}

VFPS operation: summary

High energy (2006 + 2007)



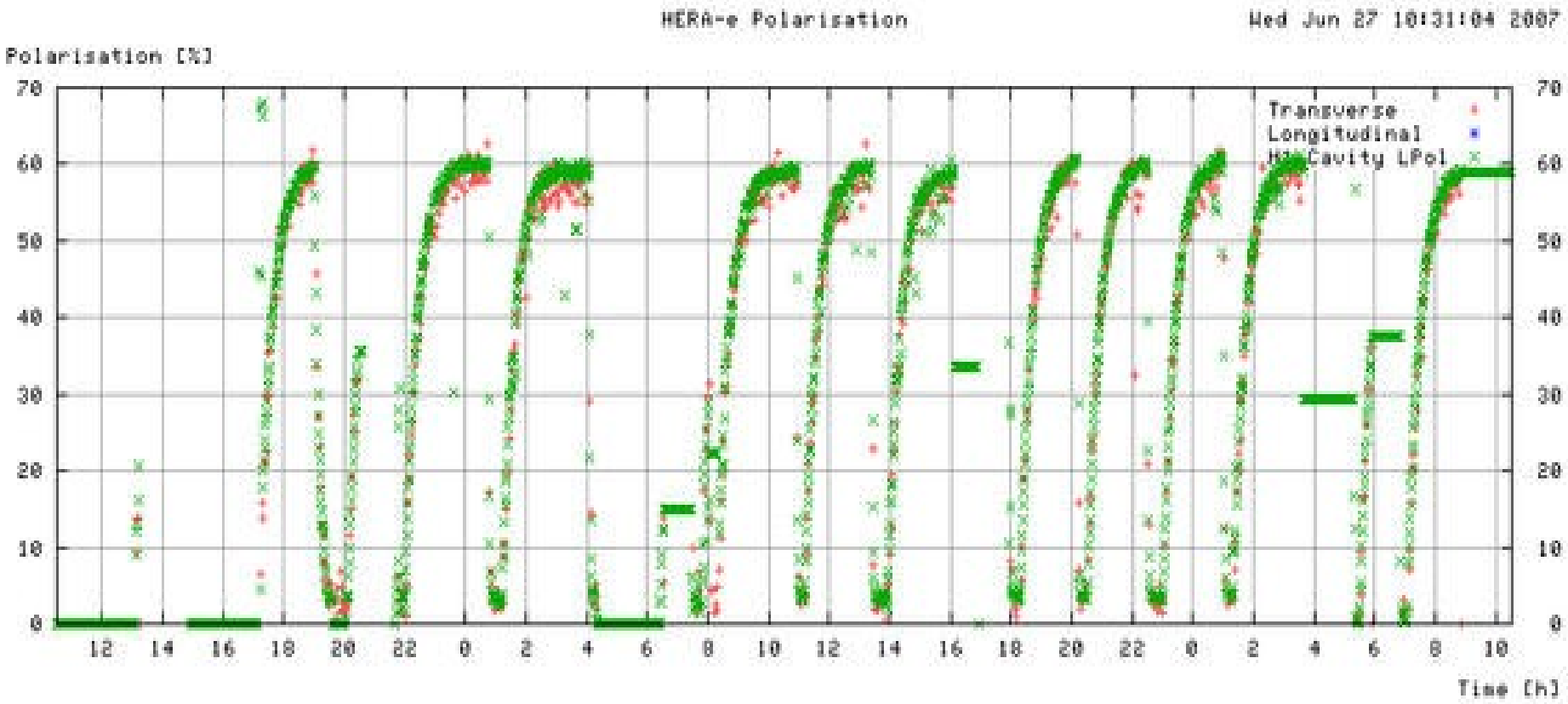
Low energy (2007)



High energy : 130 pb^{-1}
low energy : 15 pb^{-1}

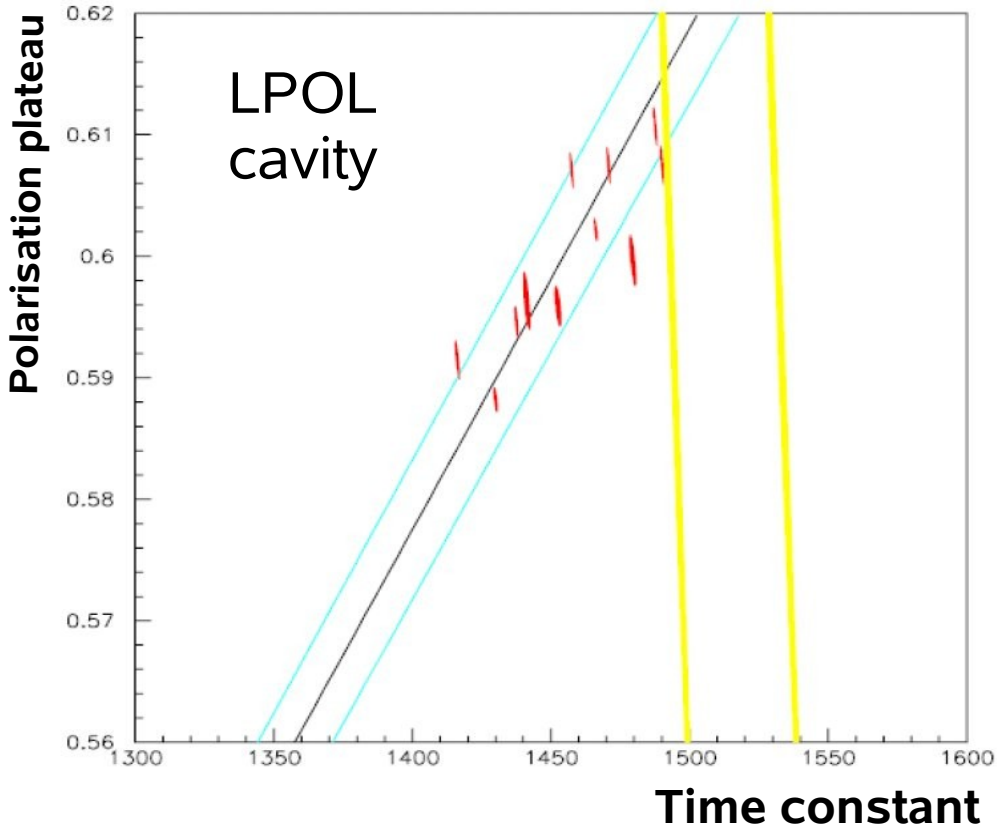
Smooth VFPS operation since 2005.
Analyses of the data are in progress.

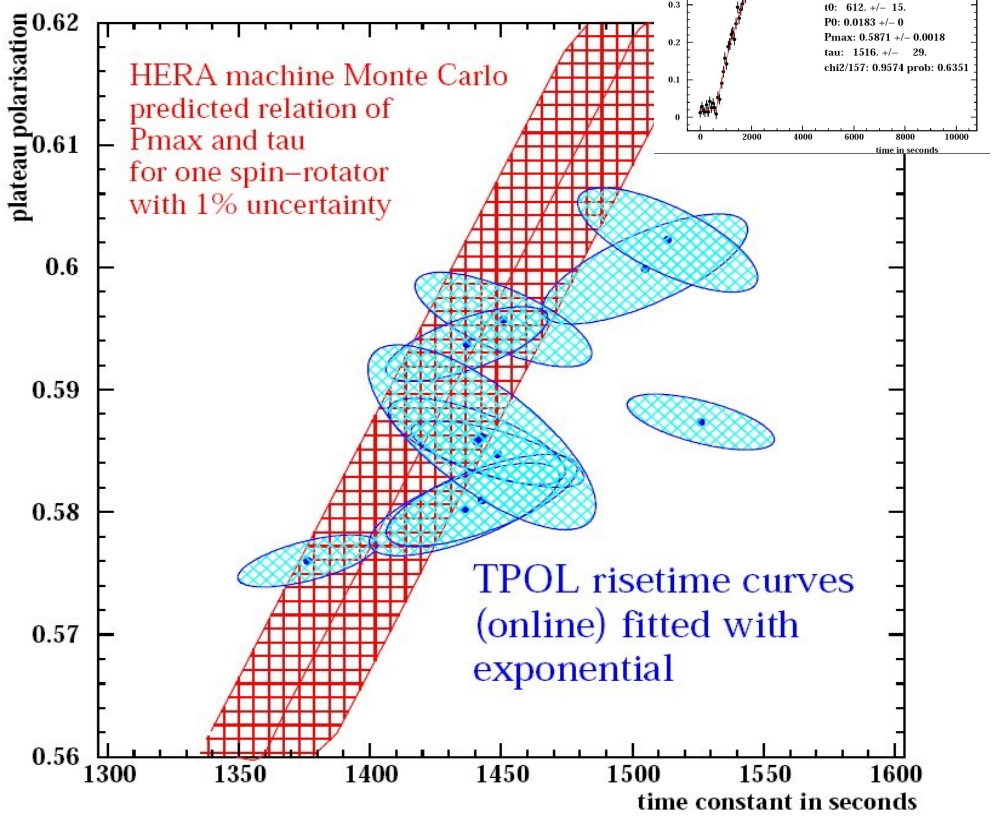
Understanding of the polarisation

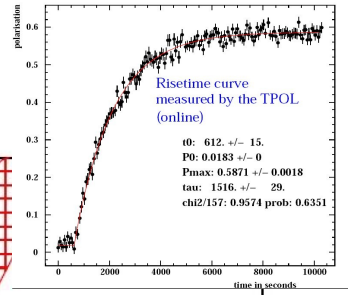


2 days of the dedicated HERA running to record ~11 polarisation risetime curves.

