Luminosity: HERA1 vs HERA2
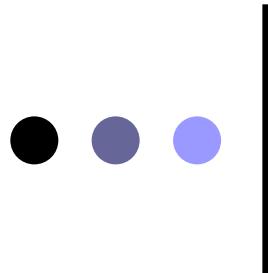
Elan low Q^2 group

H1 collaboration meeting

Varna, 16.09.2008

Tasks and methods

a) Make yield studies in Fortran and compare data sets (with identical cuts): HERA1 (2000) and HERA2 (2004-2007)

b) Compare data/MC normalization in 2000 and 2007 years (with standard cuts - not identical)

c) Compare cross section ratios for 2000 and 2007

Event selection for meth a)
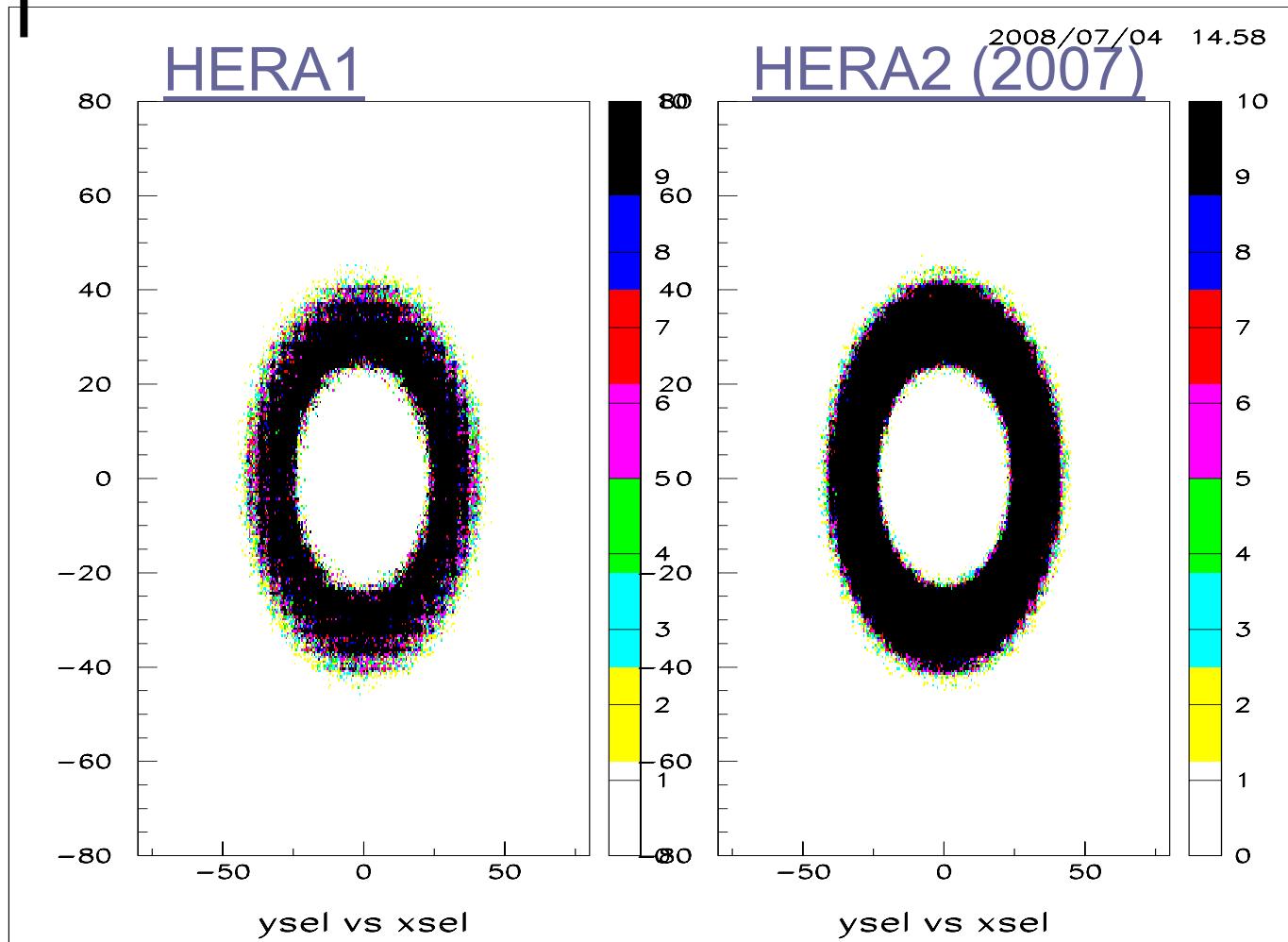
HERA1

- Data: 2000
- G&M runs
- HV CJC&SpaCal ON
- s3, s9, s0
- $15 < E'_e < 25 GeV$
- $|zv_{CJC}| < 35cm$
- $\Delta zv < 8cm$
- $R_{log} < 4.5cm$
- $166 < \theta_e < 171^o$
- Max. prescale = 15

