H1 Status

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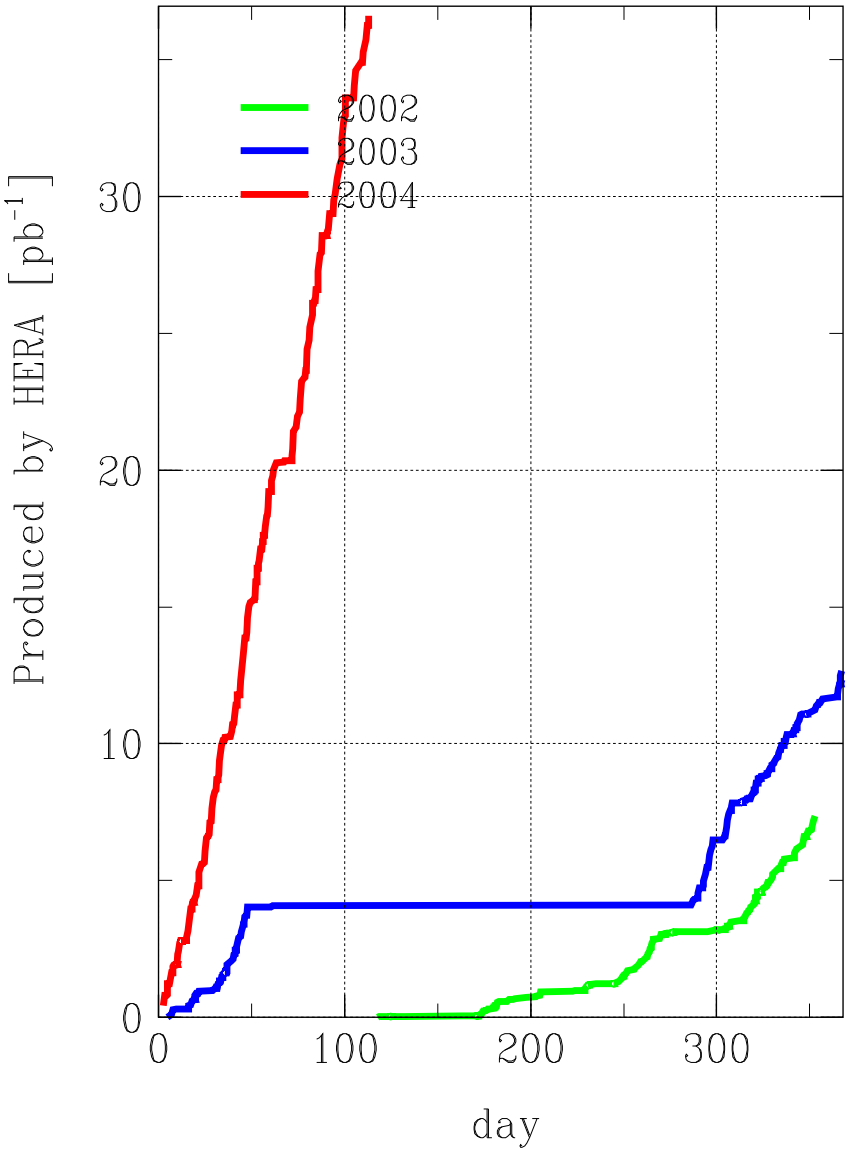
HERA coordination meeting, 23.4.2004