Understanding of the polarisation







Relation between the polarisation plateau and risetime ->
absolute calibration of the polarimeters

Studies ongoing to decrease the present systematic uncertainty of 3.5%

Recent physics results

- 4 publications since last PRC
  DESY-07-142 Measurement of DVCS and its t-dependence at HERA (HERA II)
  DESY-07-115 Dijet Cross Sections and Parton Densities in diff. DIS
  DESY-07-073 Measurement of Inclusive Jet Production in DIS
  DESY-07-065 Charged Particle Production in High Q^2 DIS

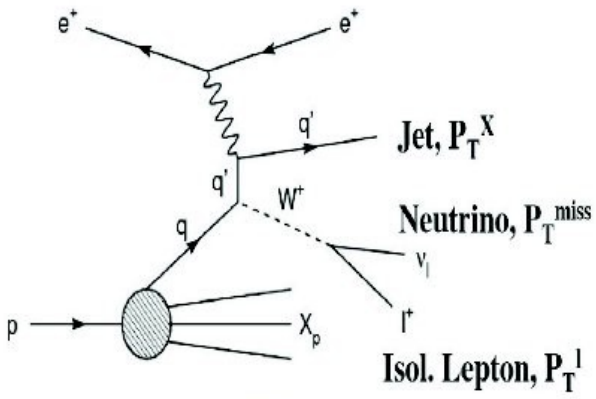
- ~50 H1 Papers sent to the EPS and LP conferences
  7 new preliminaries since last PRC (all use HERA II data)
  (~25 new preliminaries in 2007)

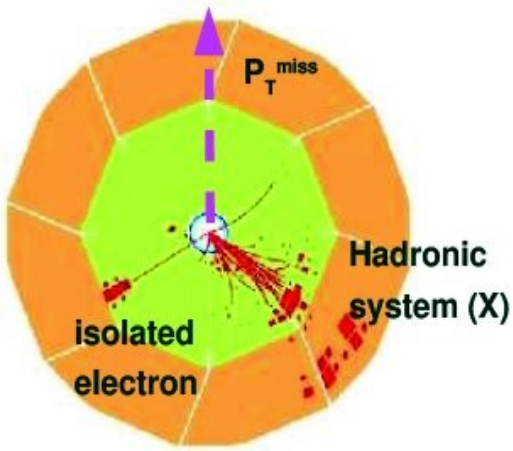
- Several new combined H1+ZEUS results

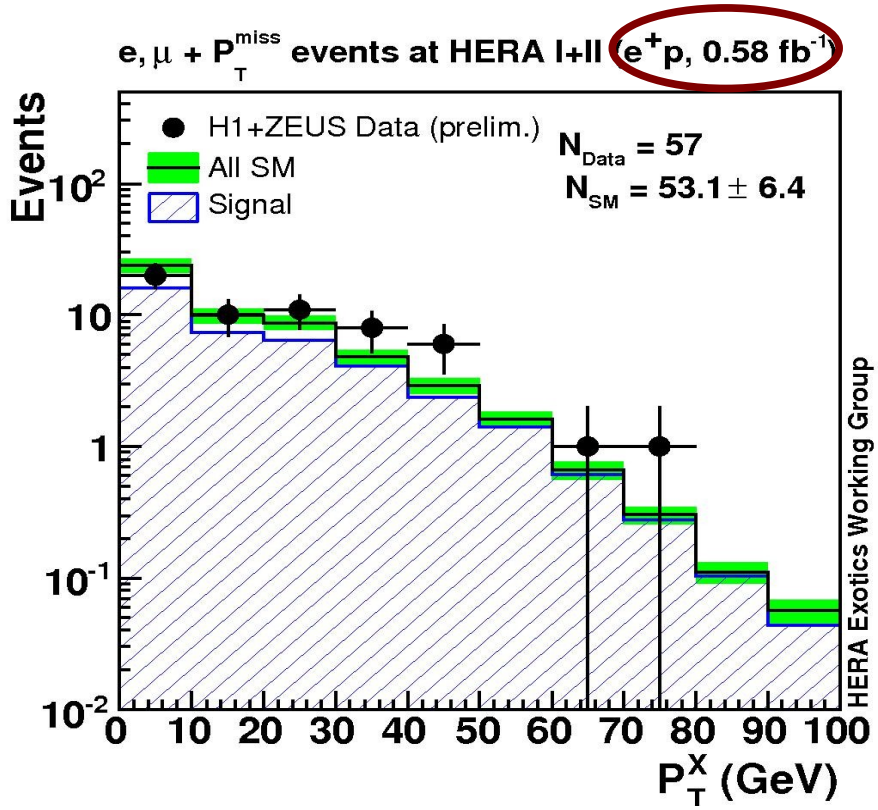
Events with isolated Leptons and missing Pt	full HERA
Multi-lepton Events	full HERA
Precision measurement of α_s at HERA	HERA I
Combination of H1 and ZEUS NC DIS Cross Sections	HERA I

Events with isolated lepton and P_T^{miss}

Preliminary, H1+ZEUS, 0.58 fb^{-1}





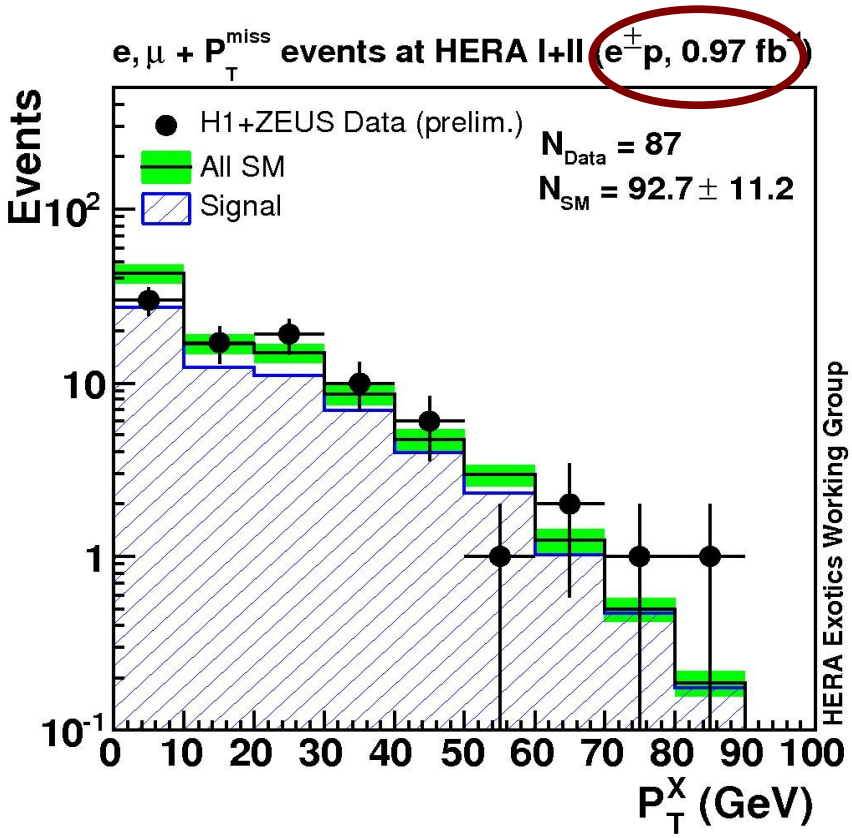


P_T >25 GeV (e^+p data):

data/SM = 23/14.6 (1.8 sigma excess)