HERA2

- Data: 2004-2007
- G&M runs
- HV CJC&SpaCal ON
- s0, s2, s3
- $15 < E'_e < 25 GeV$
- $|zv_{CJC}| < 35cm$
- $\Delta zv < 8cm$
- $R_{log} < 4.5cm$
- $166 < \theta_e < 171^o$
- Max. prescale = 15
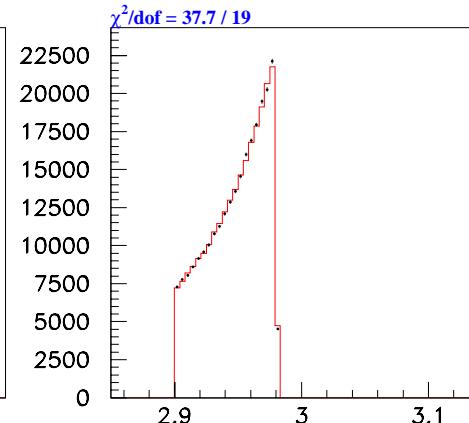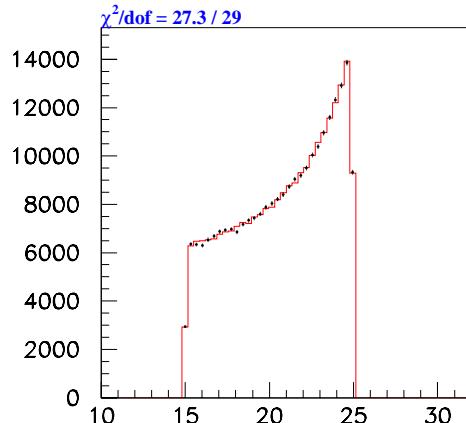
Control plots for a)
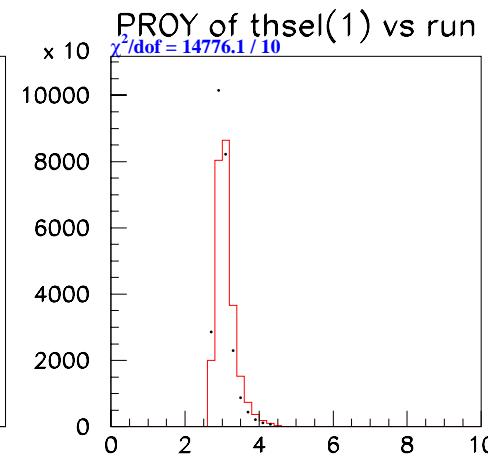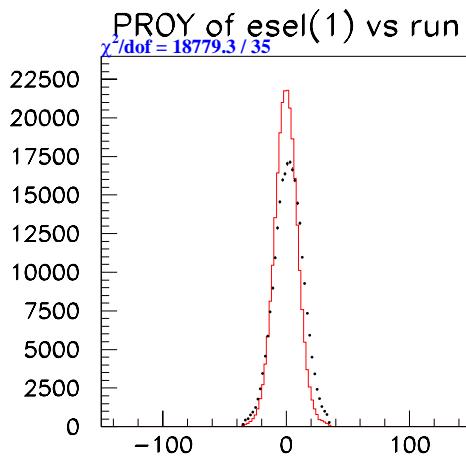

No dead regions found

Control plots for a)

