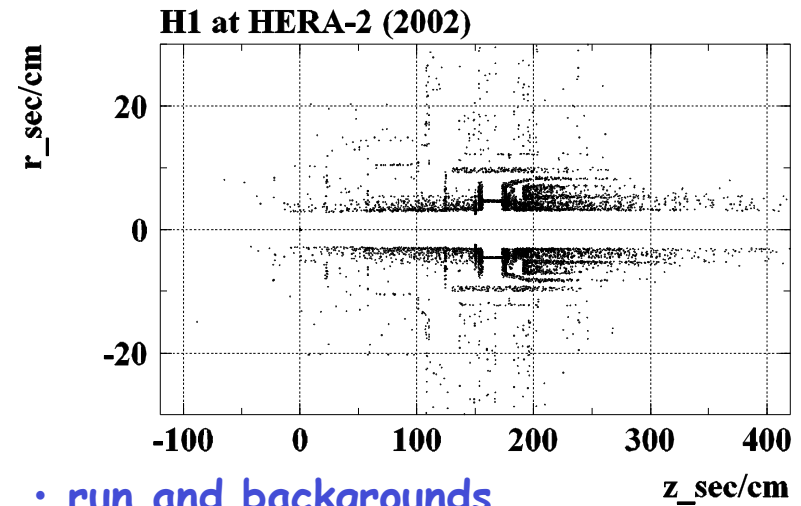
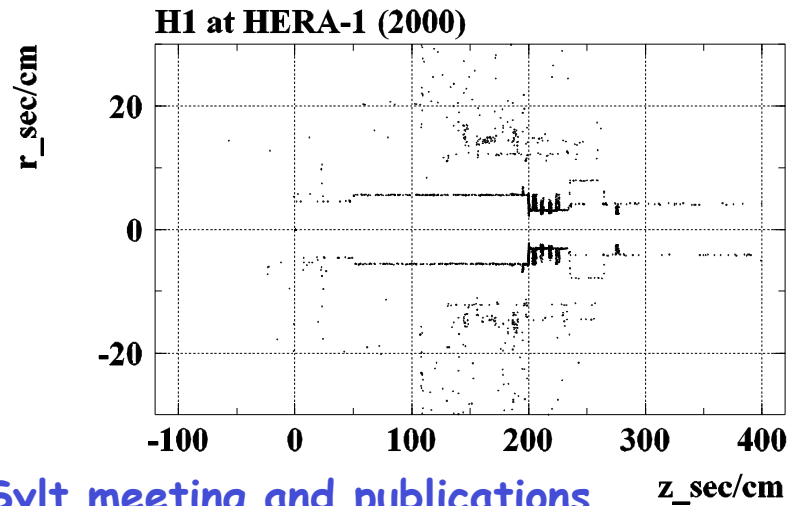


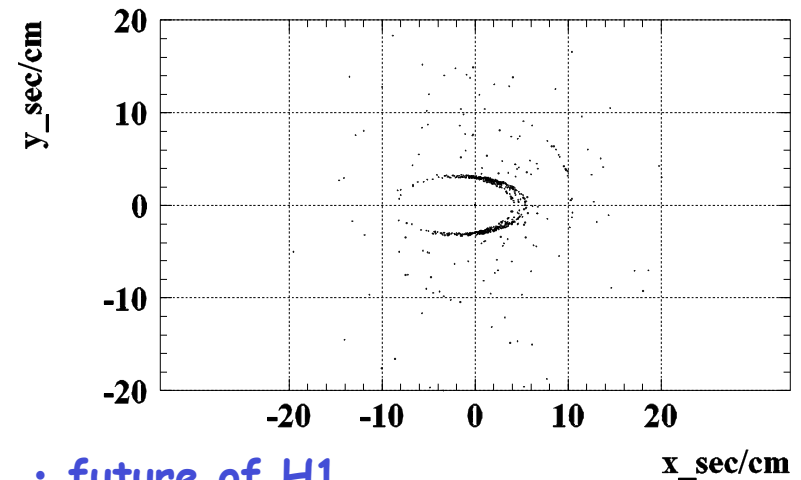
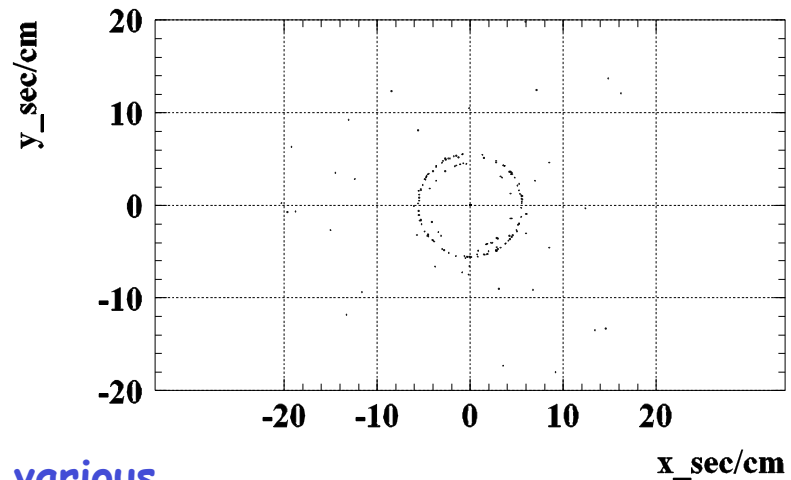
H1 in transition

Report to the Collaboration



- Sylt meeting and publications

- run and backgrounds



- various

- future of H1

meeting of physics convenors at Sylt in December 02

~30 pending preliminary results:

prel = t0 → paper
end PhD with publication
release not only in April's

DESY < - > outside

WGs meet also outside
key tasks can be solved there

Work across WG boundaries

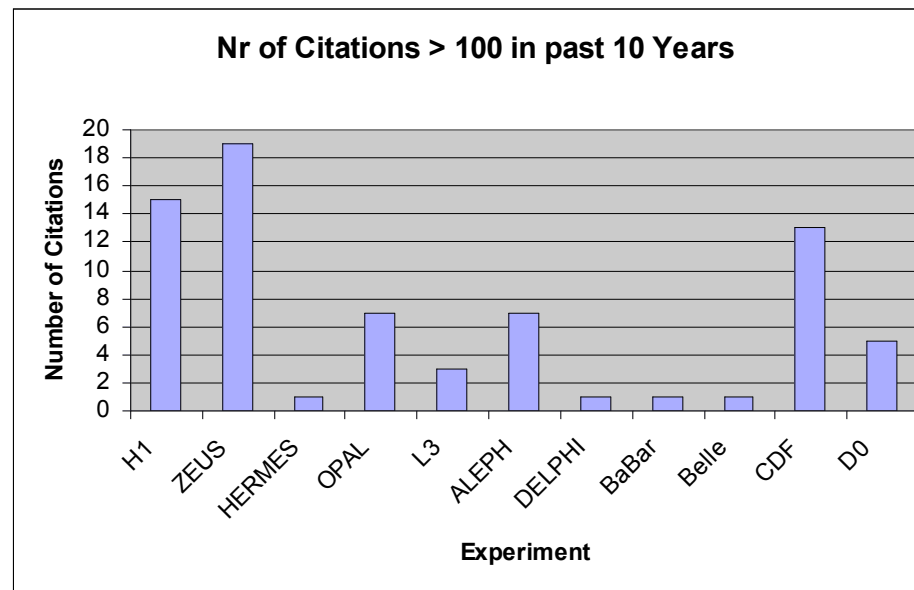
bulk 99/00 low Q2: diff and incl.
diffractive D* and jets in diff.
b,c tags, searches and HQ

Physics with HERA2 data ?

cc(P), F2c(fwd), rho, hi Q2

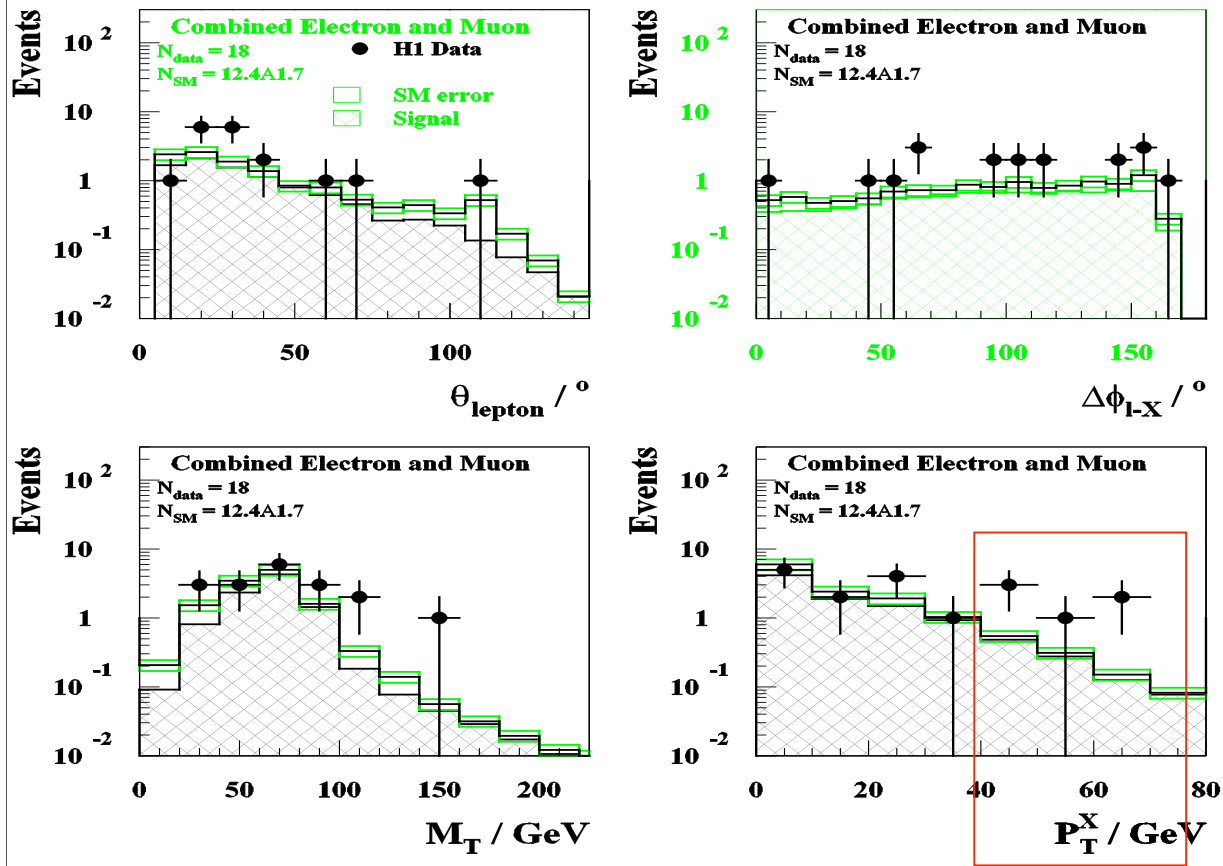
Jörg's H1-ZEUS comparison

H1 often first, but ZEUS uses more lumi
ZEUS publishes faster
H1 publishes rather refined papers
ZEUS HQ
H1 inclusive ep, searches (and findings)