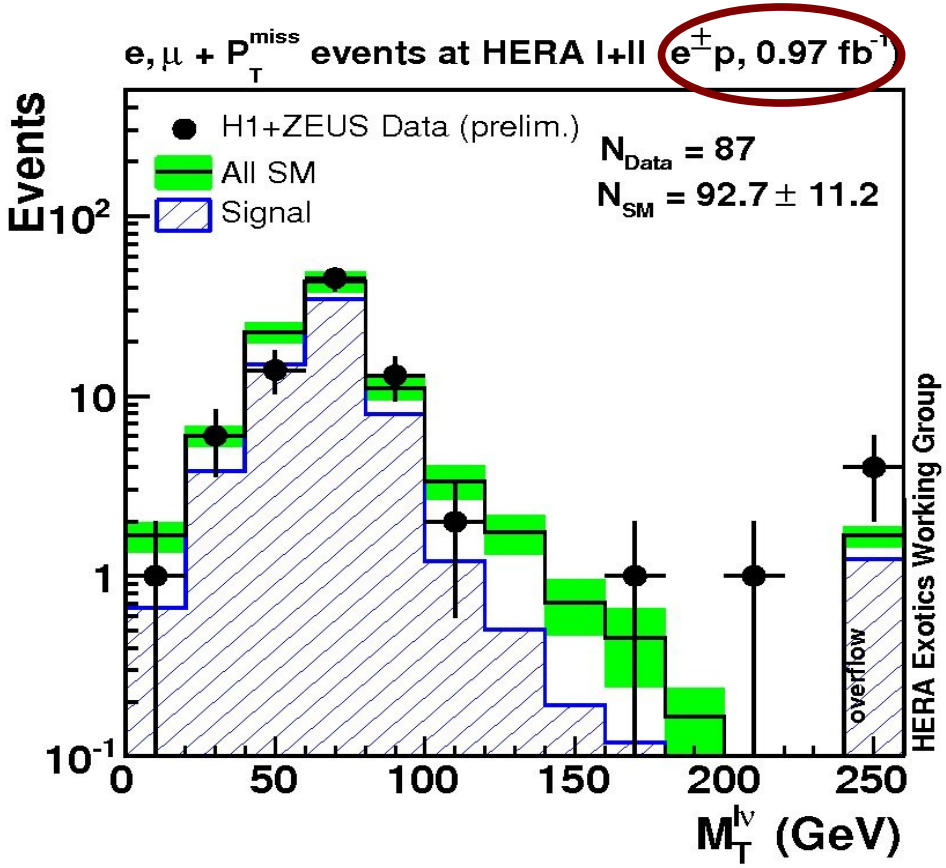
Isolated leptons and P_T^{miss}

Preliminary, H1+ZEUS, 0.97 fb^{-1}



P_T >25 GeV ($e^{\pm}p$ data):

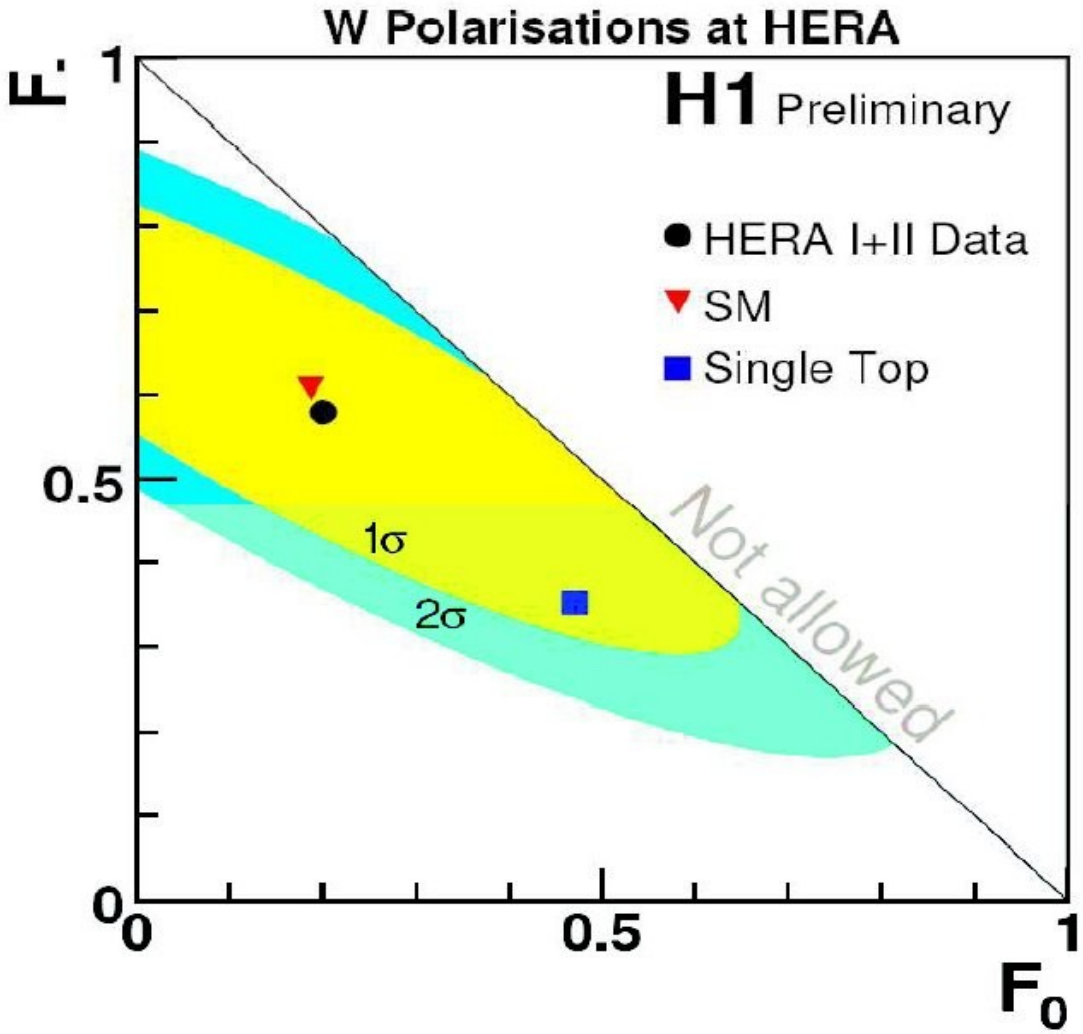
data/SM = 29/25.3



No discovery of new physics, but clean sample of W

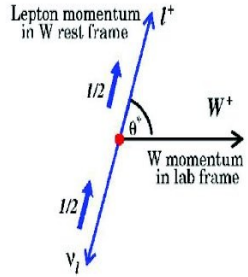
W production and polarisation

H1 Preliminary, 0.48 fb^{-1}



σ_W = 1.23±0.25(stat)±0.22(sys) (exp)

1.31±0.20(th.sys) (SM)



W fractions:

F_- - left handed polarisation

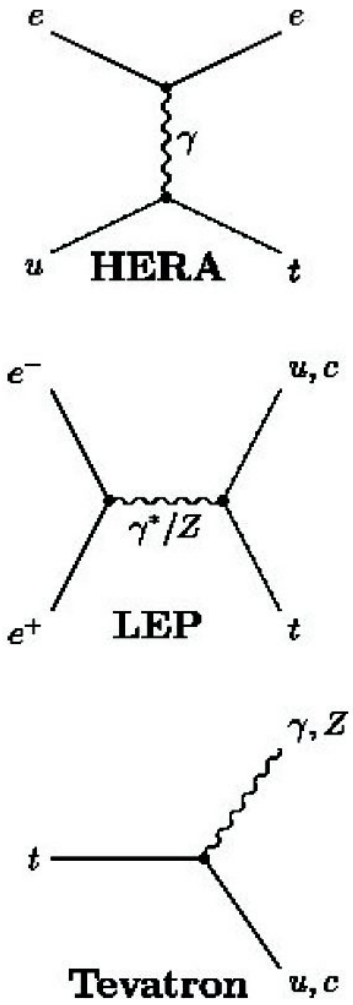
F_0 - longitudinal polarisation

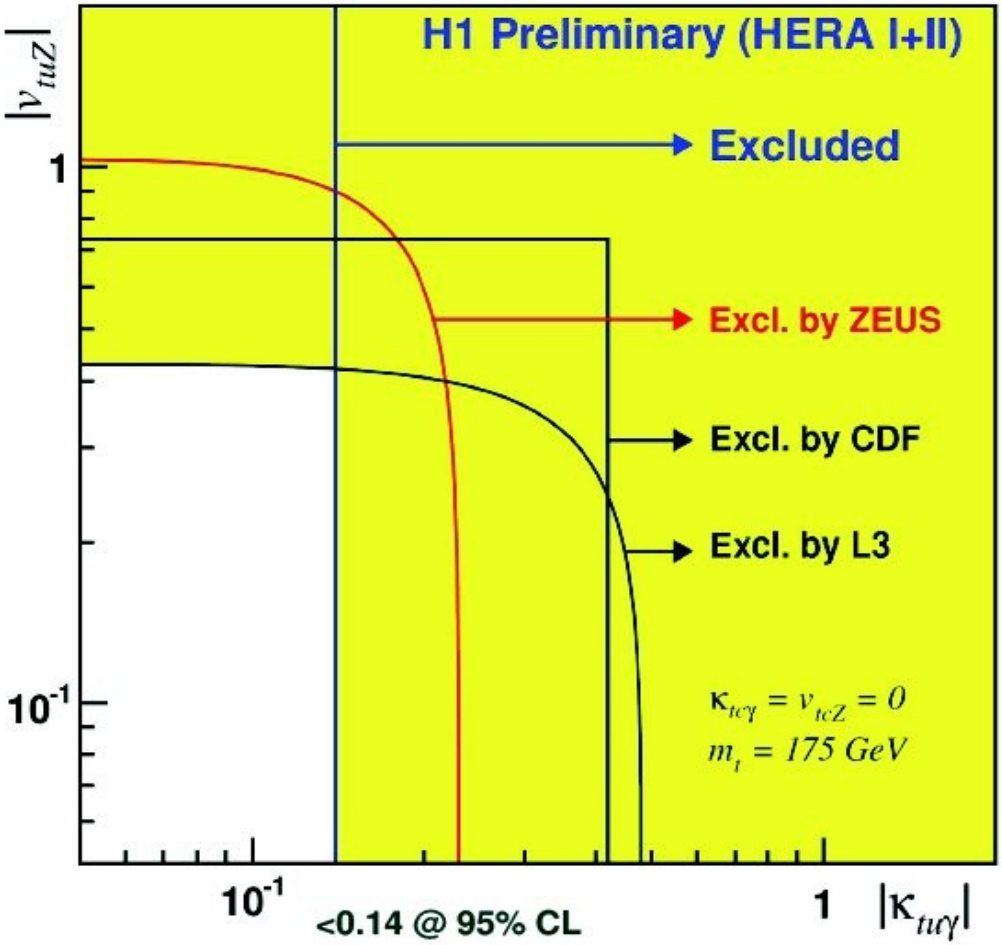
F_+ (=1-F_- -F_0) - right handed

Good agreement with the SM

Search for anomalous Single Top Production

H1 Preliminary, 0.48 fb^{-1}

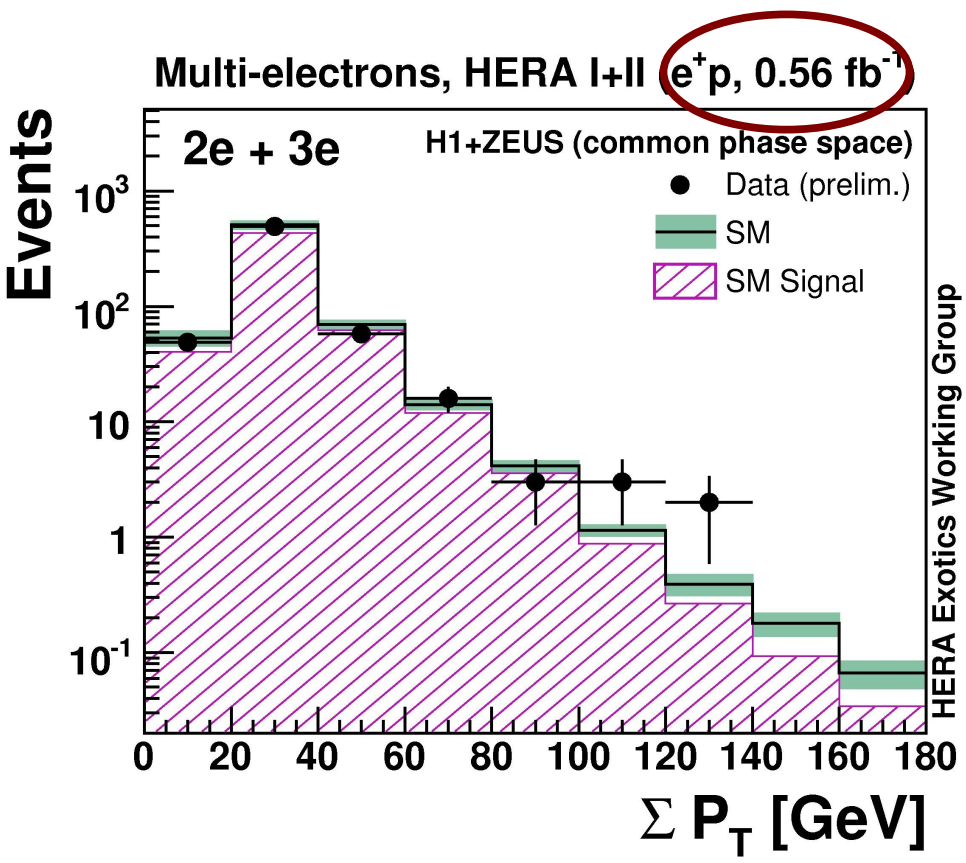