2008/08/11 13.11

No problems with
E' and θ_e from comparison
of HERA1 and HERA2 data
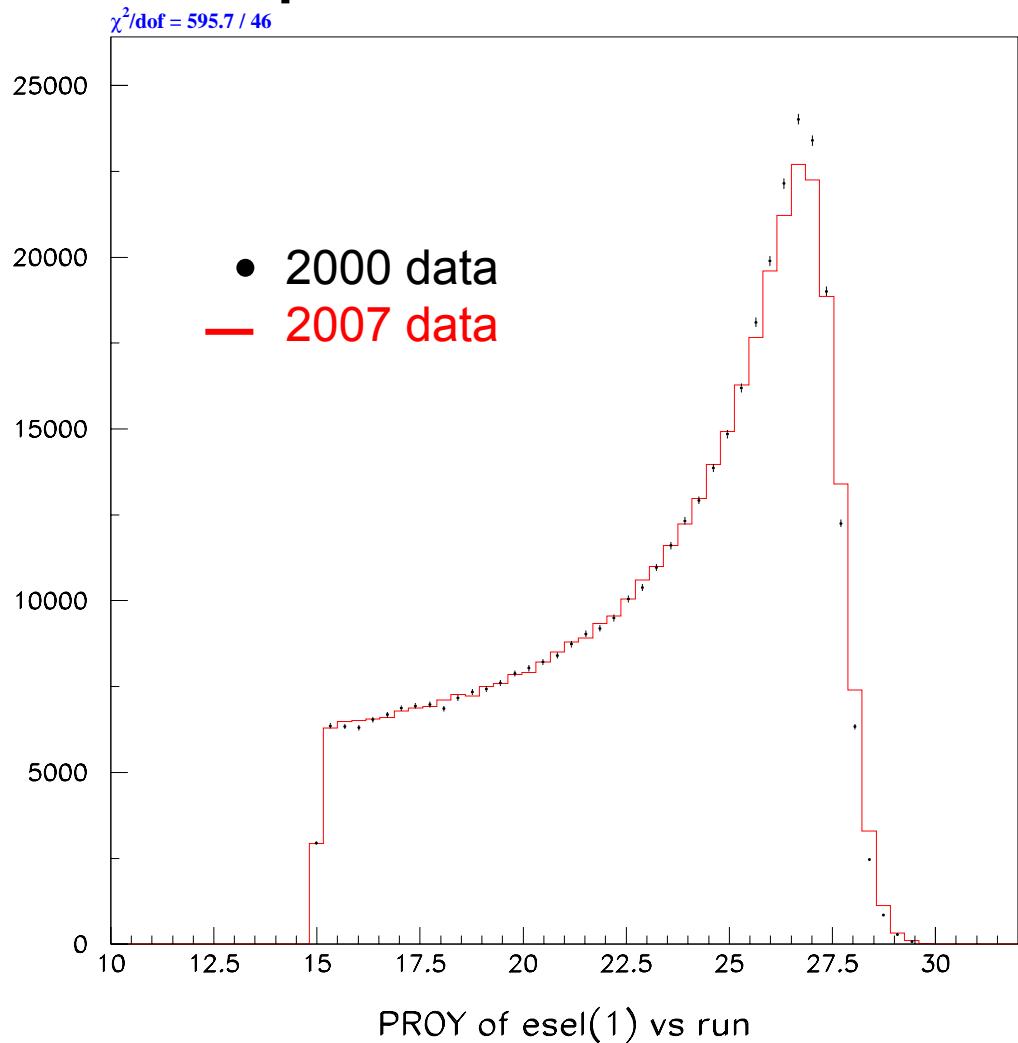
- 2000 data
— 2007 data

Safe θ_e cut used

Open R_{log} cut

Control plots for a)