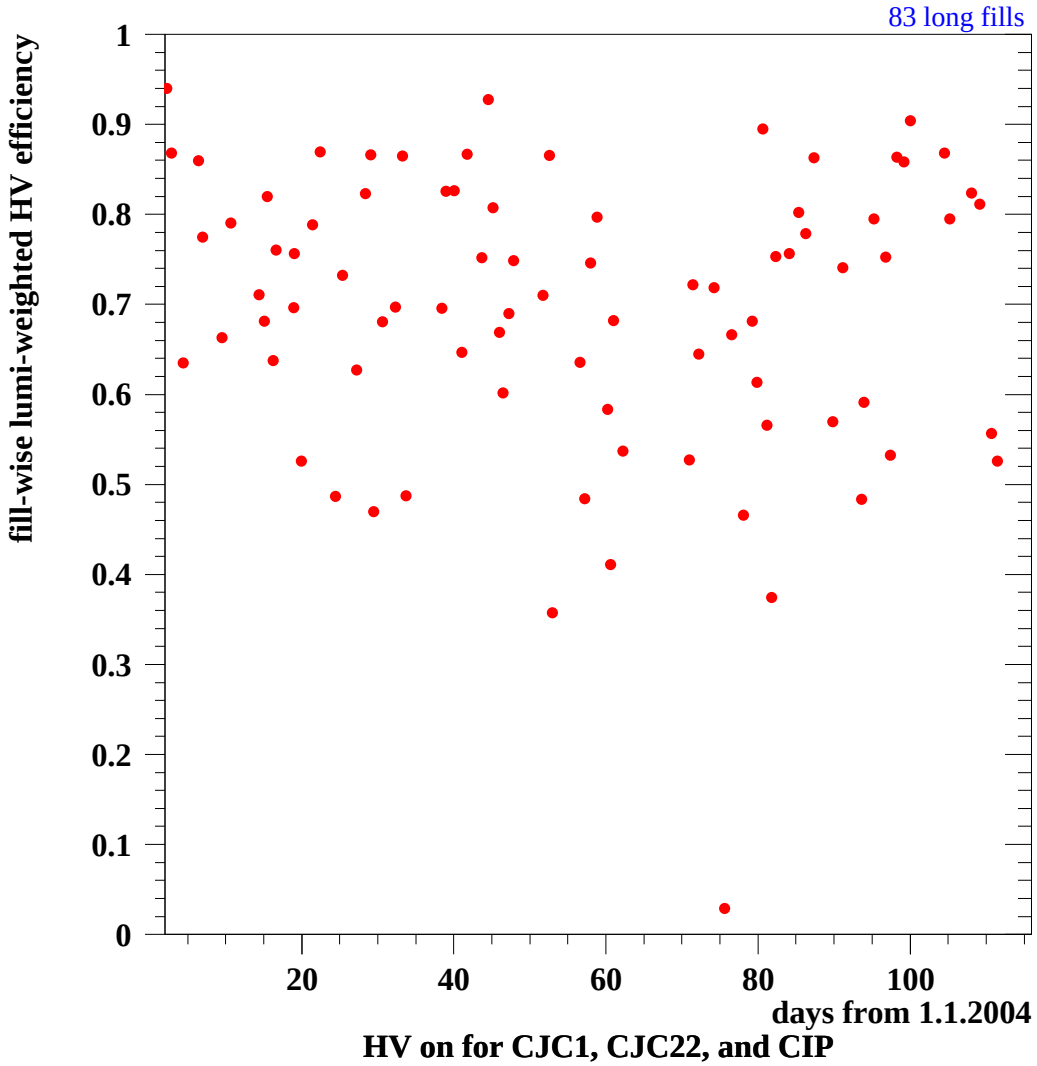
- Luminosity running and backgrounds
- First HERA II physics results
- Plans