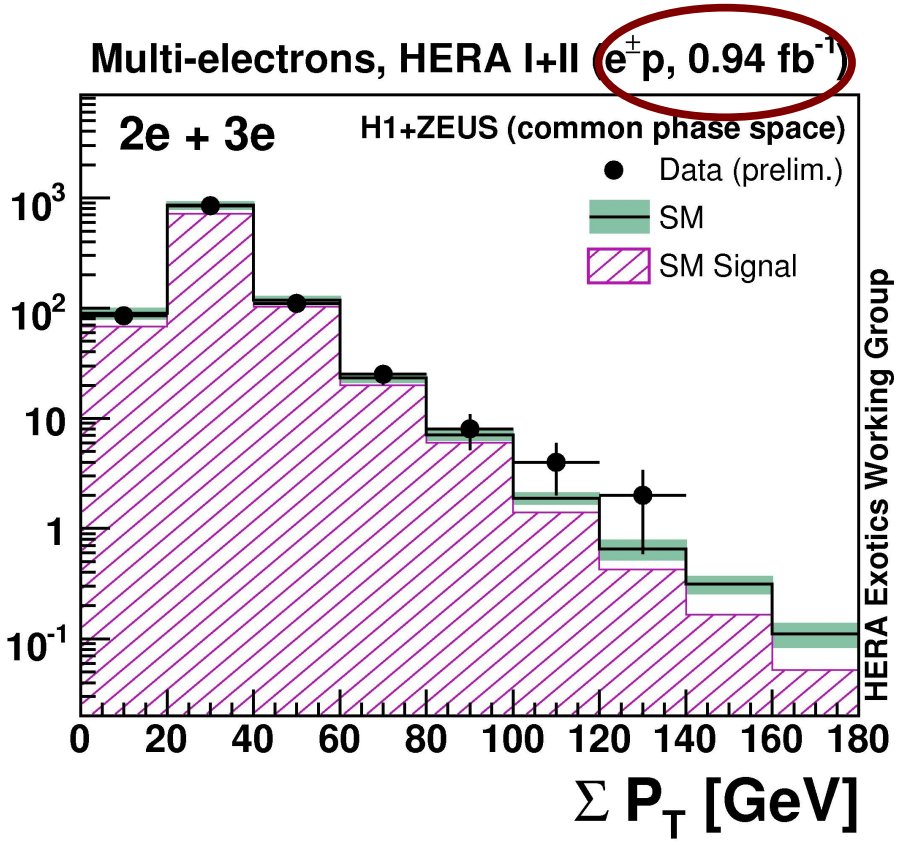


The best limit on anomalous top coupling to u and γ

Multi-electron Events

Preliminary, H1+ZEUS, 0.94 fb^{-1}





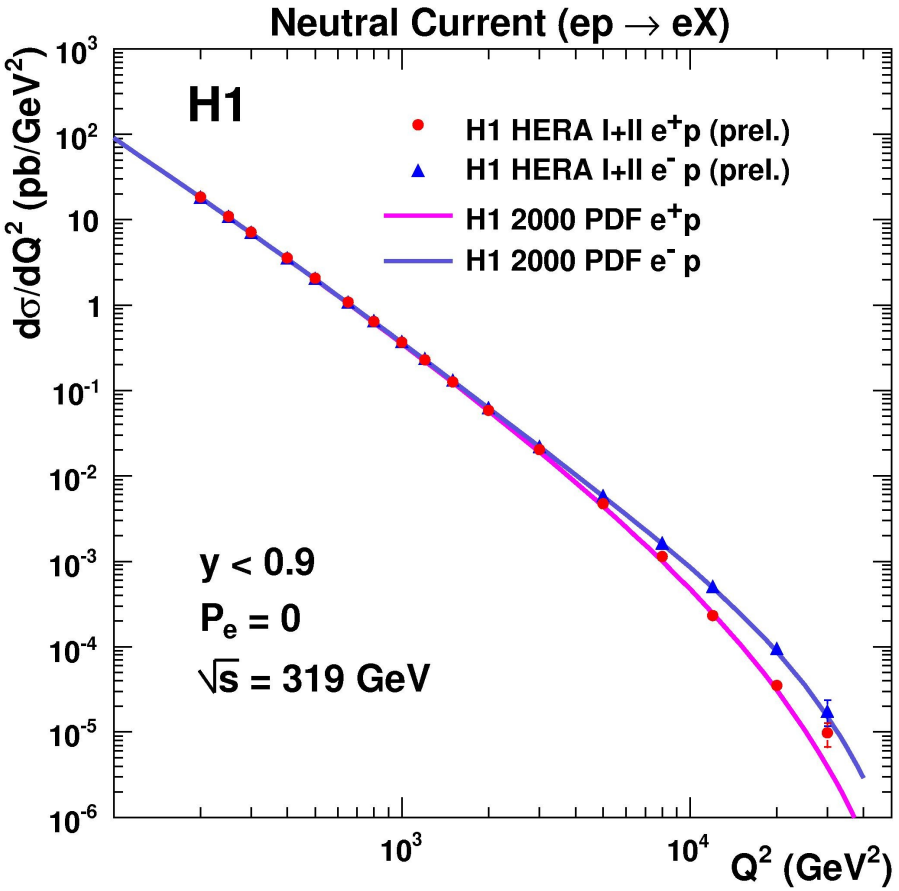
Pt > 100 GeV:

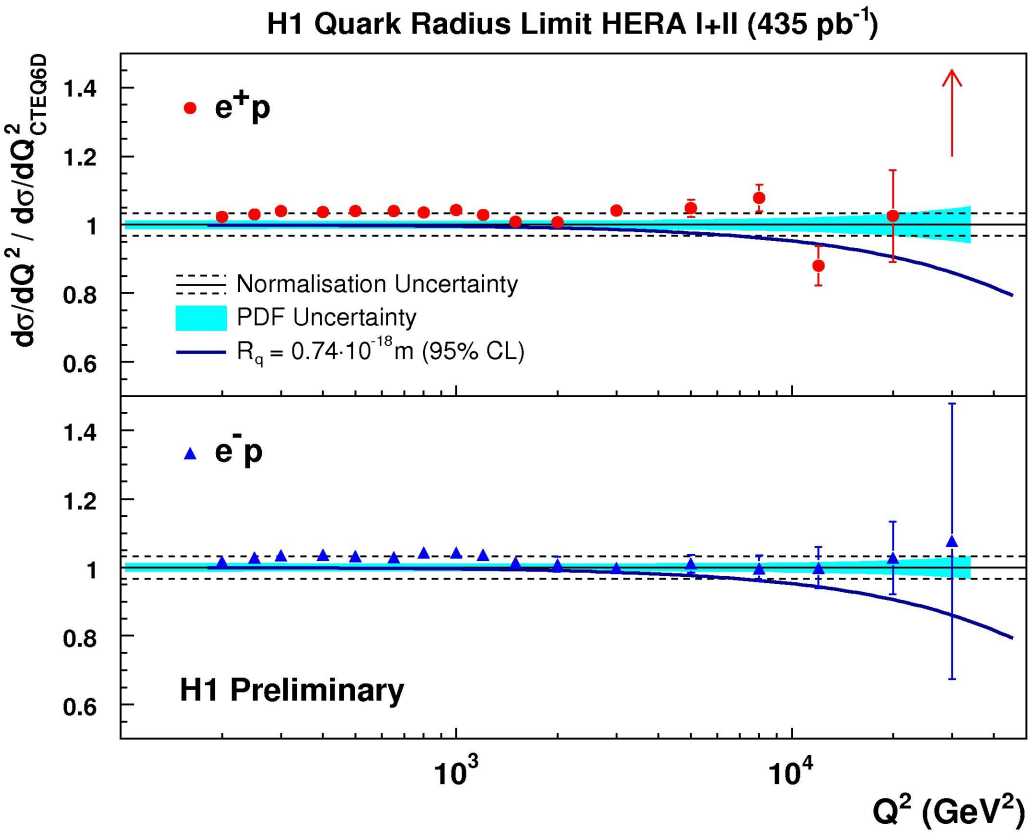
data/SM (e^+p) : 5/1.8 data/SM (e^-p) : 1/1.2