$\chi^2/\text{dof} = 595.7 / 46$

2000 data

2007 data

PROY of esel(1) vs run
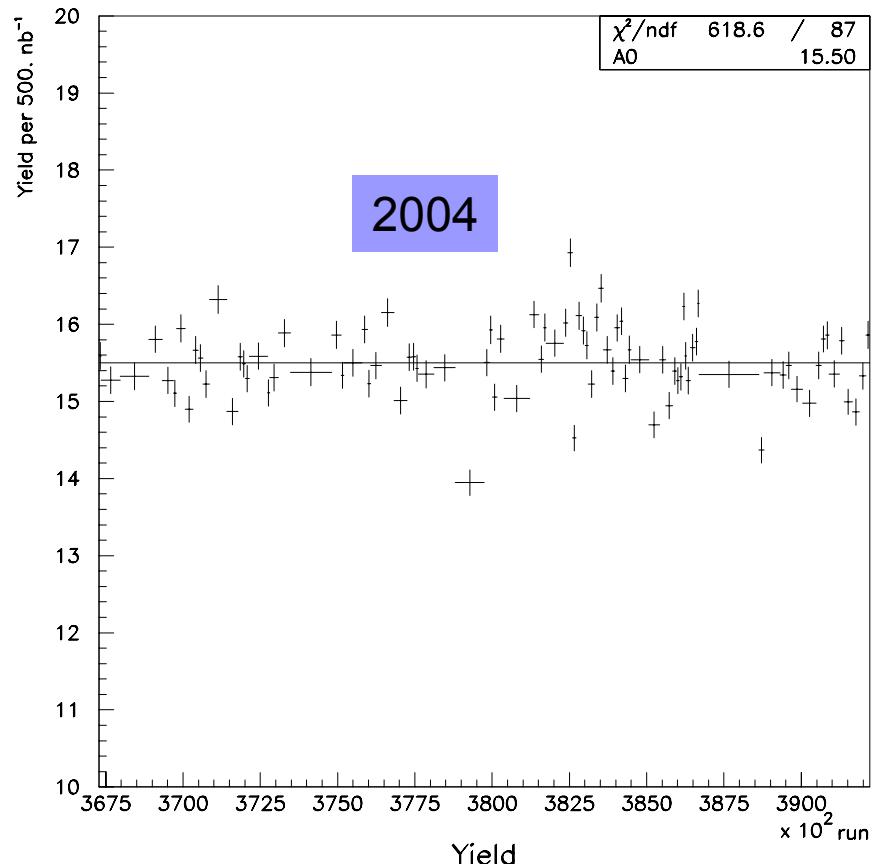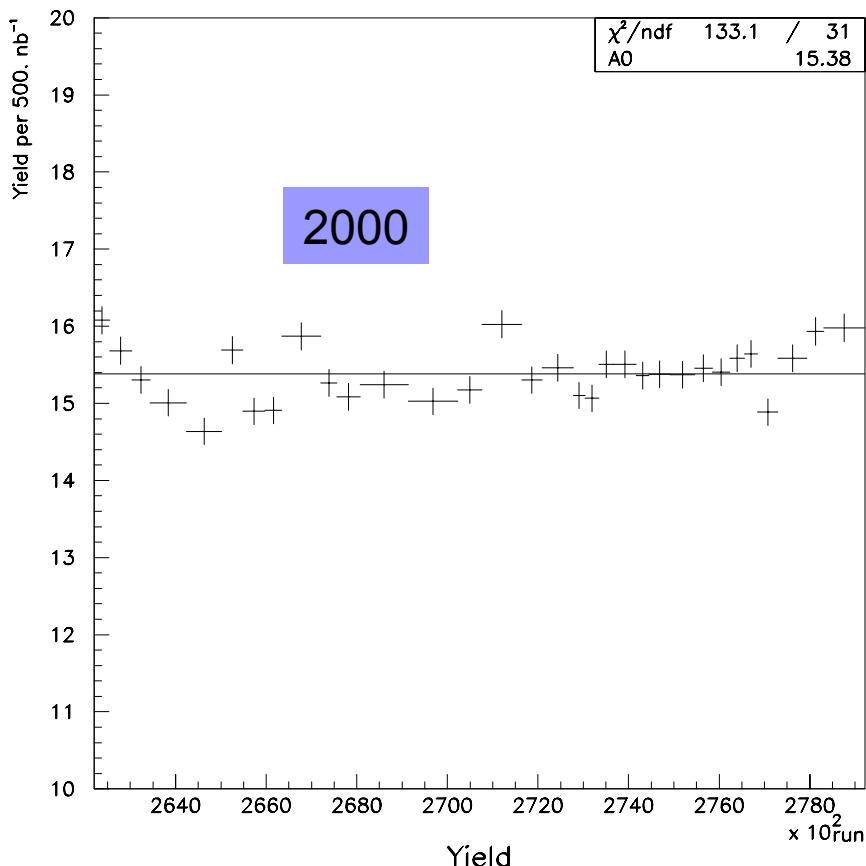
- More dead material (?) in 2007 (red line) – worse resolution compare to 2000 (dots)
- Relative shift in kin. peak <0.2%
- New E_{DA}/E' run dependent correction is applied