Isolated electrons and muons in events with missing pt

DESY 02-224 submitted to Phys.Lett. B

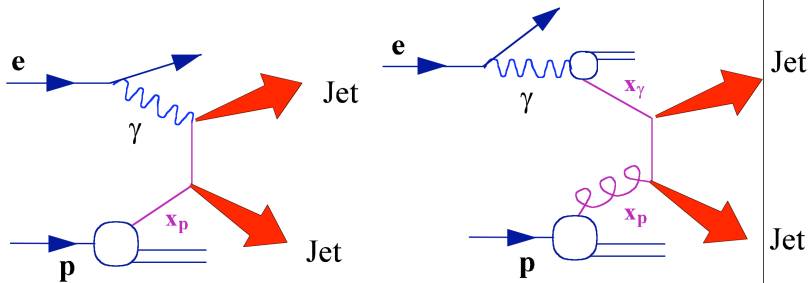


13.6 pb⁻¹ e-
& 104.7 e+

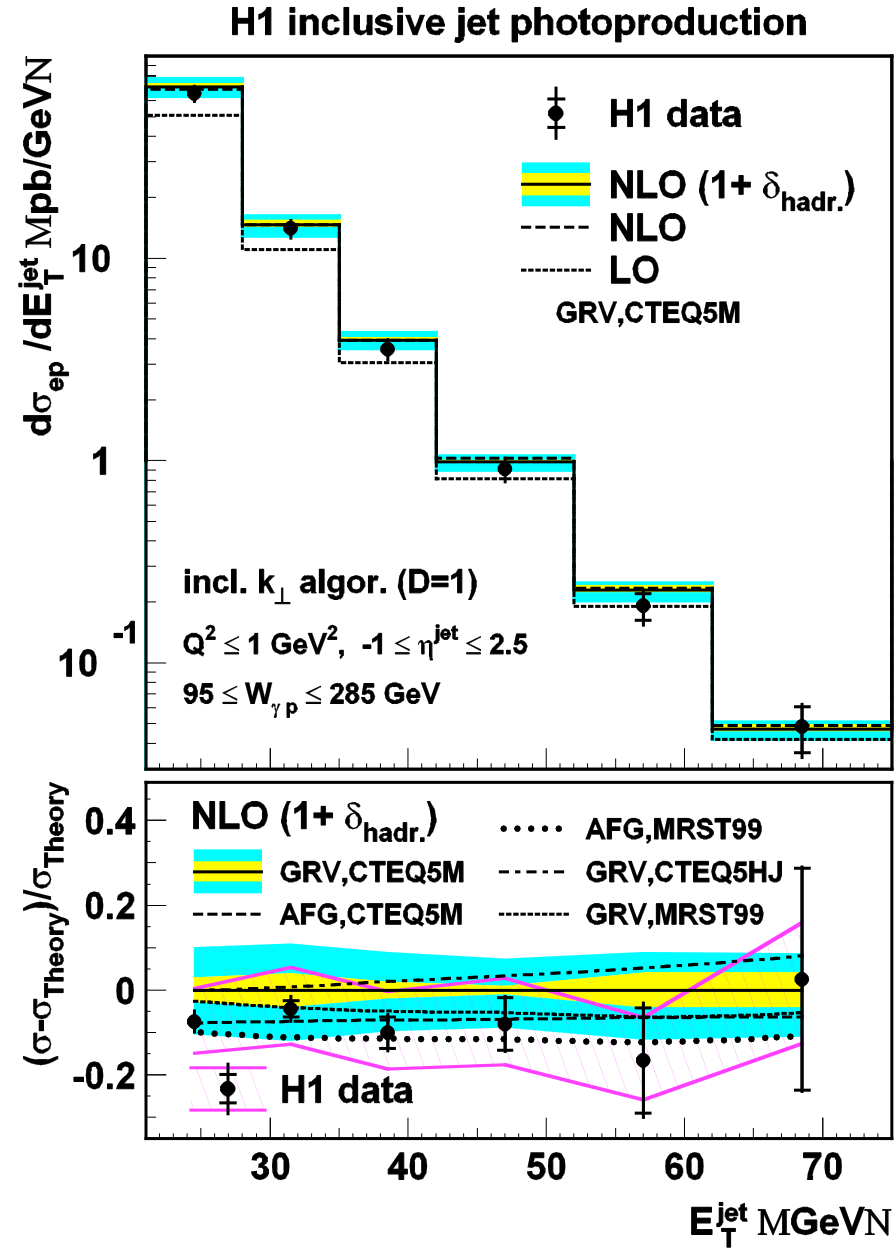
0.0012
probability for
SM fluctuation

Measurement of inclusive jet cross sections in photoproduction at HERA

24.1 pb⁻¹
inclusive kt - NLO QCD



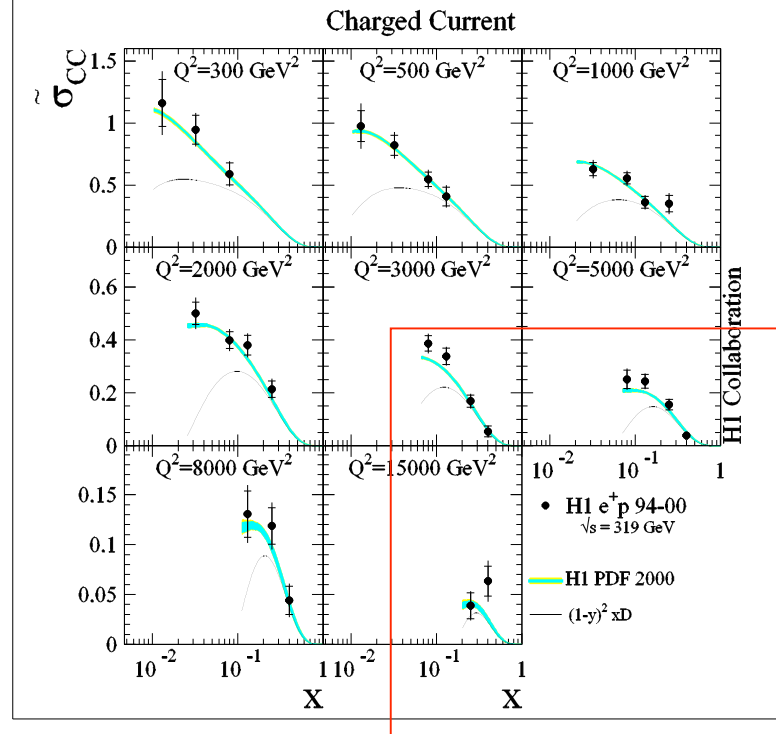
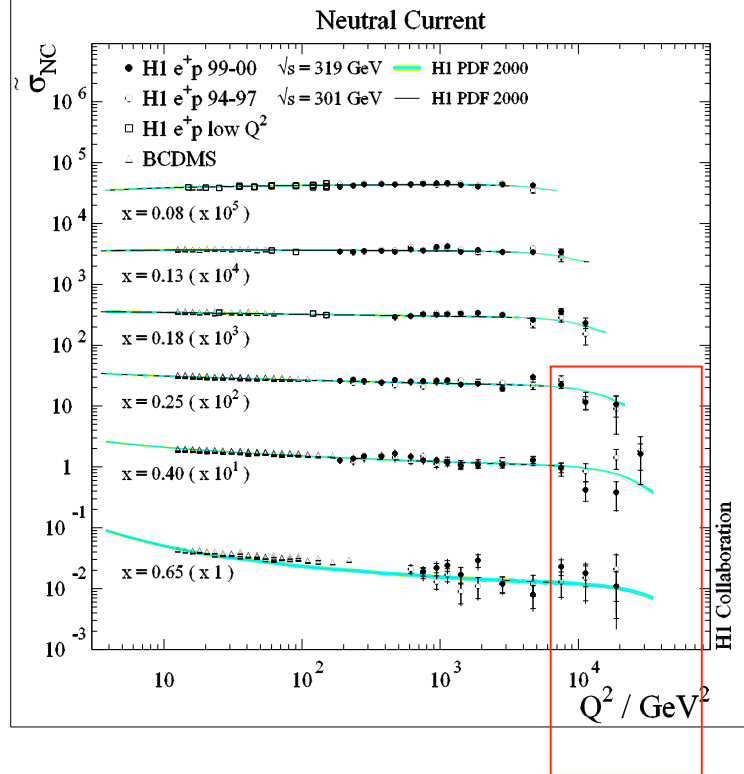
DESY 02-224 submitted to RK
to be submitted to Eur.Phys.J,C



Measurement and QCD Analysis of Neutral and Charged Current Cross Sections at HERA