Luminosity running



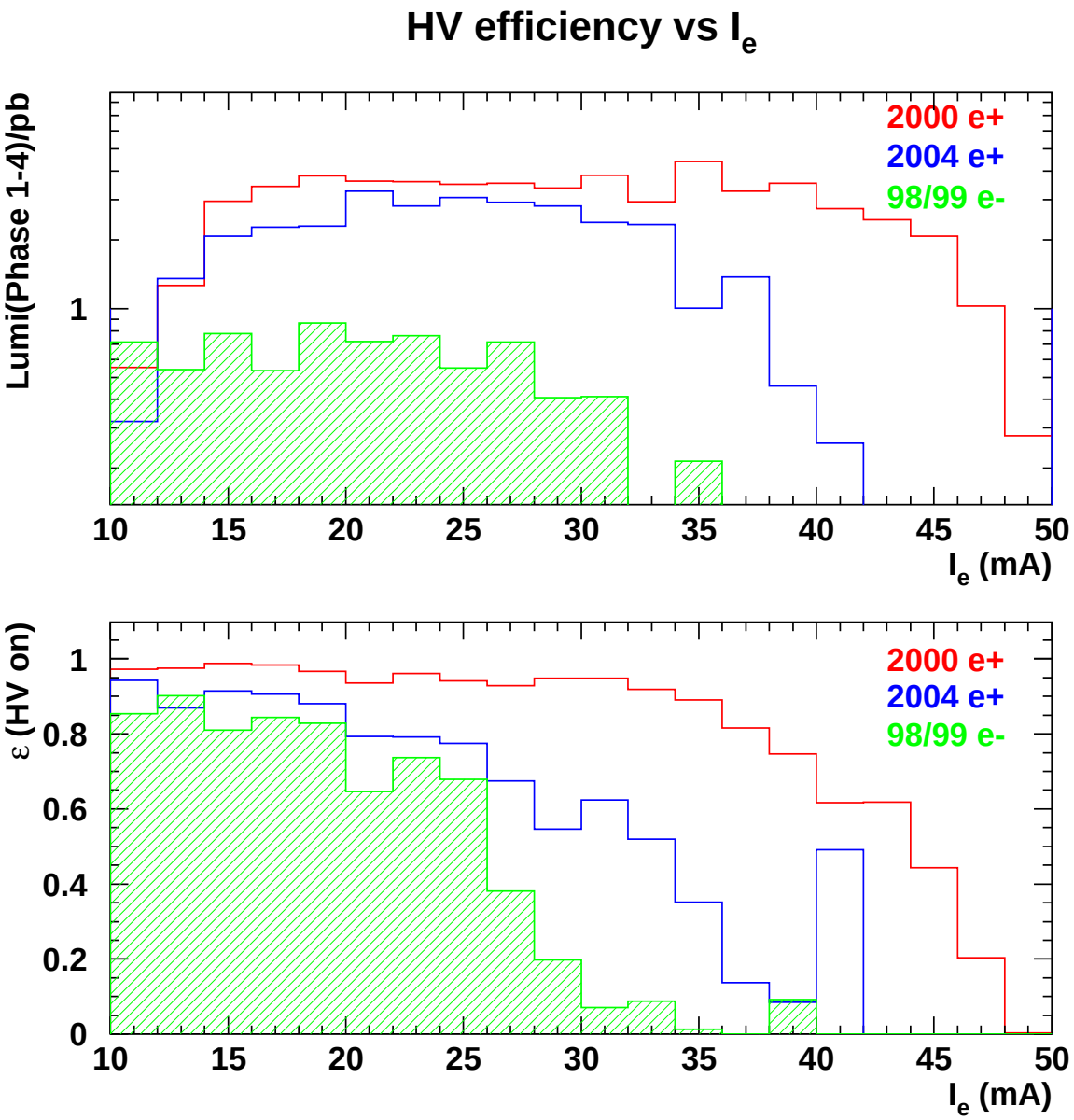
- In 2004 HERA delivered: $37.2\,\mathrm{pb}^{-1}$.
  Slope is like in 2000, with much lower duty cycle but thanks to higher specific luminosity.
- Peak luminosity so far: $3.5 \cdot 10^{31}\,\mathrm{cm}^2/\mathrm{s}$
  compared to $1.8 \cdot 10^{31}\,\mathrm{cm}^2/\mathrm{s}$ in 2000.
- H1 DAQ running: $35.5\,\mathrm{pb}^{-1}$.
  95.5% average DAQ efficiency.
- DAQ · (1 - deadtime) $32.8\,\mathrm{pb}^{-1}$.
  7.6% average deadtime.
- CJC1,2 and CIP full HV: $22.1\,\mathrm{pb}^{-1}$.
  67% average HV efficiency.