Yields from a)
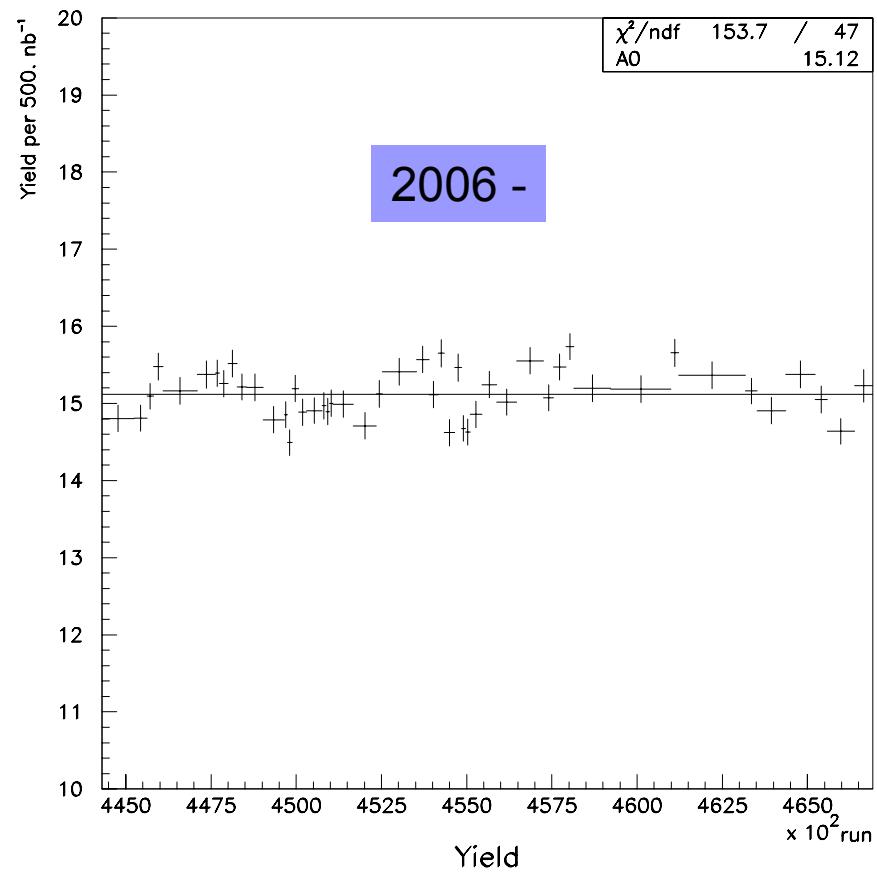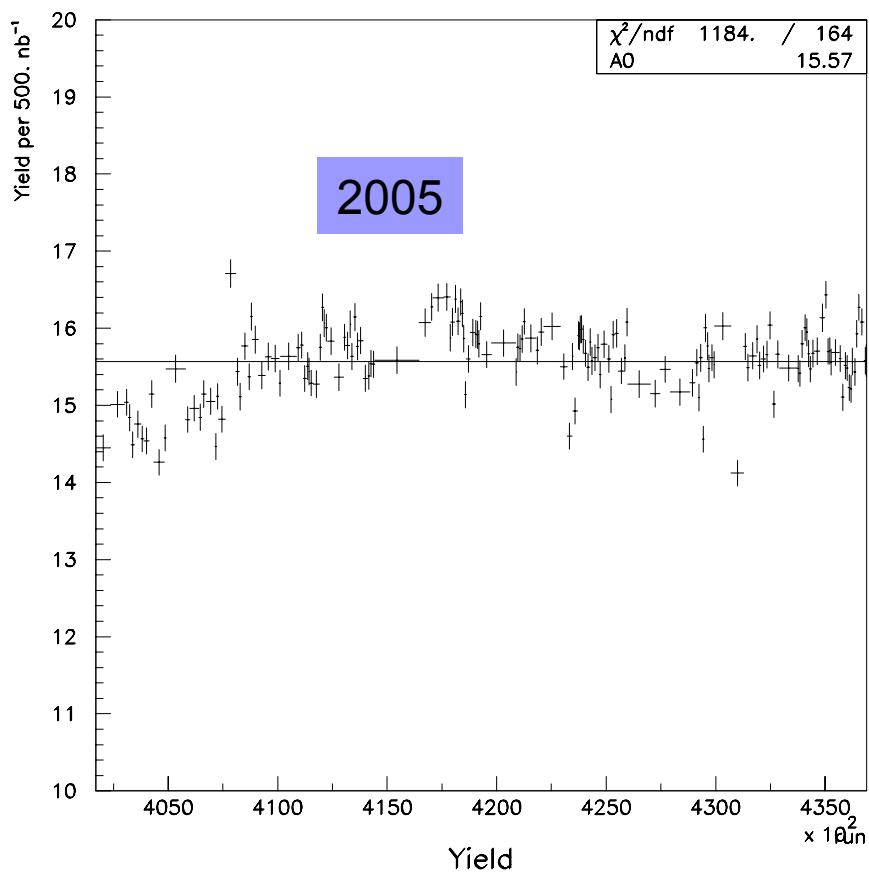
$$\text{Event yield} = \frac{\# \text{DIS events}}{\text{luminosity}}$$