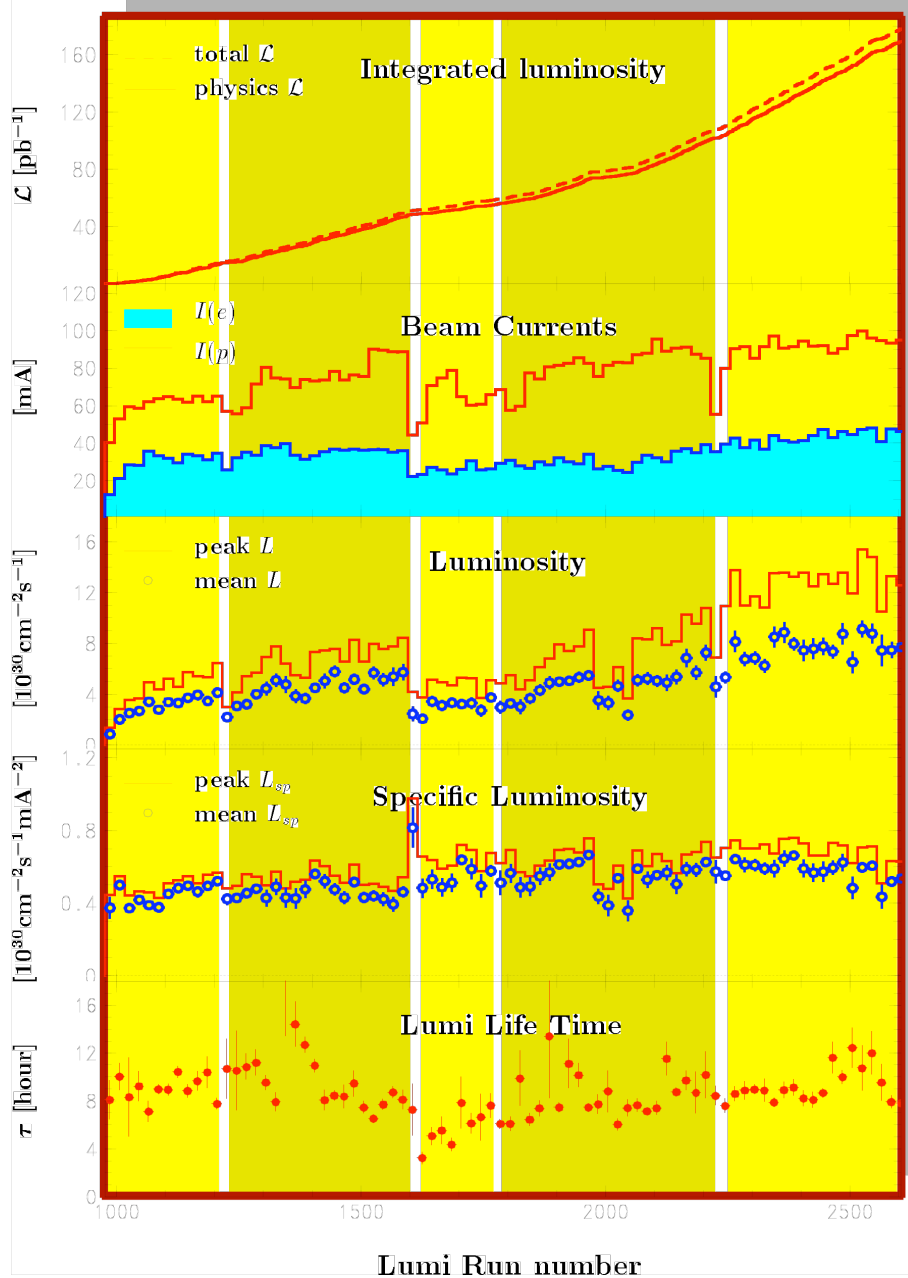
65.2 pb⁻¹, 99/00 and combinations with 94-97, xF3, FL, parton distributions

8h of final reading + 10h → submit to Eur.Phys.J C



still want luminosity increased by a big number!

HERA performance in 1996-2000



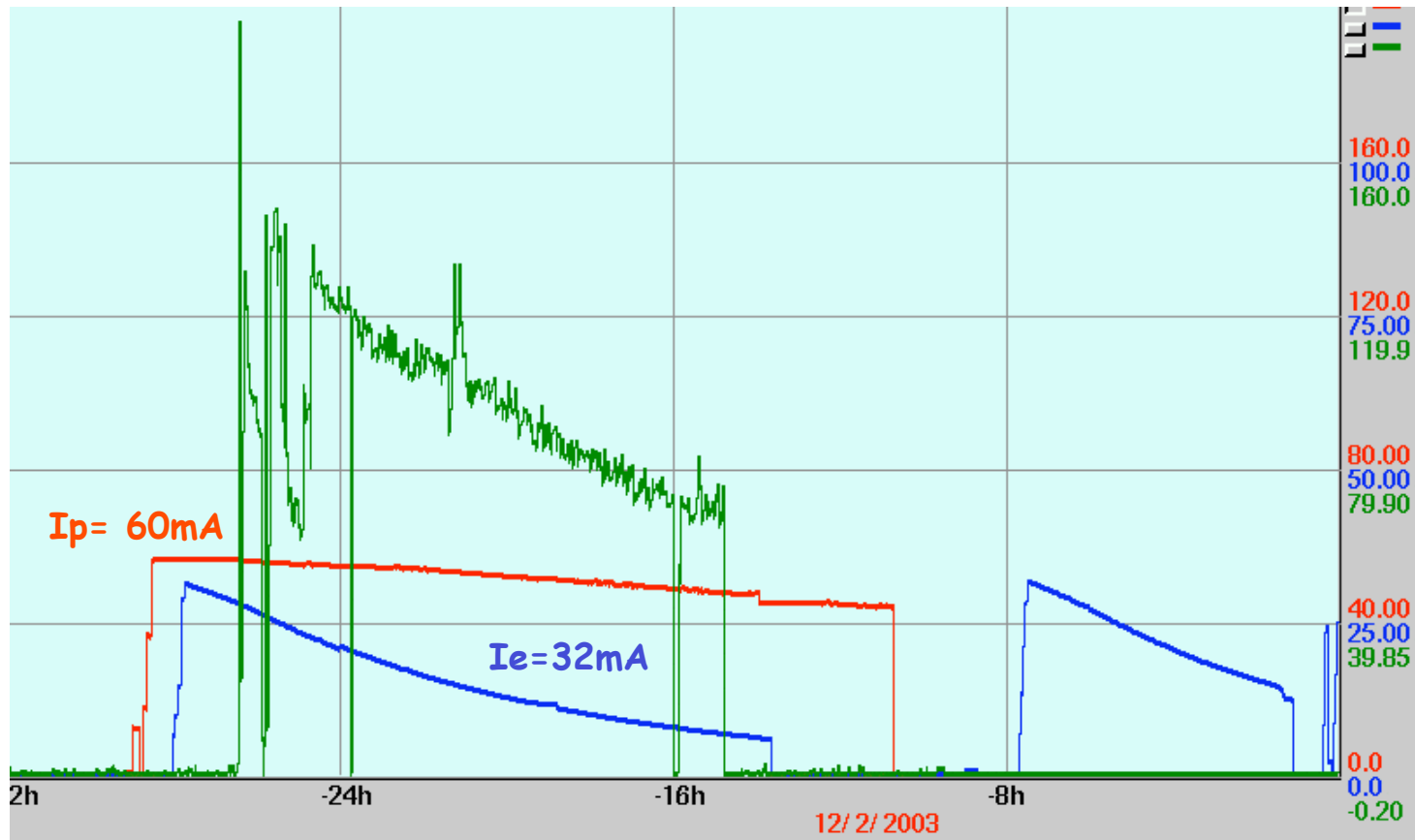
HERA in 2002-2003

- 11.5 → 2.6 pb⁻¹
- I_p 30, max 60mA
- I_e 20-32 mA
- Lumi 7 -15 10^{**30} cm⁻²s⁻¹
- L_{spec} 1.6-1.8 10^{**31}
- e lifetime 10h

$L=1.7 \cdot 10^{31}$

$L_{\text{spec}}= 1.6..1.9$

a week ago



17.2.2003 end of L run → reestablish polarisation, try high currents

most remarkable efforts
at and with the apparatus

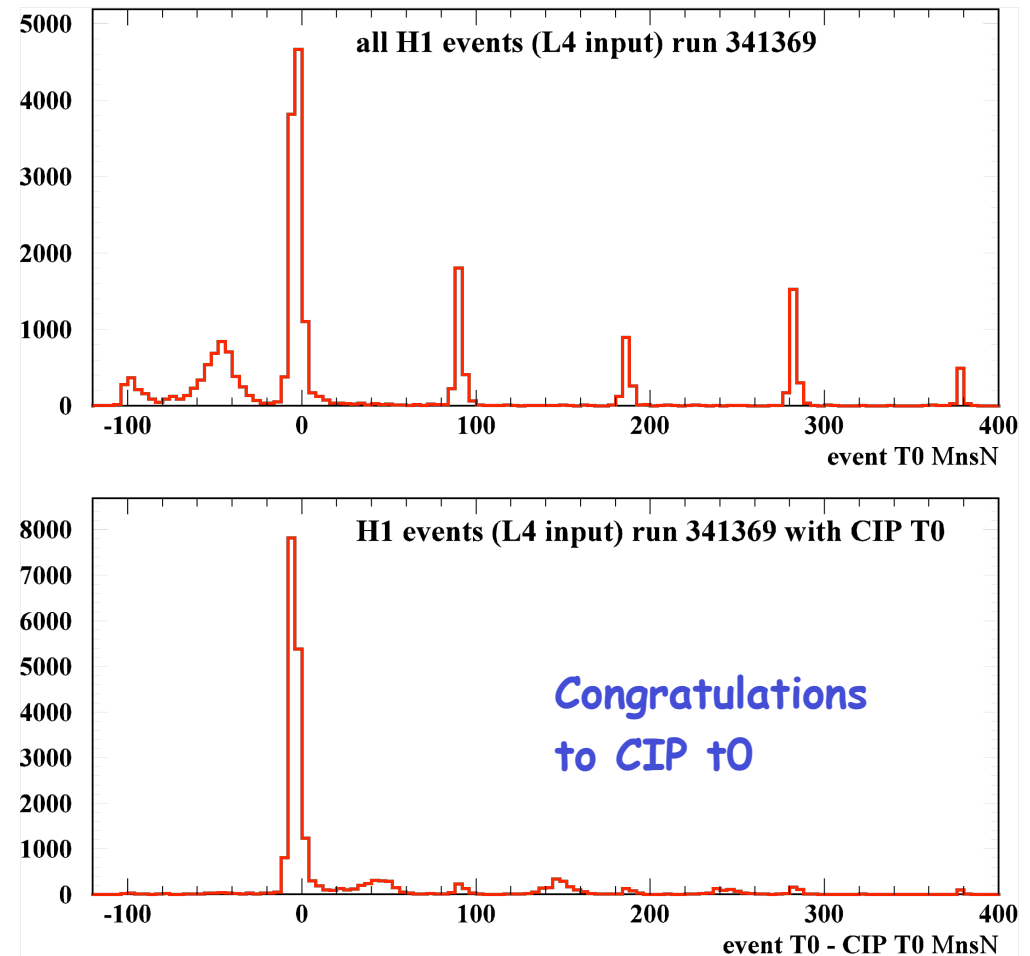
technicians (back on 2.1. Friday)

new scintillators for bgd study

running in of new components
Lumi, FT, FST, BST, FNC, CIP..