High voltage efficiency



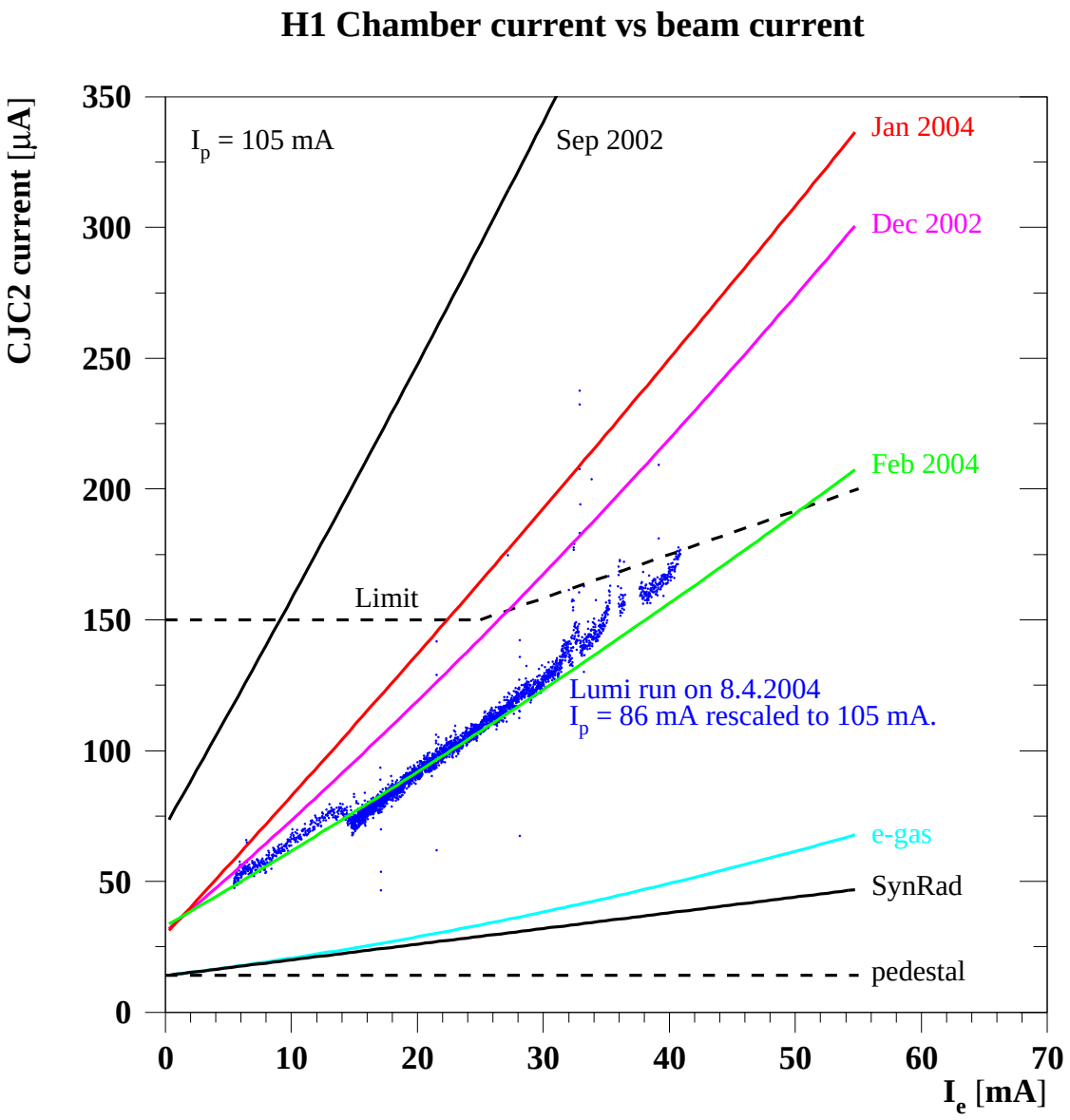
- Spread from 65 to 90% due to trips from background spikes.
- Points around 50% due to fills with long periods of 'spiky' conditions.
- Chamber trips are always correlated with spikes in scintillator rates.
- Both beams contribute.
- Spiky e beams can often be cured by adjusting tunes.
- Trip recovery now done more quickly by computer, with strict limits.

Past and present HV efficiency vs I_e for e^+ and e^-



- HV turn-on procedure and initial steering period cause losses at highest I_e.
- An automatic procedure was implemented recently.
- Stable conditions are required to profit from highest luminosity.
- e^-p operation in 1998/1999 was inefficient above 28 mA.

Chamber current



- The improved conditions from Feb 2004 have been almost maintained in March and April.
- Stable chamber operation at $I_e \cdot I_p = 40 \cdot 90\,\mathrm{mA}^2$.
- HV now follows pressure variations to stabilize gain. $g \sim p^{-5}$, $\pm 30\,\mathrm{mbar}$ used to cause $\pm 15\%$ gain and current variations.