next step is to add muons in the combination

High Q^2 analysis

H1 Preliminary, 0.44 fb^{-1}

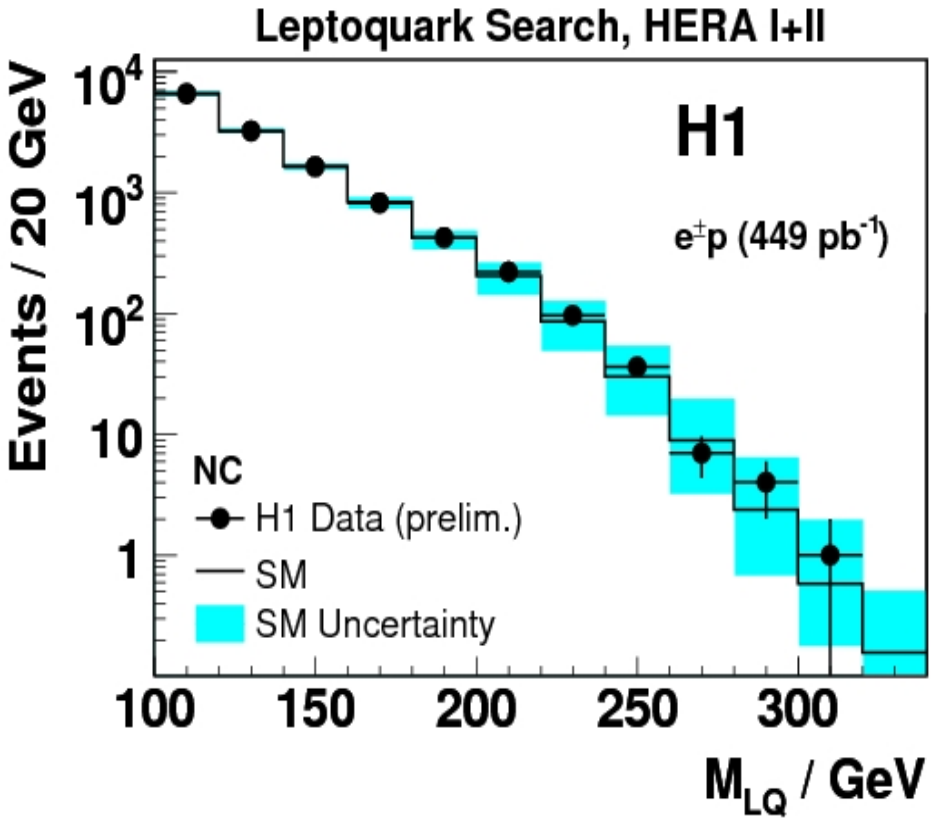


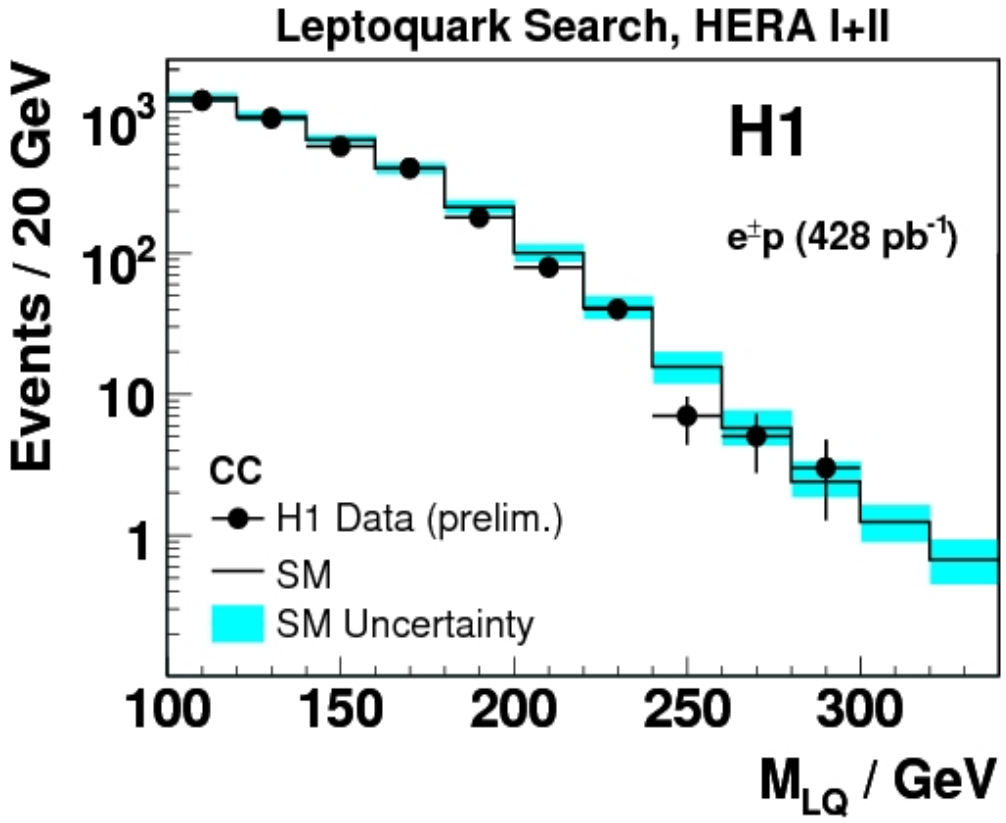


$$R_q < 0.74 * 10^{-18}\ m$$

Search for the Leptoquarks

H1 Preliminary, 0.45fb^{-1}

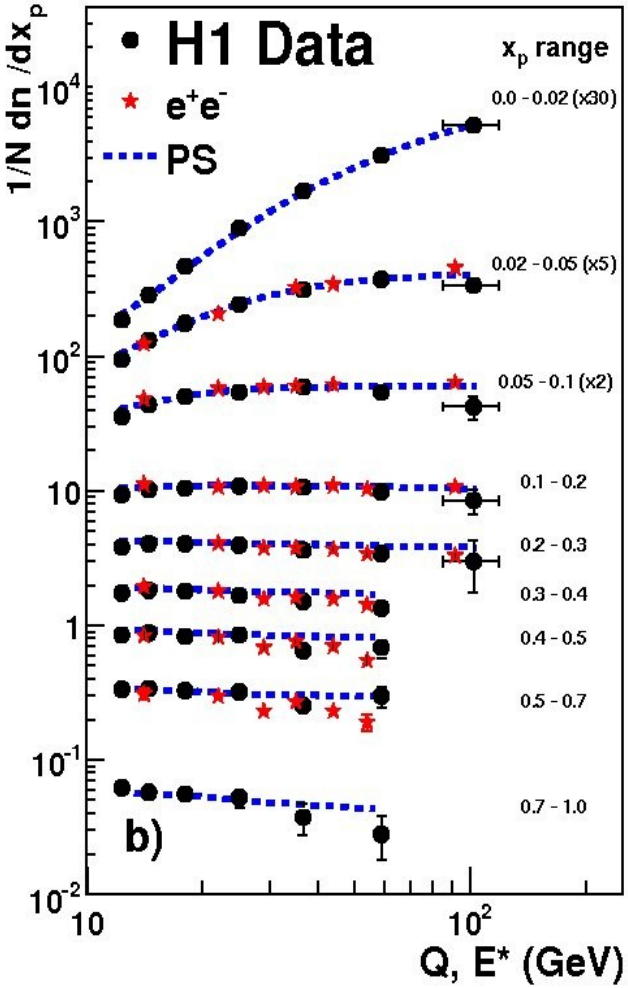




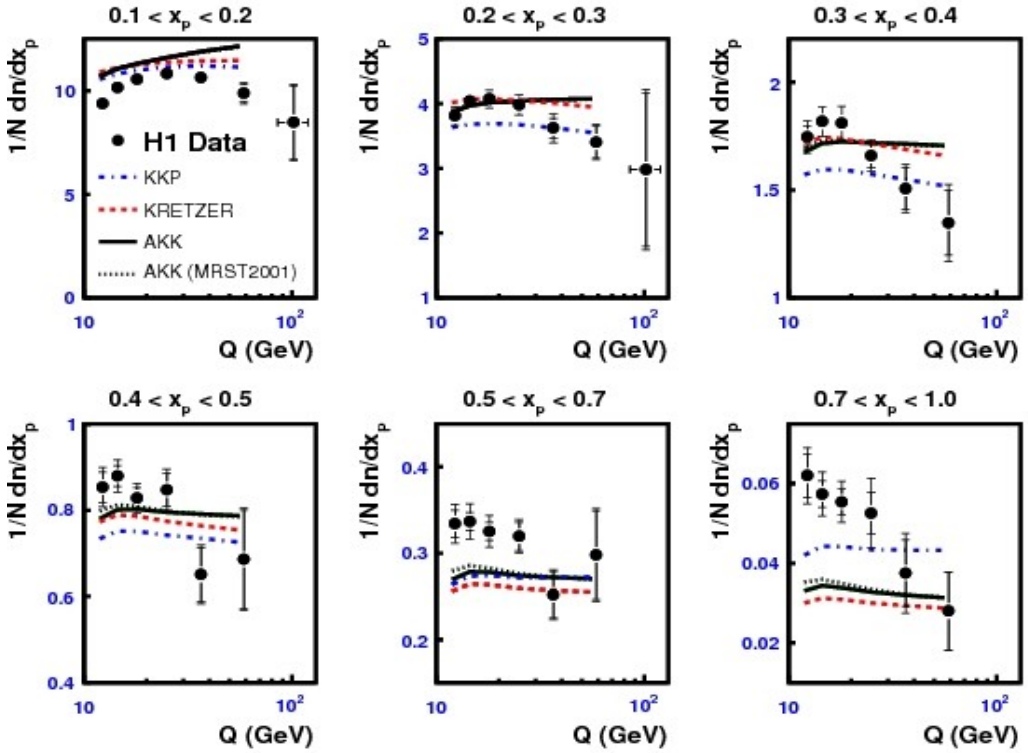
No significant signal in NC and CC mass spectra

Charged particles production at High Q^2

Phys.Lett.B654, 148, 2007

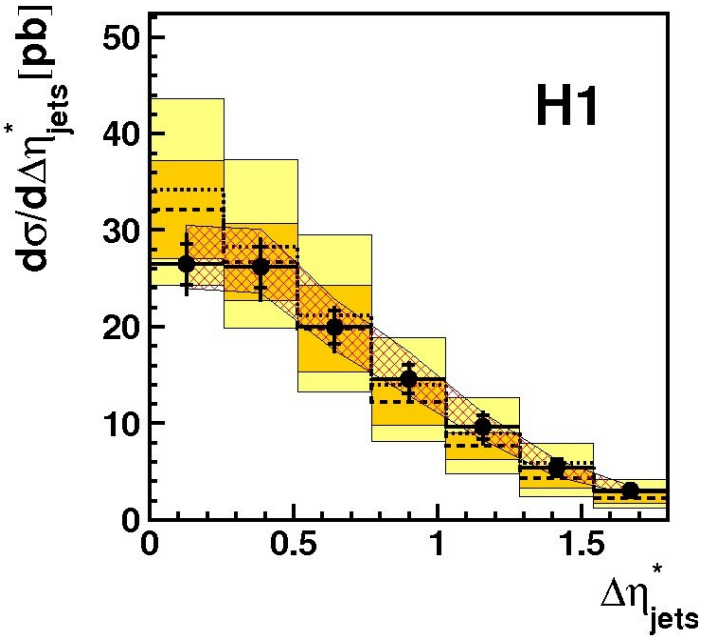


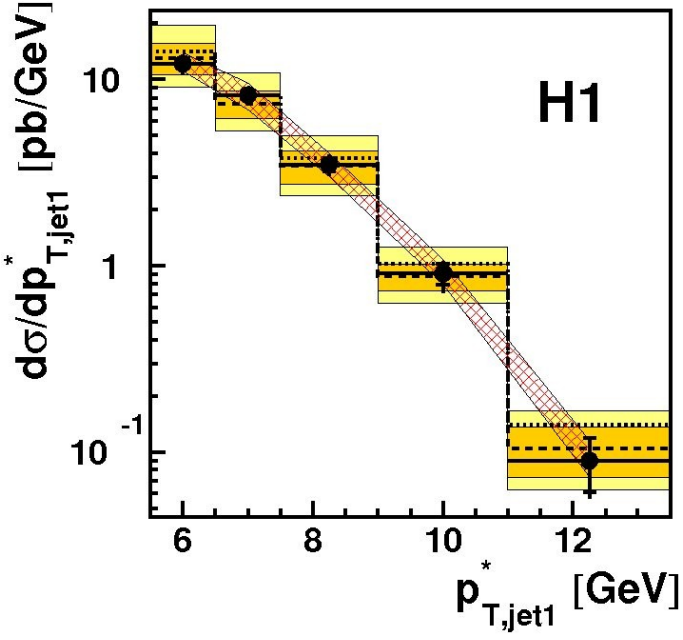
- Supports the concept of quark fragmentation universality in e^+e^- and ep collisions
- NLO QCD calculation fails to describe scaling violation seen in the data.