operation of old components
LAr, Spacal, CJC, muon system..

worries:
lost BST repeater, CST?,
precision lumi, chambers on, CDAQ

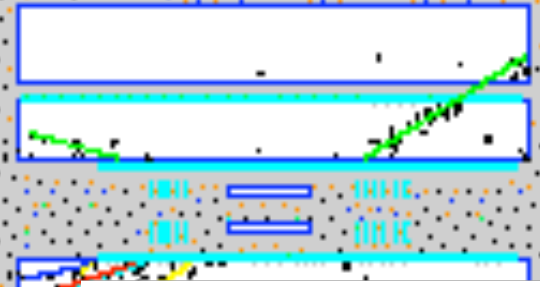
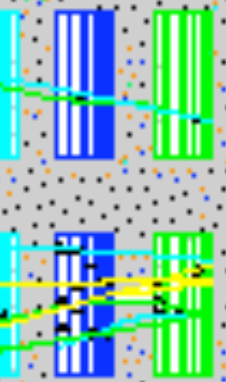


•CIP2k and COP → „old zvtx“ for z resolution and big rays

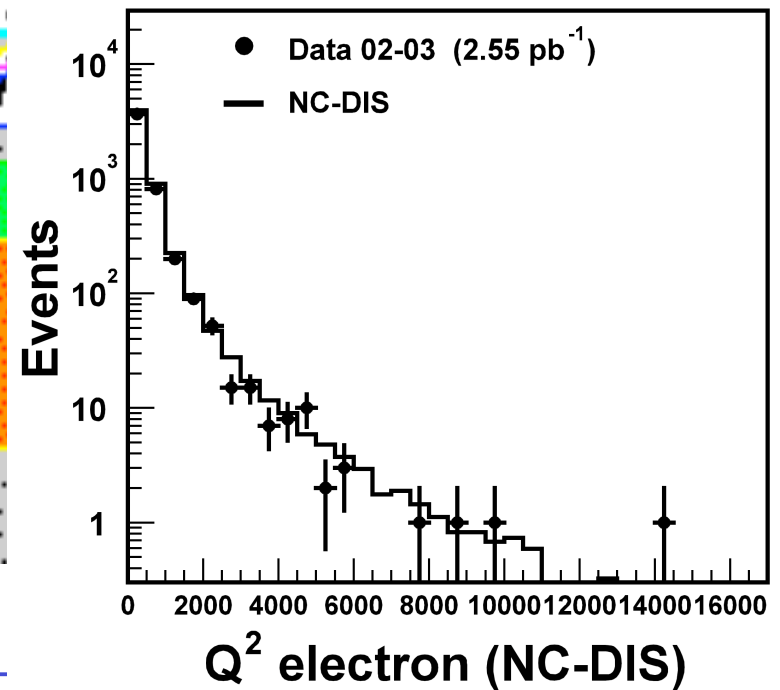
2002/03 high Q² data

generic high Et analysis

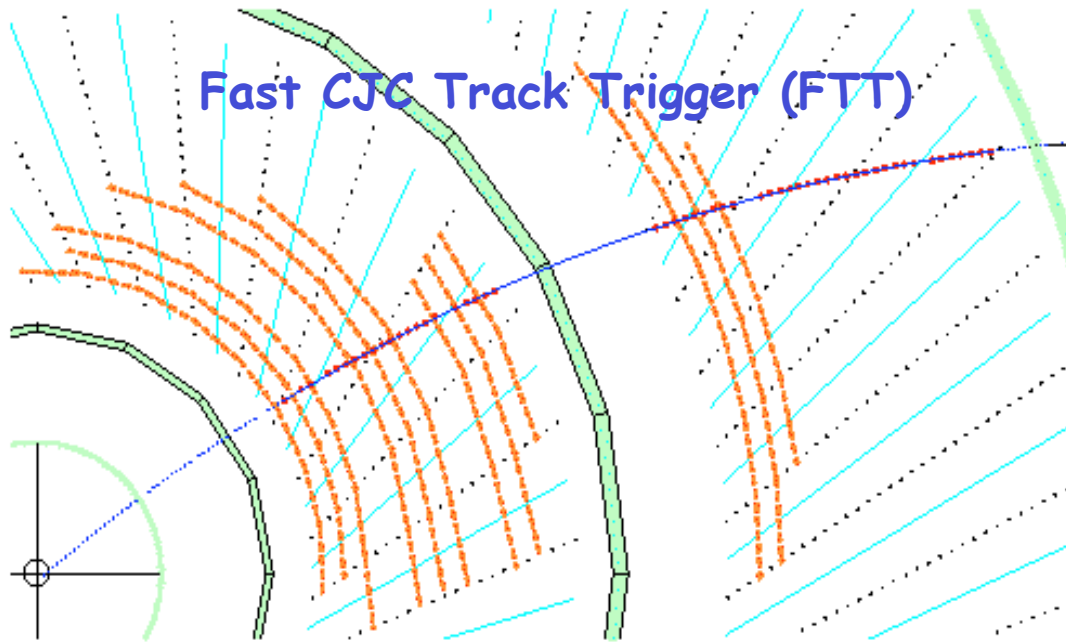
channel	data	MC
e-j	714	758
j-j	653	838
j-v	20	48
j-γ	8	11
e-v	2	2.5
e-γ	4	3.7
e-j-j	3	8
j-j-j	15	14



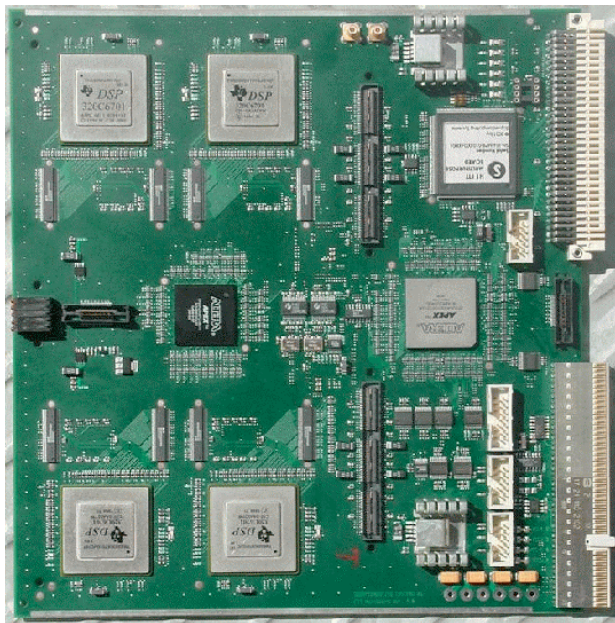
FT tracks



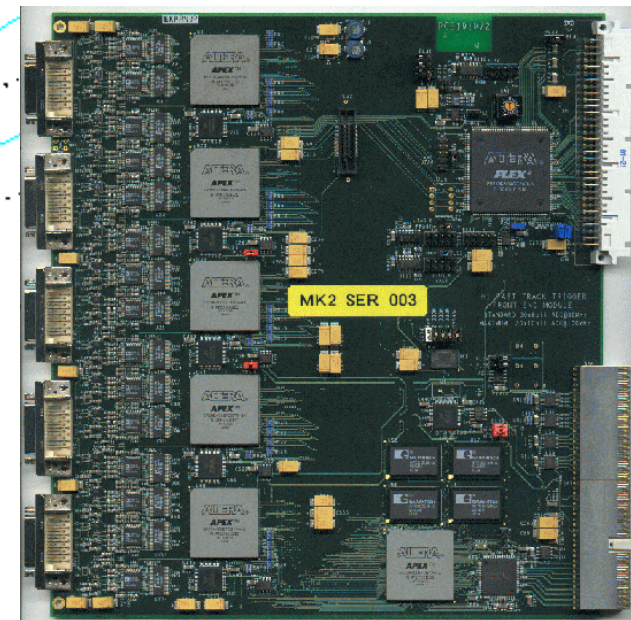
Fast CJC Track Trigger (FTT)



- Level 1 reconstruction of hits (Qt) and r-phi-tracks in ~30 FEM boards with 5 APEX chips and 30 FADCs (10bit)