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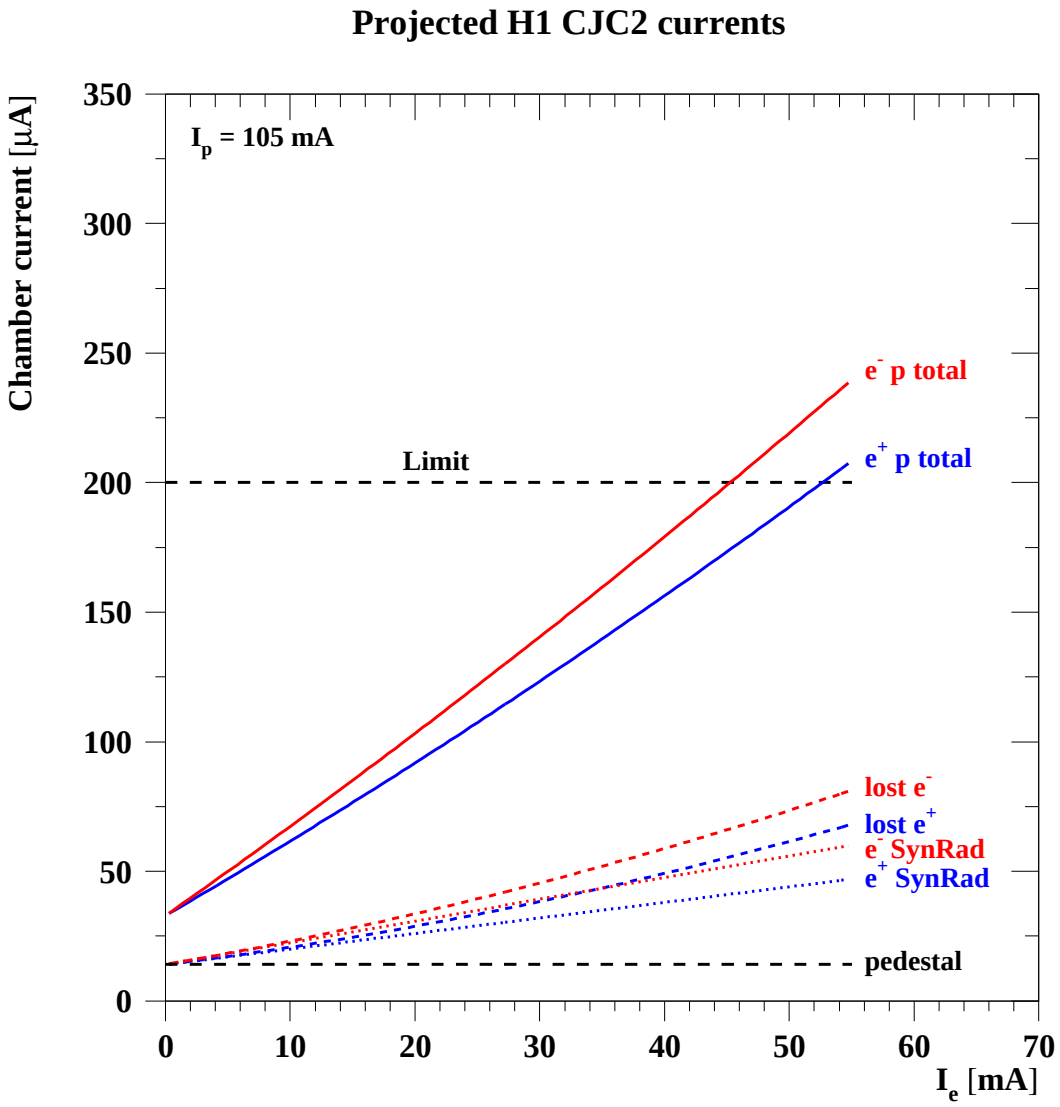
Expected chamber current e^+p and e^-p