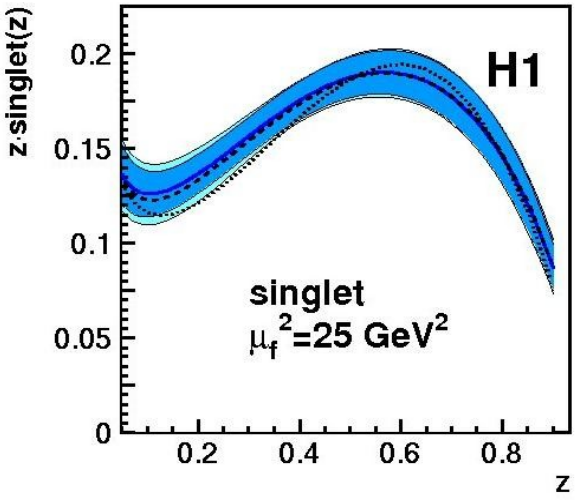


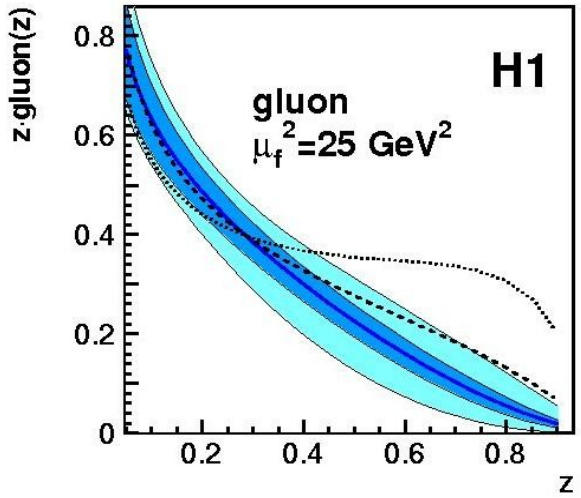
Di-jets in diffractive DIS

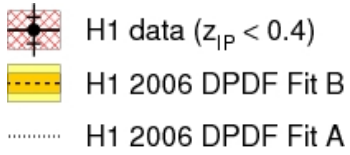
JHEP 0710:042, 2007









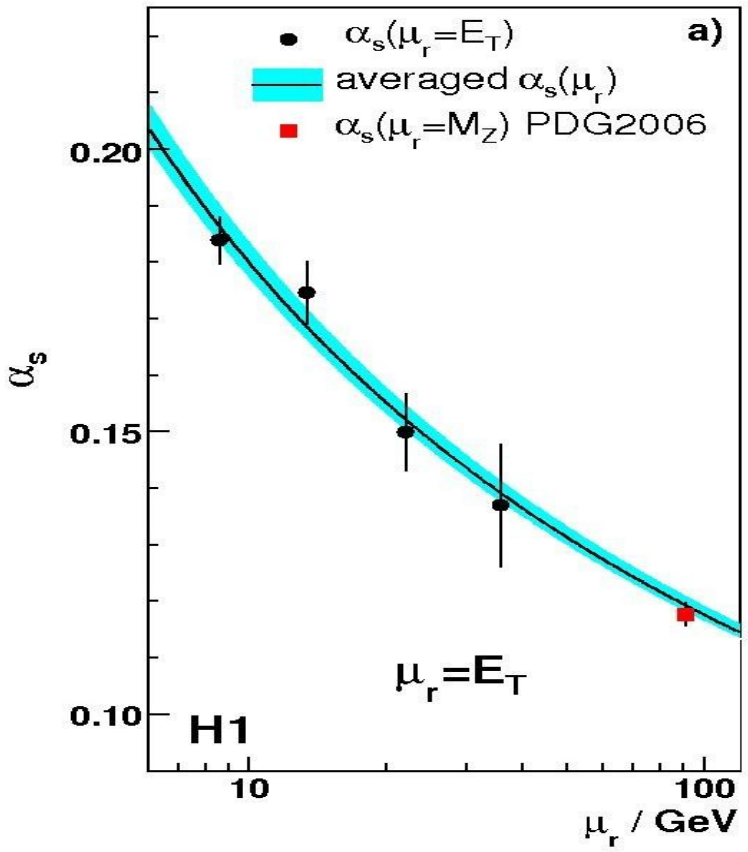


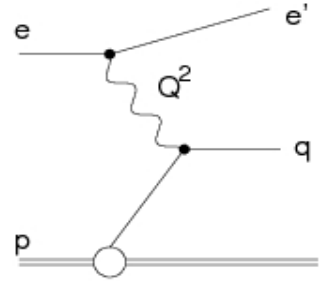
Data are consistent with QCD factorisation

Combined fit to the di-jets and inclusive data → better constraints on the diffractive gluon density at large momentum fractions.

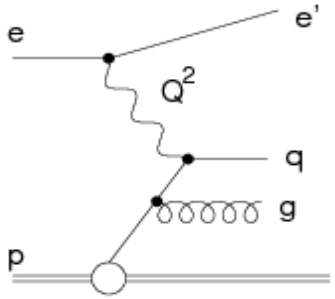
Inclusive Jets in DIS and measurement of α_s

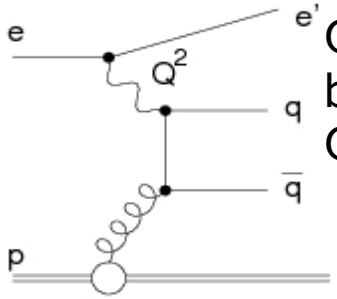
Phys.Lett.B653,134, 2007





Born contribution O(1)





QCD-compton
boson-gluon fusion
$O(\alpha_s)$

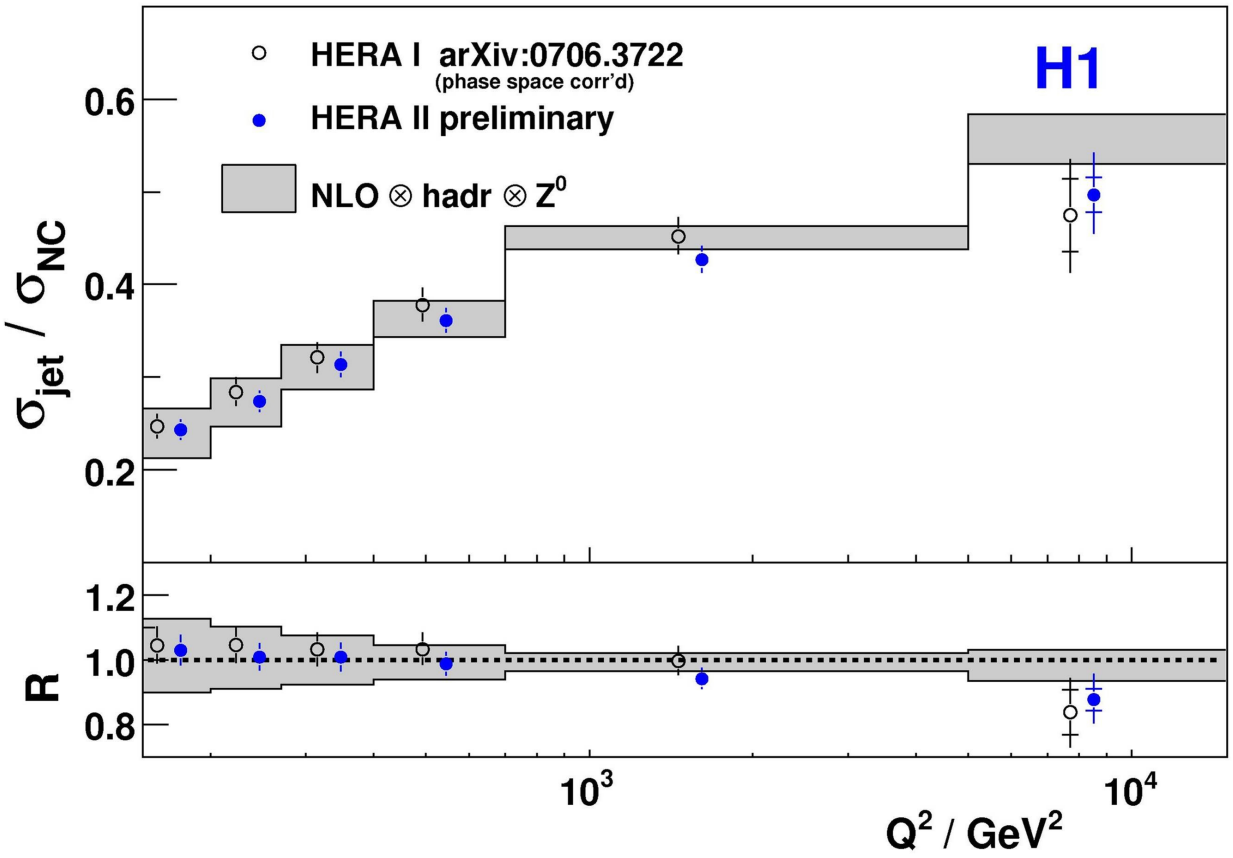
Final result from the HERA I jet-data

Experimental error ~ 1%

$$\alpha_s(M_Z) = 0.1193 \pm 0.0014\ (\text{exp.})^{+0.0047}_{-0.0030}\ (\text{th.}) \pm 0.0016\ (\text{pdf})$$