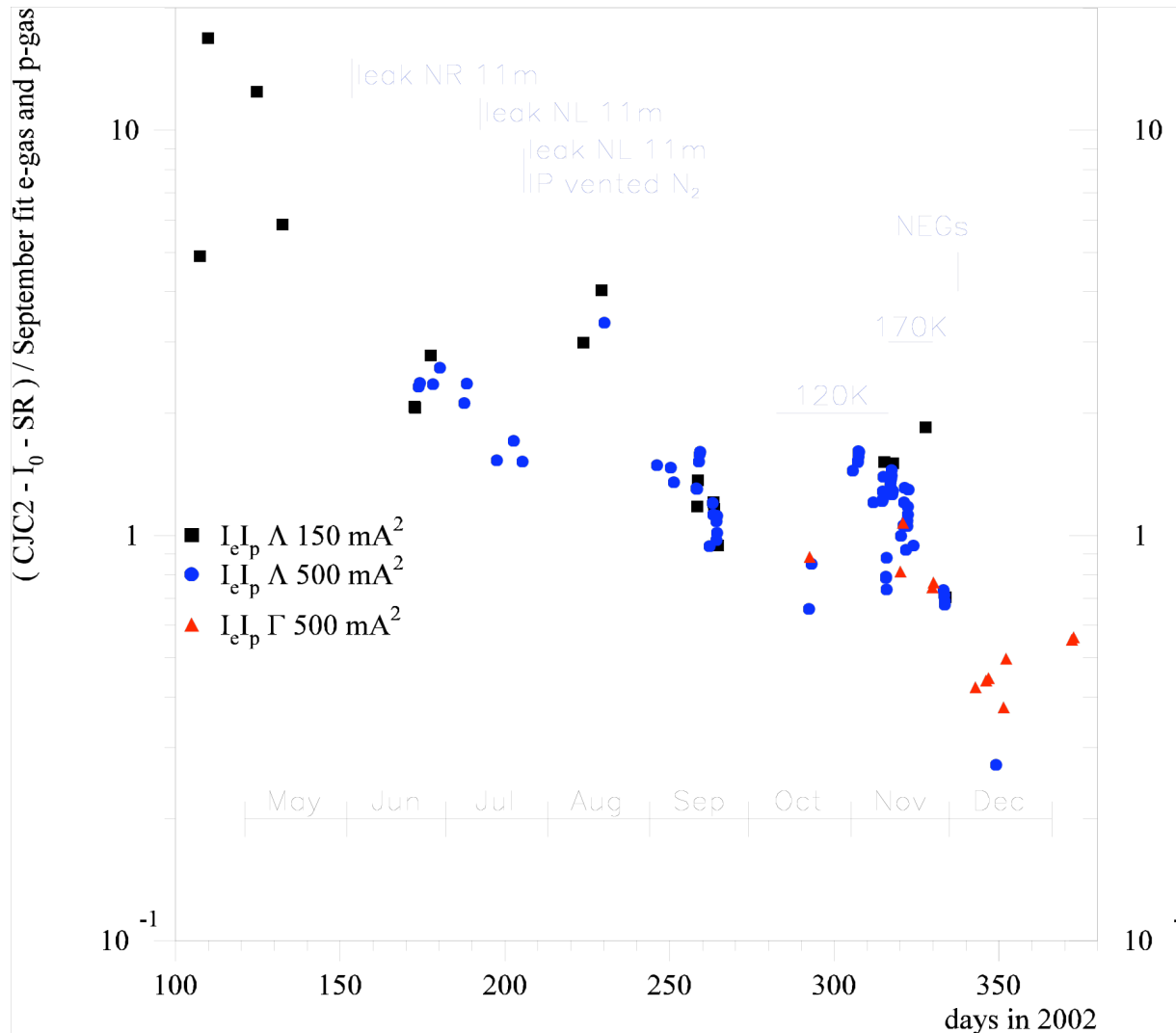


Level 2
merger, linker
track fit on ~25
multipurpose boards



→ Level 3 D*... in central detector (and x) region
software! fully operational in summer 2003
keep dcrphi

LAr jet trigger (ACS) installation starts April 03



background reviewed
by external committee

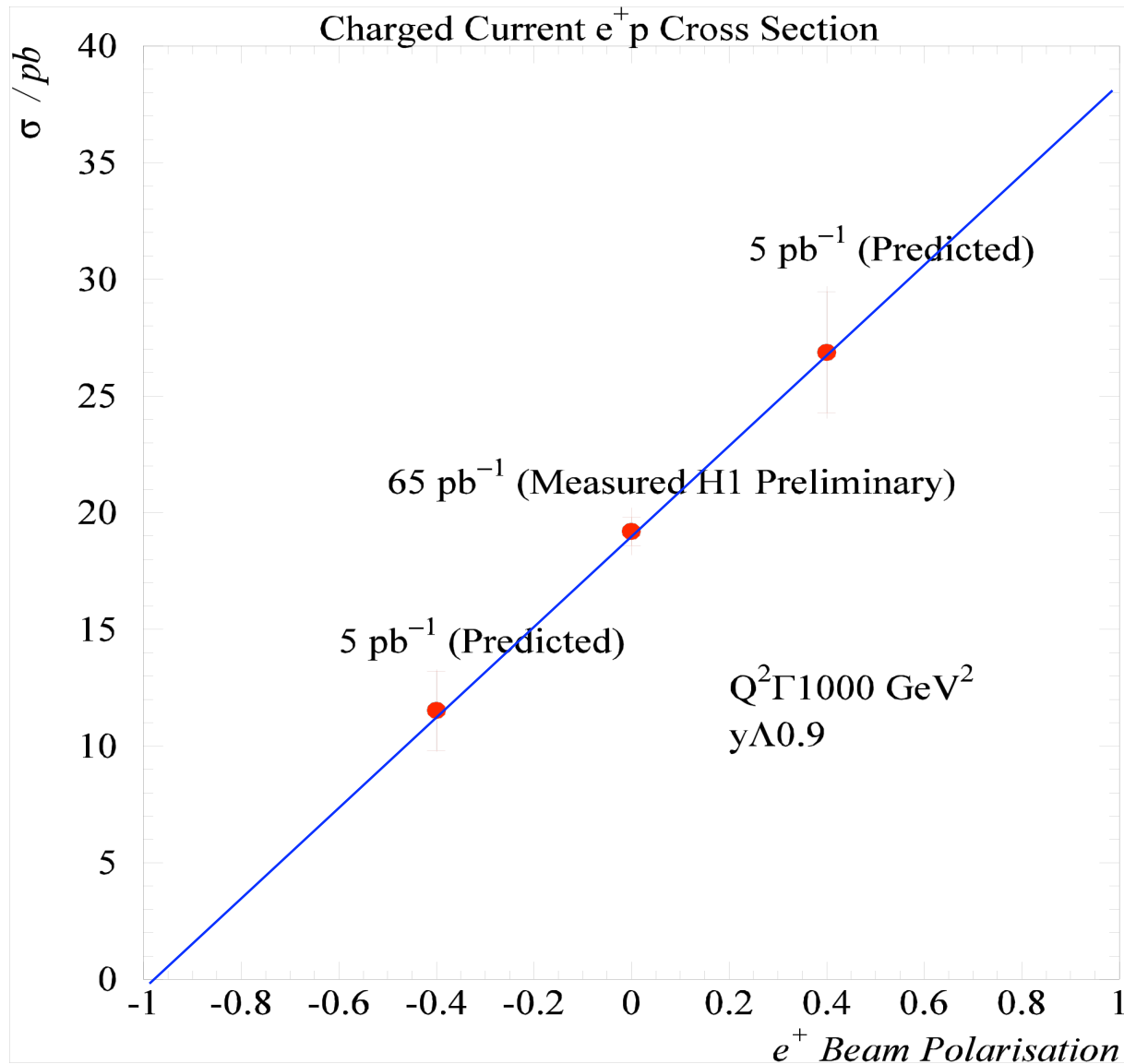
2 detailed reports
„fascinating“ H1 notes
strong collaborative effort

„es soll keine Wissenschaft
werden, nur besser“ dp

insisted on colliding beams
in Sept 02 and Jan 03

decided (EC, Thursday, bgd
group, committee, ZEUS)
to shutdown now
[3.3. (8:00) - 6.7. (15:15)]

hoped for helicity dependence of CC cross section (LUND)



- Trigger (LAr, CIP)
- Polarisation in ep measurement (T/LPOL)
- Luminosity

November 2002

Priority was given to backgrounds

versatile H1 detectors

CJC - massspectrometer

FST - HOMometer

Lumi - manometer

BSTp - radiometer

Spacal - hotspotometer

versatile physicists

chemist

ion trapper

simulator

regenerator

activator

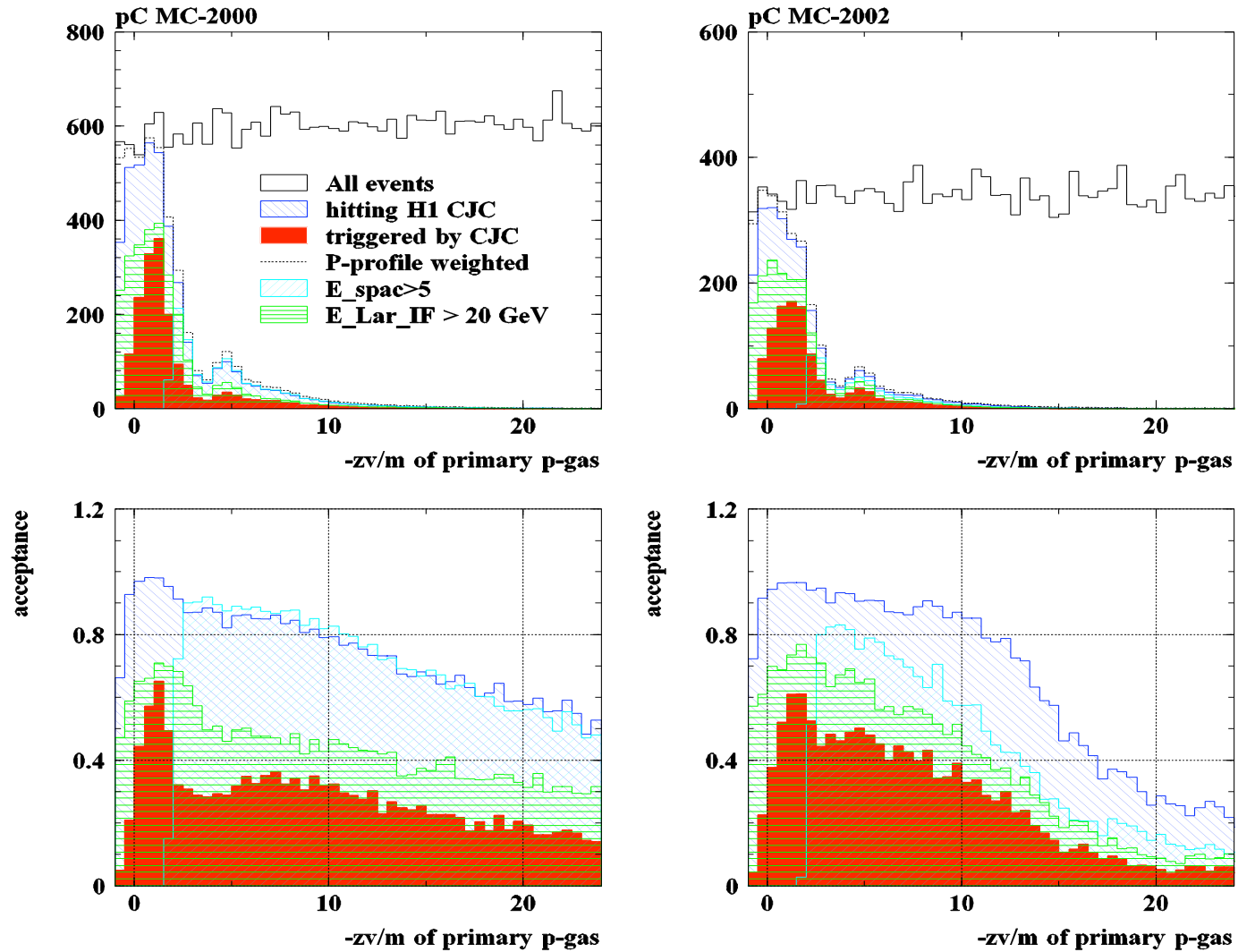
mediator

beulenfahrer

- minimize venting
- condition beam elements
- preheating (N₂? H₂O?)
- bakeout, how long (synr+HOM)
- ...