Veto eff. correction applied
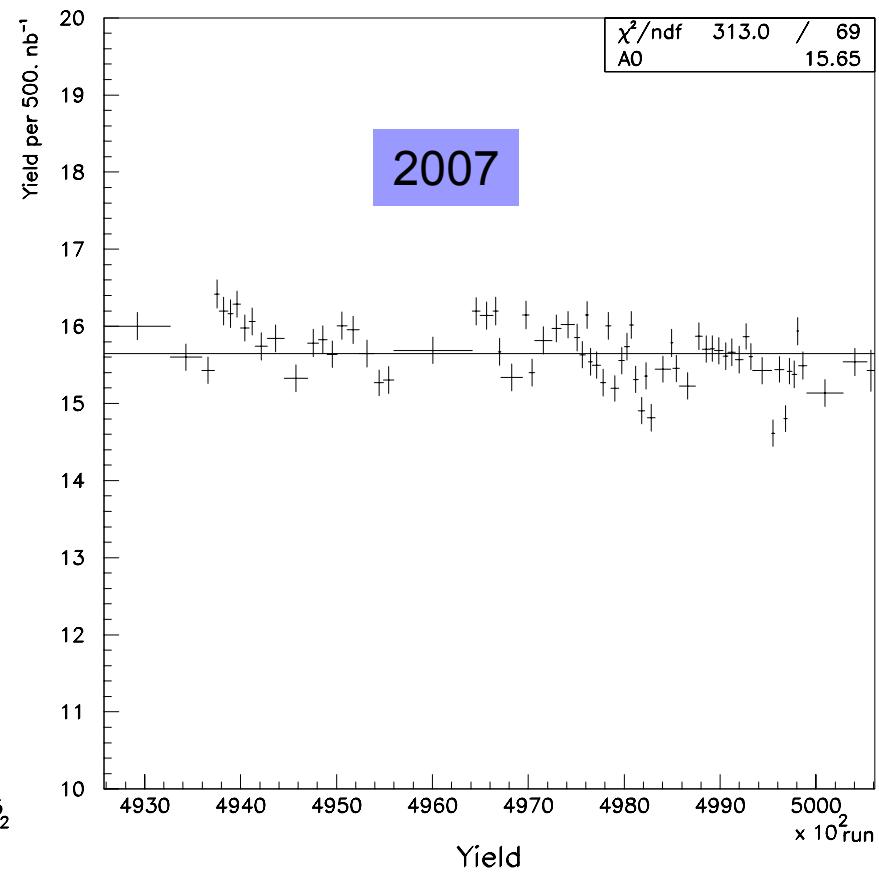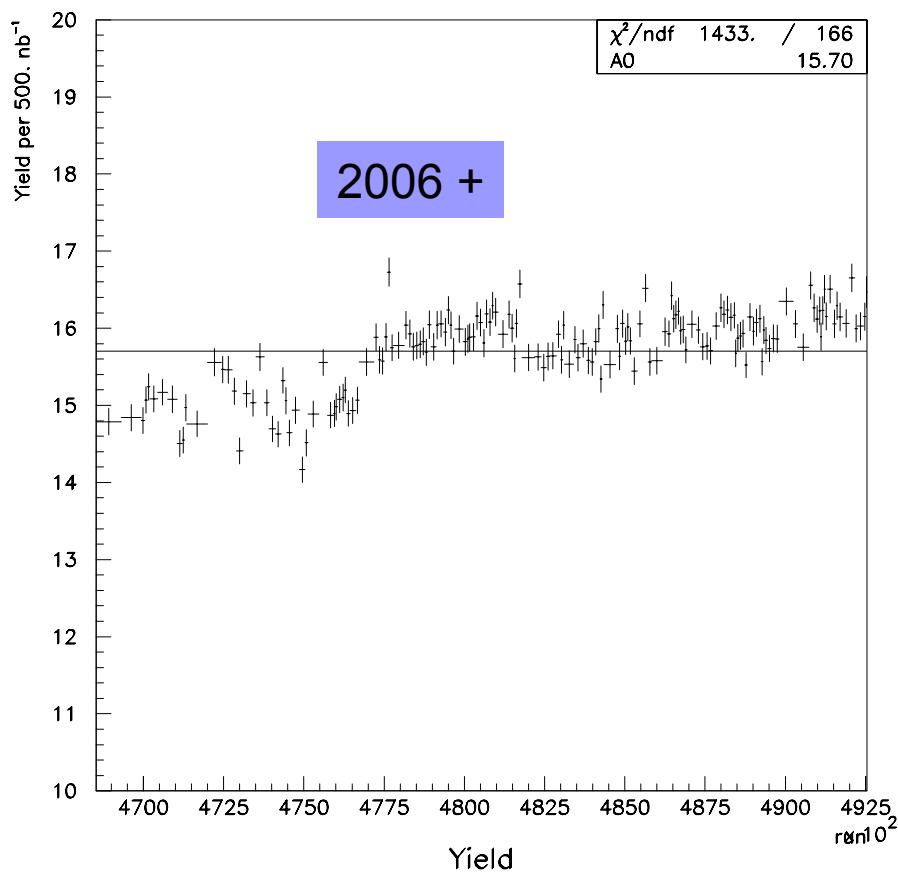
Yields from a)

$$\text{Event yield} = \frac{\#\,\text{DIS events}}{\text{luminosity}}$$

Yields from a)