Inclusive jet at HERA II

Preliminary, 0.32 fb^{-1}



Significant improvement in precision. Potential to reduce further experimental error on α_s

Prospects : DATA

Sample	$\mathcal{L}$/pb	Events	Days	CPU	Mev/day	Status
2007 low E	13	$149 \cdot 10^6$	7	84	21	DST4, ongoing
2007 mid E	6	$62 \cdot 10^6$	3	84	21	Scheduled for Nov 10
2007 high E	47	$87 \cdot 10^6$	6	60	15	DST4, done
2007 e^+p	47	$87 \cdot 10^6$	14	64	7	DST3, done
2006 e^+p	89	$177 \cdot 10^6$	25	64	7	DST3, done
2006 e^-p	58	$86 \cdot 10^6$	8	60-80	11	DST3, done
2005 e^-p	115	$166 \cdot 10^6$	10	40	17	DST3, done
2004 e^+p	51	$62 \cdot 10^6$	9	40	7	DST3, done
2003 e^+p	4	$20 \cdot 10^6$	3	44	7	DST3, done

Total H1 statistics:
1 billion events
(200 millions low/middle energy run)

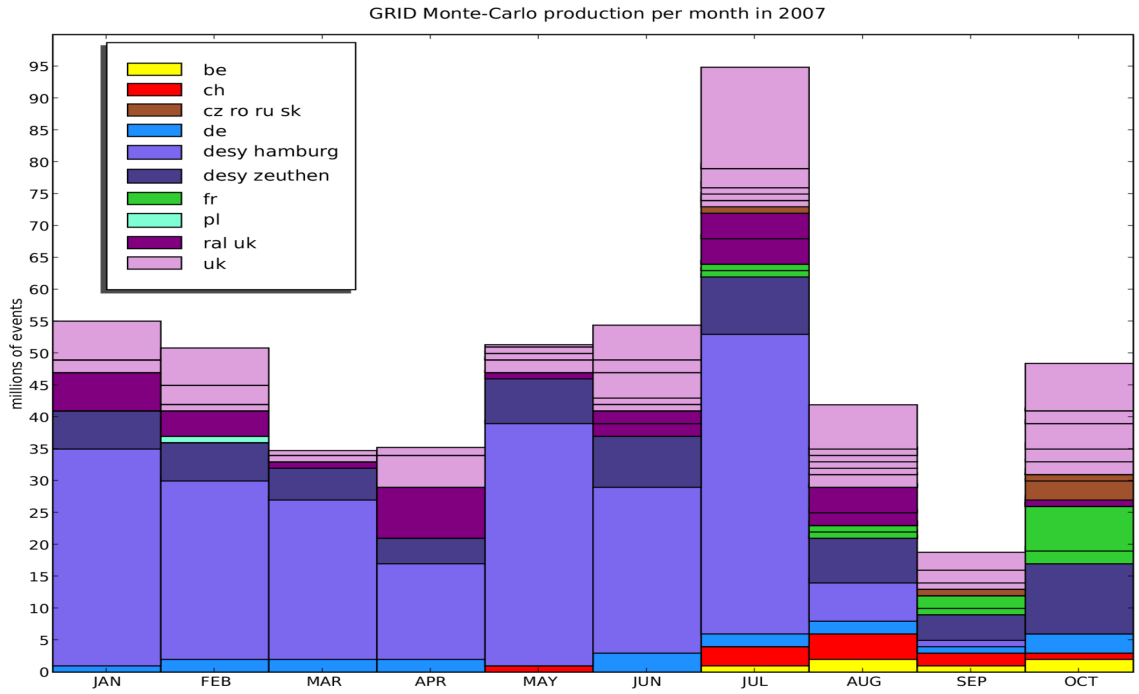
With the improvement in the repro-scheme:
~1.5 months for full reprocessing of data

DST3 (Ready) – homogeneous data sample(high energy HERAII)
to finalise analysis of the searches

DST4 (in 2 weeks) – data sample for F_L analysis
(low/middle/high energy 2007 data)

DST5 – homogeneous data of HERAI+II for precision analyses

Prospects : MC



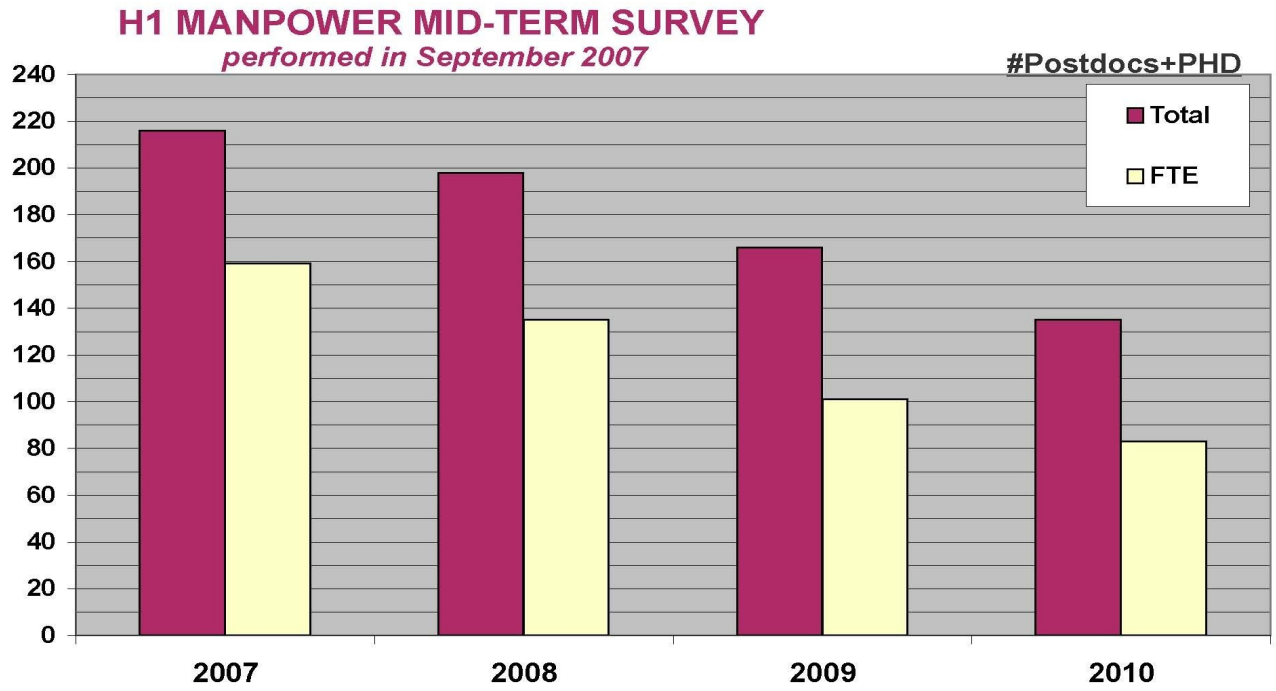
All MC production is on GRID now.

Current speed:
50-100 millions ev./month

Goal:
100 m./month(average)
(200 m./month (peak))

Independent on LHC startup it is important that H1 will get necessary GRID resources.

Prospects : Collaboration



2009 :
2/3 of present FTE

2010 :
1/2 of present FTE

H1 Collaboration is strongly motivated to finalise data analyses for publication.

Summary

Present :
- 0.5 fb^{-1} data of high energy + low energy
- First results using the full HERA I+II H1 data sample
- First results using the full HERA (H1+ZEUS) data sample

Short-term future (2008) :
- final words on most searches for new physics
- first result on direct measurement of F_L expected
- new HERA II QCD measurements

Mid-term future (≥2009) :
- Final precision analyses