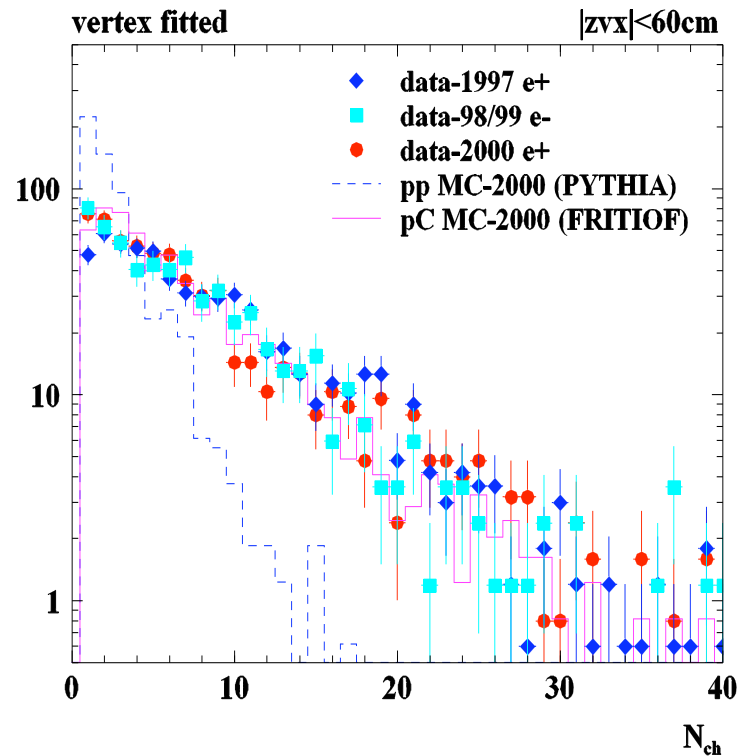
will be needed for restart in the summer and analysis till then

fruitful cooperation with HERA experts, close contact with Dir.'s

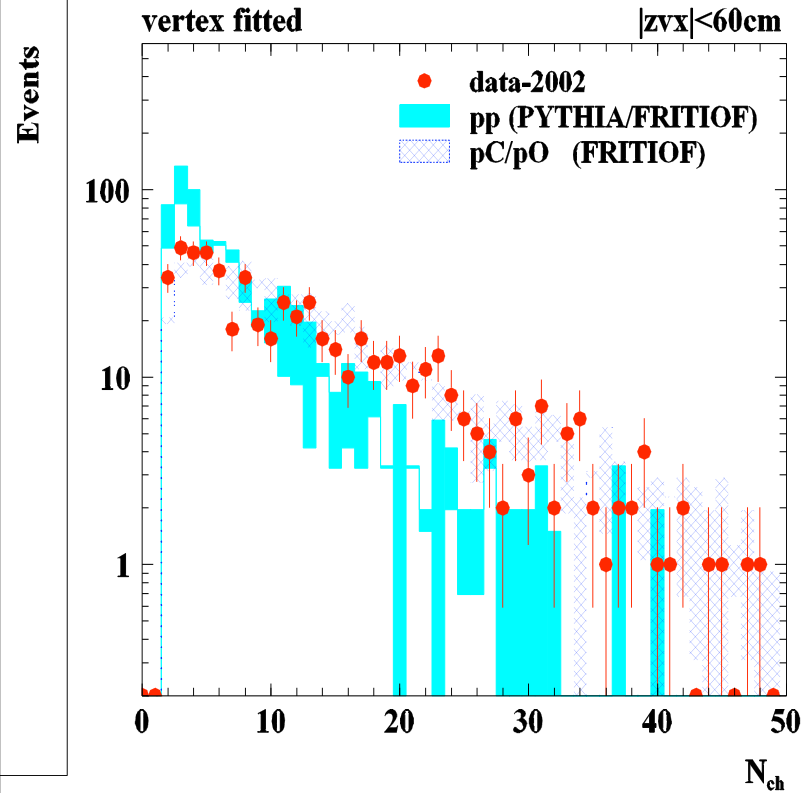


- full simulation of p backgrounds, also e^+e^- initiated
- pressure and HOM simulation also by H1?

charged multiplicity in jet chamber



1997-2000



2002

backgrounds much better understood and so is HERA operation

need to: repair CIP, BST, CST, install VFPS [April: via hall north!]

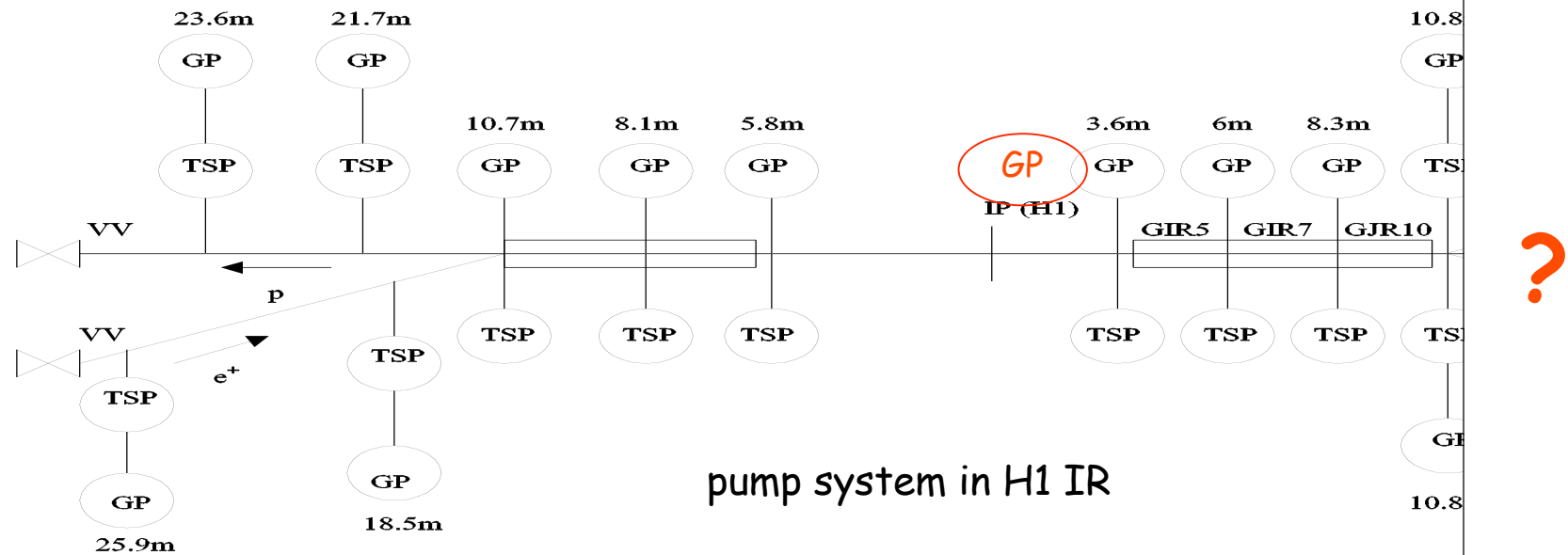
improve background situation (the problem is mainly proton initiated)

H1:

- install getter pump at -1.5m
- modify C5B (thinner, larger, tapered, cooler)
- install RGA at -3.6m

HERA:

- coat abs4 at -11m
- improve pumping
- at -3.6m →
- ?



pump system in H1 IR



•Marseille 15.-19.9.2003

MK H1 collaboration meeting, 19. 02. 2003

•Group flights from HH → HH/AG

- Various Collaboration matters

- Software:

- oo: user number increased, release 2.3.14

- all data 96-03 included.

- platform for data quality (HAT and DQ-HAT)

- still in transition of analyses to new system

- less attention to „old software“ H1SIM !

- ZUBR: PF: version 0.93 ← done in parallel to PhD

- CDAQ and branch stability, touch an old system?

- Monte Carlo: request 1671 for HAQ:

- 10 Mio: 5 before upgrade plus 3 with 10 new XEON nodes

new collaborators

Montenegro: analysis, BFST, students at MPI and DESY-Z

CINVESTAV (Centro de Investigacion y de estudios Avancados del Politchico Nacional) Mexico City, UNAM: Guillermo Contreras, Gerardo Herrera et al heavy flavour, join and support CST

Sofia, Bulgaria: Ivan Tsakov et al (HERA B): upgrade CTD gas system, join analysis

hope for further development and integration into H1

.

•further

- Finances: LPI supported for at least 2 years by DFG
- EC: thanks to Andre Schoening and to Cristi Diaconu
- Ralf Gerhards is proposed to continue as software coordinator
- H1 results are published by H1
- active in conference participation and application for H1 talks
- regular cooperation and contact to ZEUS, also HERMES and HERA-B
- lost Mike Albrow (FNAL) as PRC referee after 4y, Joachim Mnich +?
- ...

Workshops
on the future
of DIS
beyond
the canonical ep

1968 (DT and WB)
→ 2003 (H1 and WB)

s from 10 GeV²
to 100.000 GeV²

is there a
next step,
which one?

References

- [1] <http://www.desy.de/heraea/>
"Physics with HERA as Electron-Nucleus Collider", Ed.s G. Ingelman and M. Strikman, May 1999;
<http://www.desy.de/heraws96>
"Future Physics at HERA", Proc. Workshop, DESY 1996/97, Ed.s G. Ingelman, A. De Roeck and R. Klanner, pp 85+1092.
- [2] "Prospects for Spin Physics", Proc. Workshop, Ed.s J. Blümlein and W.D. Nowak, DESY 95-200, Zeuthen 1995;
"Physics with polarized protons at HERA", Proc. Workshop, Ed.s A. De Roeck and T. Gehrman, DESY-PROC-1998-01, Hamburg 1997;
<http://www-h1.desy.de/radel/spin99/procsent.html>, "Polarized Protons at High Energies - Accelerator Challenges and Physics Opportunities", Proc. Workshop, Ed.s A. De Roeck, D. Barber and G. Rädcl, DESY-PROC-1999-03 (1999), Hamburg 1999;
"The Spin Structure of the Proton and Polarized Collider Physics", S.D. Bass and A. De Roeck, Nucl. Phys. Proc. Suppl. 105 1-27 (2002);
"Transverse Spin Physics", Workshop transparencies, DESY-ZEUTHEN-01-01, 37+ pp, Zeuthen 2001.
- [3] http://www.phenix.bnl.gov/WWW/publish/abhay/Home_of_EIC
"The EIC White Book", R. Holt et al., BNL, March 2001.
- [4] <http://www-zeuthen.desy.de/thera>
"THERA: Electron-Proton Scattering at $\sqrt{s} \sim 1$ TeV", TESLA TDR, DESY 2001-011, ECFA 2001-209, part VI, Appendices, pp. 99-160, Ed.s R. Klanner, U. Katz, M. Klein and A. Levy, March 2001;
"The THERA Book", Ed.s U. Katz, M. Klein, A. Levy and S. Schlenstedt, DESY-01-123, DESY-01-123-F, LC-REV-2001-062, DESY-LC-REV-2001-062, Dec 2001, 415 pp.
- [5] "TESLA-N: Electron Scattering with Polarised Targets at TESLA", TESLA TDR, DESY 2001-011, ECFA 2001-209, part VI, Appendices, pp. 161-190, Ed.s R. Kaiser and W.D. Nowak.
- [6] "ELFE: The Electron Laboratory for Europe", TESLA TDR, DESY 2001-011, ECFA 2001-209, part VI, Appendices, pp. 191-207, Ed.s R. Klanner, E. DeSanctis, J.-M. Laget and K. Rith.