$$\text{Event yield} = \frac{\#\,\text{DIS events}}{\text{luminosity}}$$
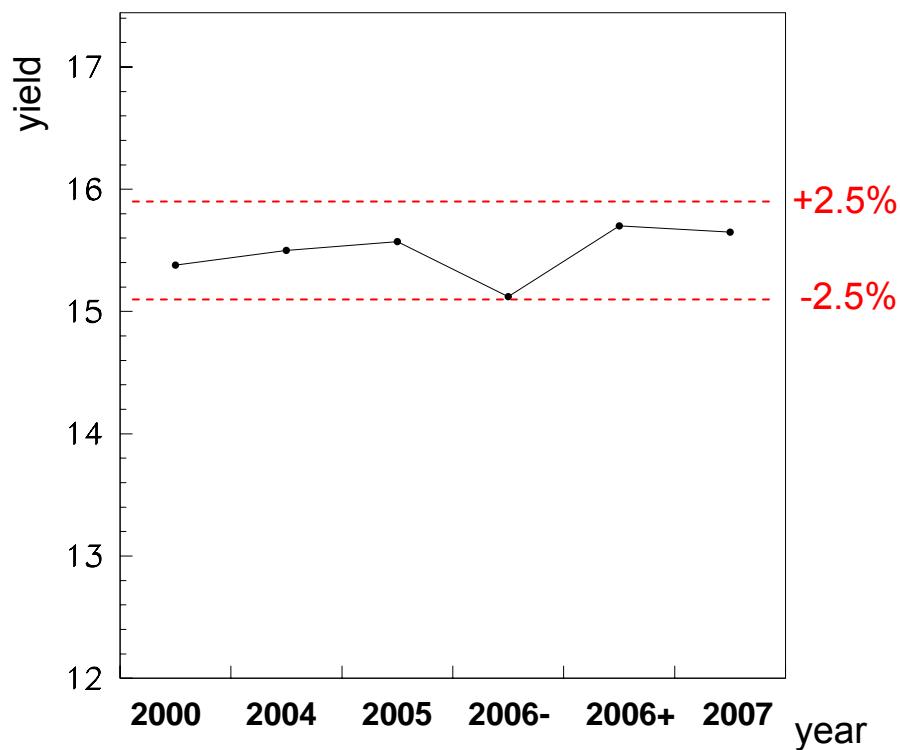
Study of systematics for a)

	Yield 2000	Yield 2007	Yield diff. 2007/2000
Calibrated E_e & default cuts	15.38	15.65	1.8%
Calibrated & R_{log}<4 cm	15.17	15.38	1.4%
Not calibrated E_e	15.70	15.79	0.6%
Calibrated & no E_e cut <25 GeV	25.64	25.98	1.3%
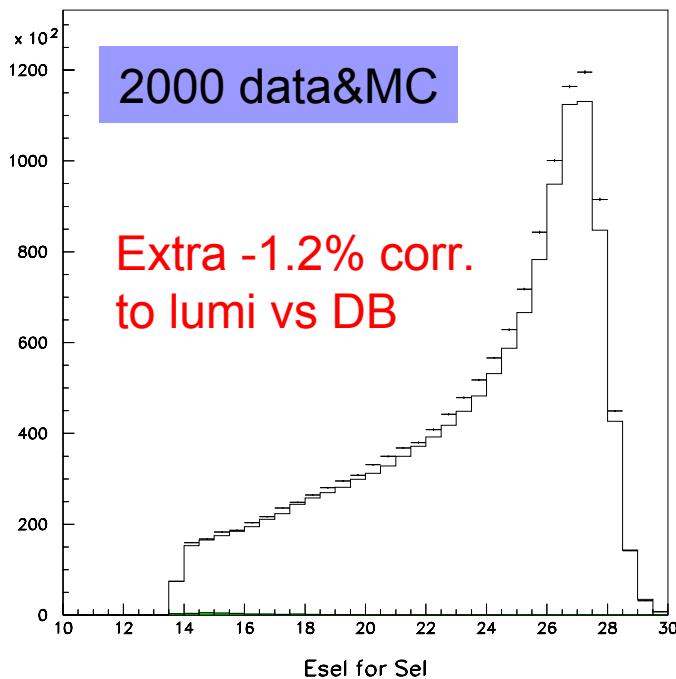
Summary for HERA1-2 yield

year	2000	2004	2005	2006 -	2006 +	2007
yield	15.38	15.50	15.57	15.12	15.70	15.65
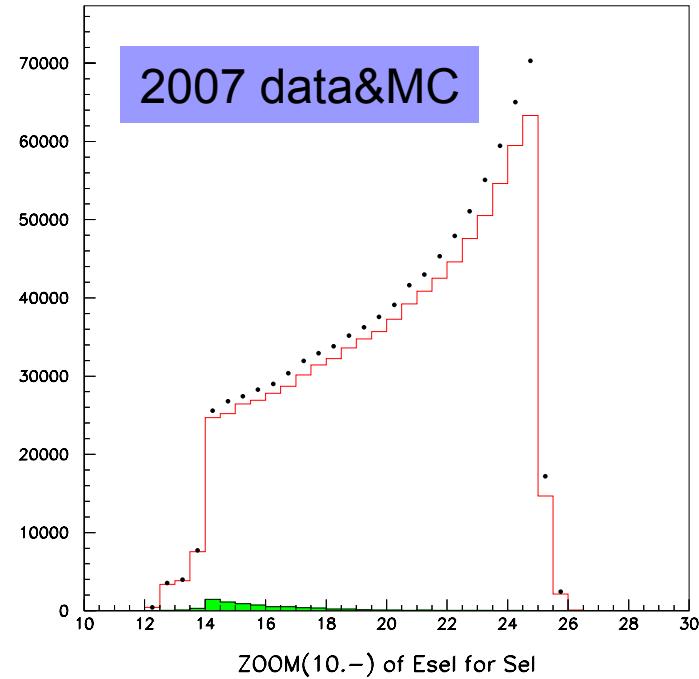
Control plots for meth b)