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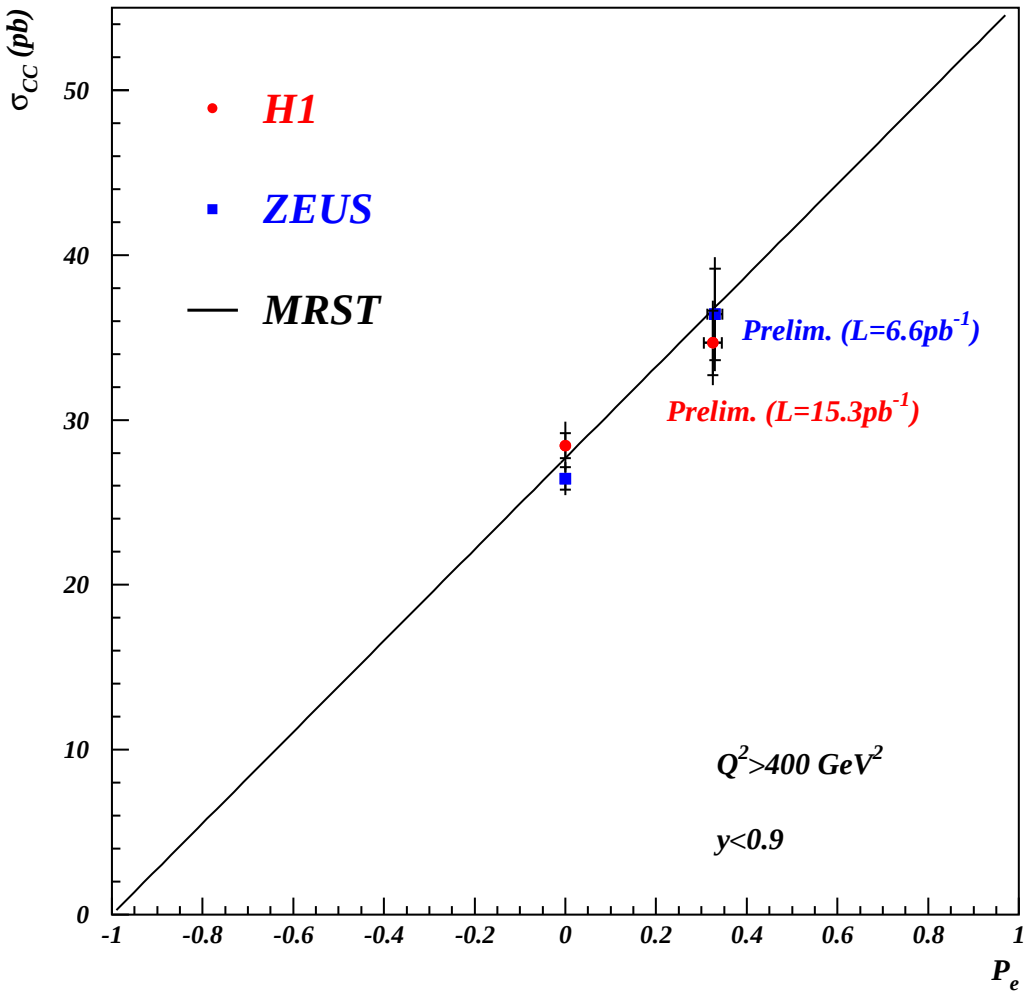
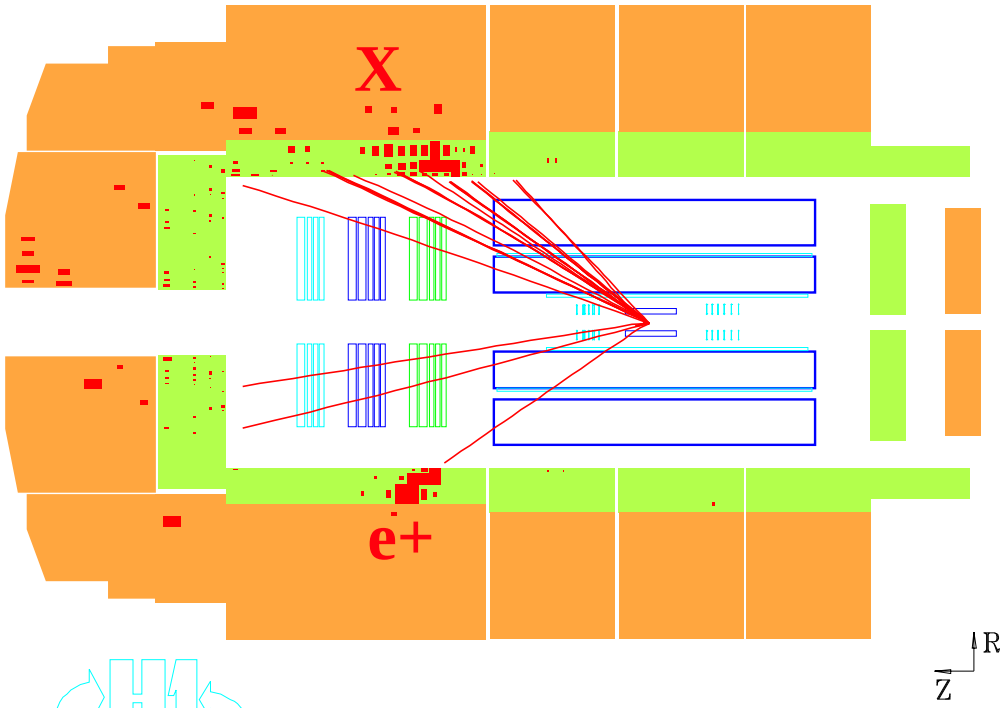
- Backscattered SynRad background in the CJC increases by 40% due to higher flux and harder spectrum.
  Coating of ABS4 would reduce by a factor 1.7.
- e-gas unchanged, with proper collimator setting.
- p-gas increases by 15% due to higher photon flux, causing photodesorption.
- At $I_e \cdot I_p = 50 \cdot 105\,\mathrm{mA}^2$ expect $220\,\mu$A with e^-p instead of $190\,\mu$A with e^+p.