September 2001:

Directorate decides „to transform PETRA into a dedicated synchrotron light source, starting in January 2007, after the completion of the HERA II programme...
The basic assumption was that the future of DESY lies in the TESLA LC and XFEL.“

December 2001

Durham workshop on the future of HERA → hep-ex/0204032

10. April 2002

„Decision on the Technical Study to transform PETRA into a SLS“
one ring less than wished by the extended scientific council

21. April 2002

„HERA Running and the Future Use of PETRA“, statement of the H1 Collaboration

April 2002 DIS2002 at Cracow

Directorate requests letters of intent for the future use of HERA for May 2003

August 2002: International Steering Committee for HERA III (exp's)

December 2003: Workshop at MPI (MPI web, transparency book in print)

January 2003: German BMBF endorses XFEL and PETRA SLC („ab 2007“)

March 10-14, 2003: Draft Letters of Intent, Meeting at Zeuthen

May 7, 2003: PRC intends to discuss the future programme of HERA

why of interest?

Confinement and the origin of mass?

Isolated leptons, leptoquarks and further surprises

The structure of QCD (CGC, instantons, BFKL) and the final state

The partonic structure of the nucleons at high density and small dimensions

Superhigh energy neutrino and astrophysics and parton saturation

The understanding of LHC and Tevatron experiments, of RHIC and ALICE

Constituent quarks and partons in nucleons and nuclei

The role of heavy flavour, intrinsic or extrinsic to the proton

The secret of Pomeron exchange and the QCD of spin

some key measurements (which will not be done till 2007)

determination of parton distributions, tagged nucleons

FL in the transition region

jets close to the p beam direction

eA scattering at lowest x - saturation

polarised asymmetries and final states at small x and high Q^2

- The physics of lepton-nucleon scattering is by far not explored
- HERA is unique and remains to be unique in the world for the foreseeable future until a LC-p collider is built
- „A DIS facility that spends 14 years on protons and never even tries to exploit the possibilities of deuterons looks plain silly“
„LQ's is more fun than deuterons“

A deuteron programme is a logical next step
(Hofstatter, SLAC, muon experiments)
after the current programme is completed
(we can expect surprises, excitements and delays,
2006 has thus been a non acceptable end date for HERA
from the H1 and ep science point of view).
HERA has more than fixed target ID experiments:
CC and diffraction < - > shadowing

The detector has been upgraded with major efforts,
and so was HERA, to achieve high luminosity, polarised e
running. FL and high x require extended running at low
proton beam energy, including $E_p/2$.

eD requires the least modifications to the IR in the
high luminosity phase (e^+ and e^- which is the equivalent to
neutrino and antineutrino experiments, at much higher Q^2).
eD is a most natural addition to the high lumi pdf programme.
It may be followed by a low x phase with substantial
Upgrades in backward and forward region for ep, eD, eA.

next steps

Working groups, Sylt, today's discussion (TS)

CB discusses further procedure

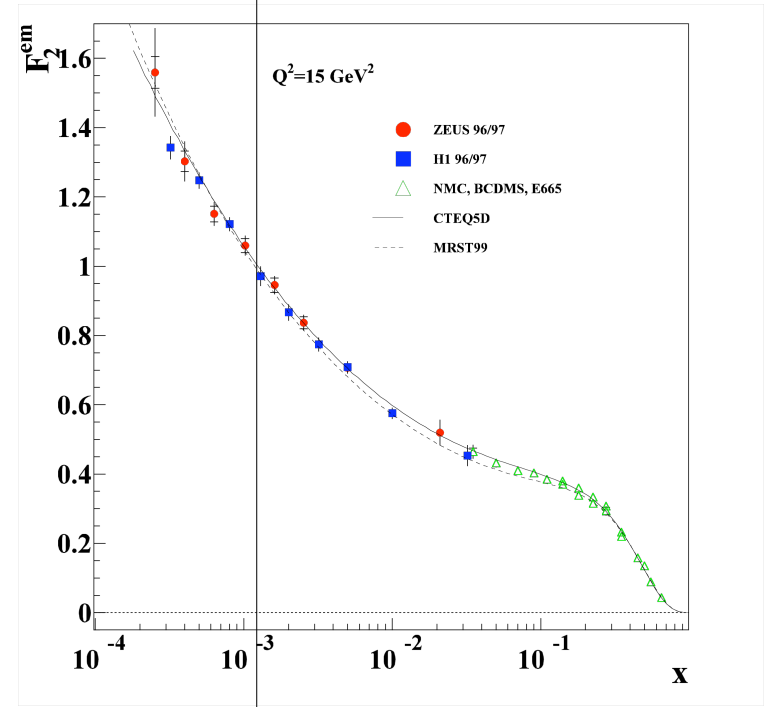
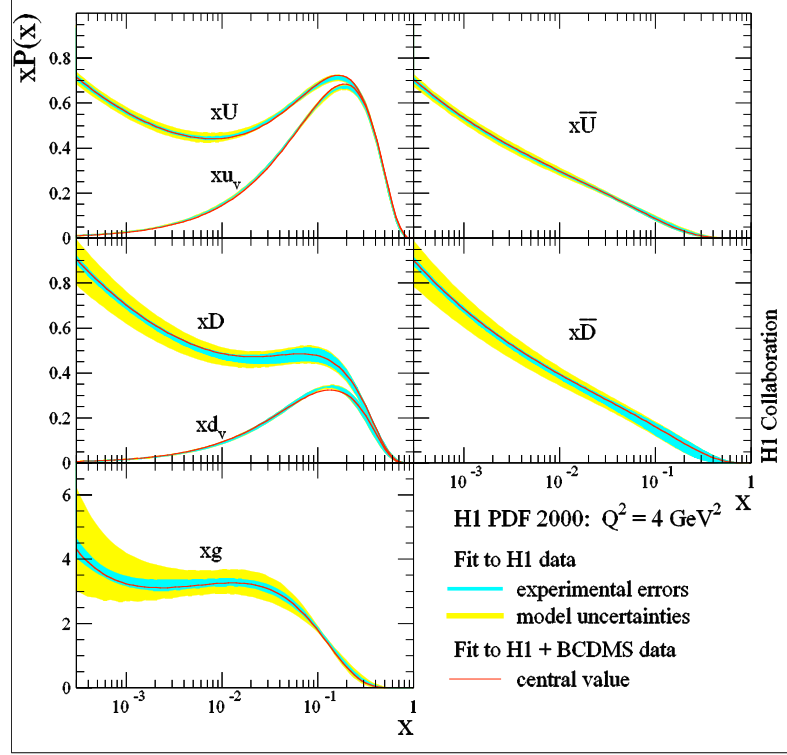
discussion document → LoI requires:

- agreement on physics and schedule scope
(so far eD with options for lowx eA and spin-
the „grand time plan“ was in the document to demonstrate
compatibility with the new HERA collider experiment)
- a detector section regarding H1 modifications
- more work on physics case

If endorsed by CB

- editorial boards for physics and detector
- draft LoI by end of March for final consideration
- the LoI needs to be submitted early April for the May PRC

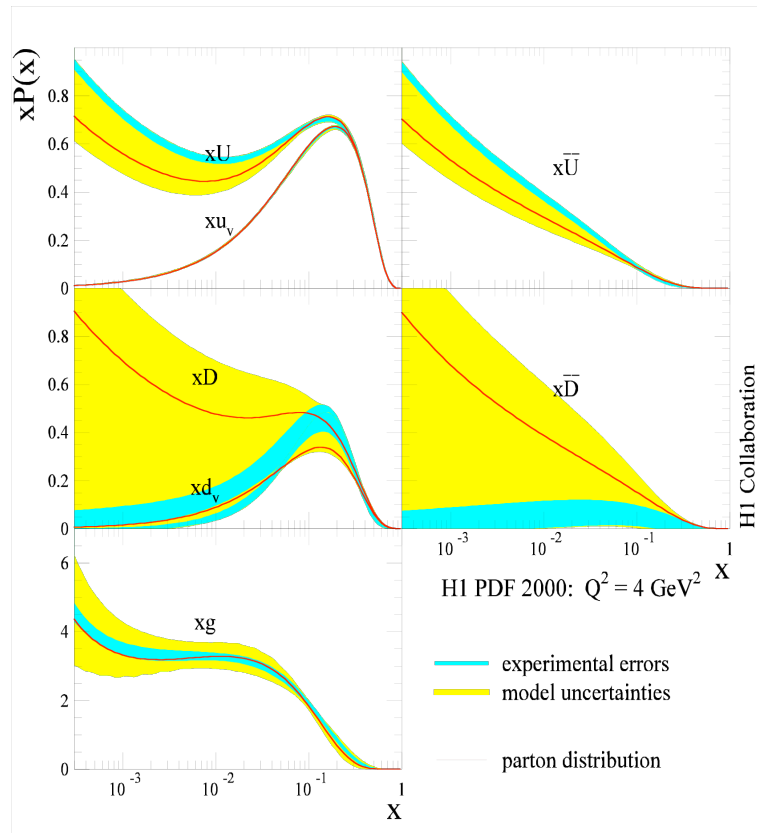
for example:
parton distributions at low x