2008/07/04 16.10

2000 data&MC

Extra -1.2% corr.
to lumi vs DB

Esel for Sel

2007 data&MC

ZOOM(10.−) of Esel for Sel
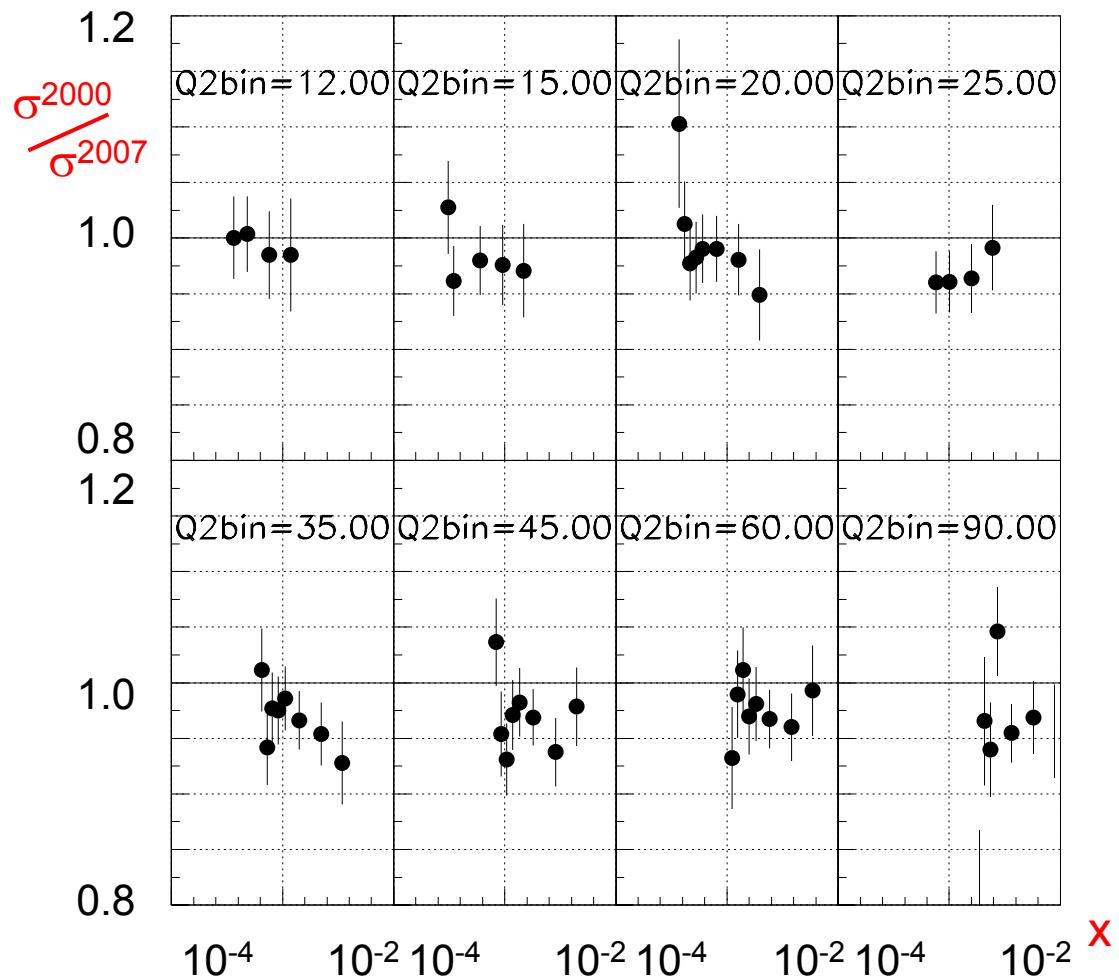
2000: normalization = 5.3%

2007: normalization = 6.8%

2007/2000: difference = 1.5%

Method c)

- Use y bins like for 2007 for 2000

- e method for 2007 and e&σ for 2000

Average ratio ~ 2.6%

Conclusions

	HERA1 (2000)	HERA2 (2007)	HERA2/HERA1
yield	15.38	15.65	1.8% (NO -1.2% corr. for 2000 data)
data/MC	5.3%	6.8%	1.5%
σ/σ	---	---	2.6%

✓ 0.6% (with -1.2% correction for 2000 data) vs 1.5% (method b) and 2.6% (method c) ⟶ HERA2/HERA1 = (1.6 ± 1.0)%