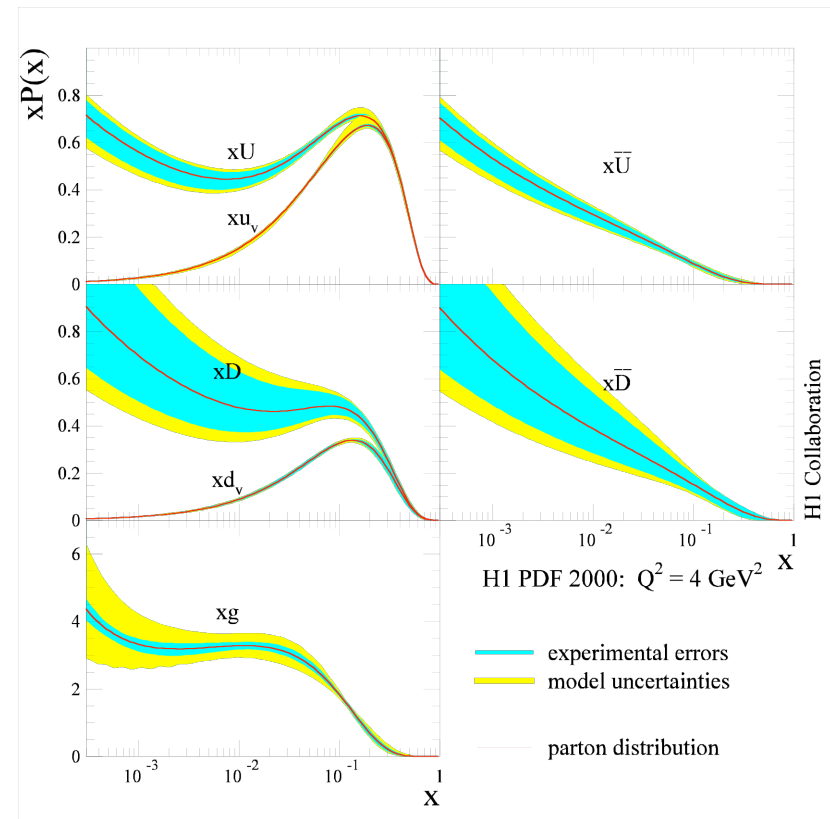
cannot predict high E neutrino N scattering from ep
→ measure dbar, ubar and HQ

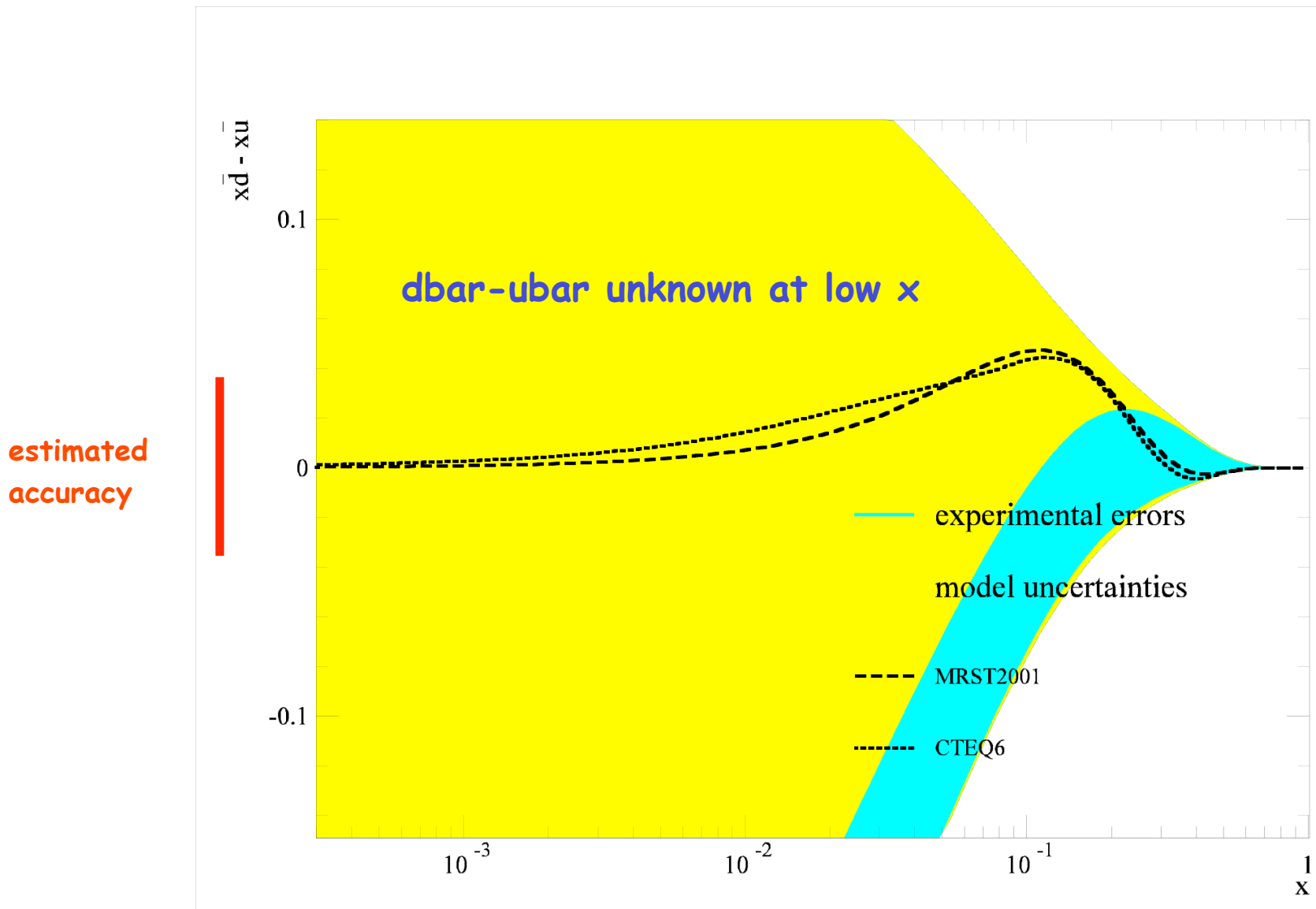
$$xP = A_P x^{B_P} (1-x)^{C_P} f(x) \rightarrow A_P x^{B_P}$$

slopes B may differ

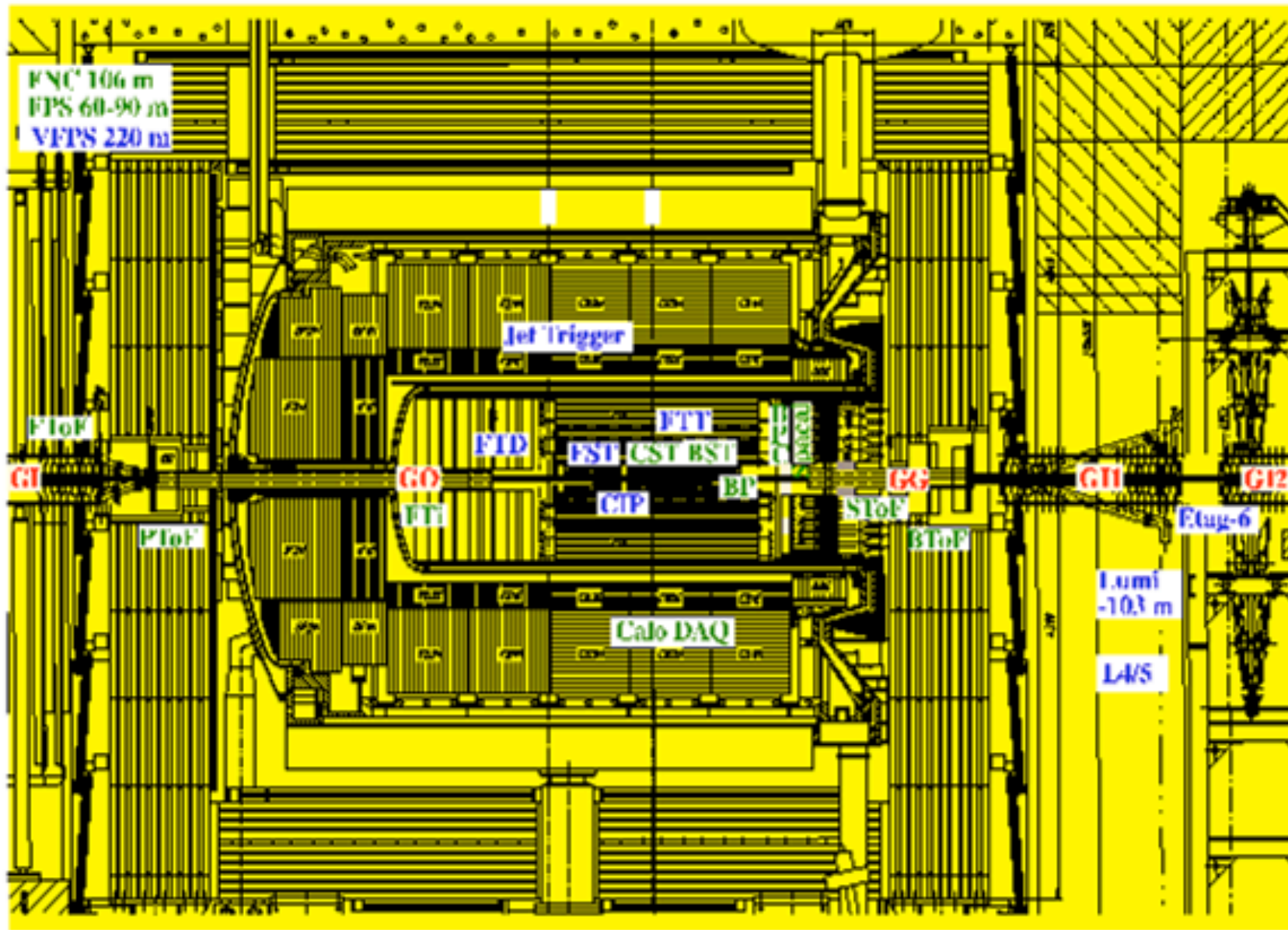


normalisations A differ





Pauli blocking, confinement, pion cloud : do NOT expect dbar=u_{bar}



designed in 1986, built in 1990, upgraded in 2000, quo vadis H1? ← requires strong collaboration

- As often: busy times are ahead
- It's worth it to calmly operate H1 in/through the transition phase from I \rightarrow II and perhaps into III
- The future depends on all of us, on how we see elementary particle physics and H1 in particular.
- Dont miss the bowling, thanks.