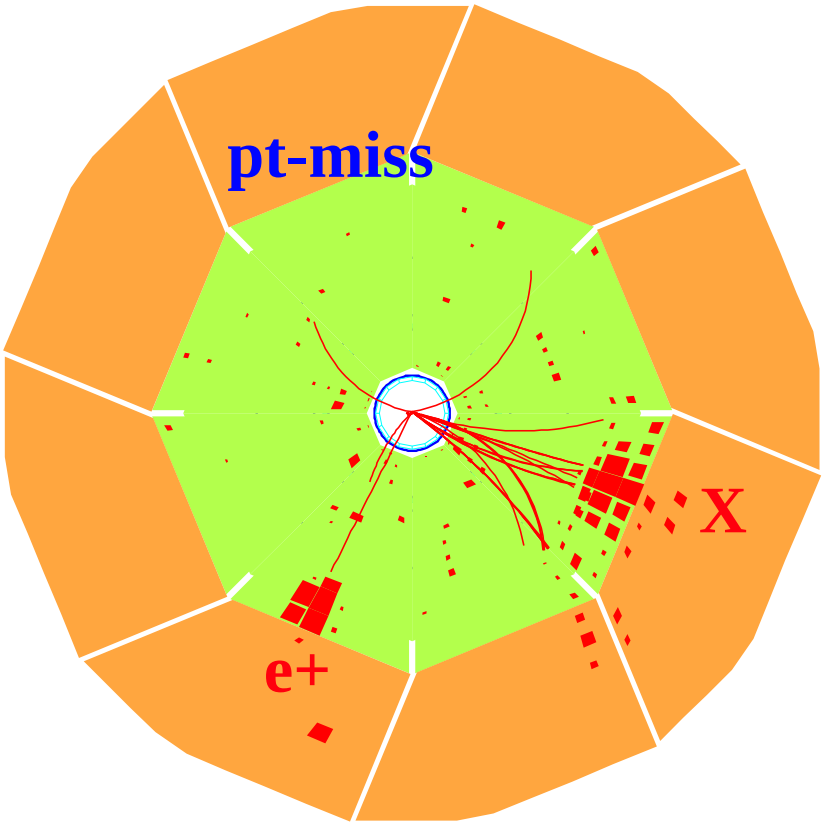
Polarised $e^{\pm}p$ charged current cross section



- The charged current $e^{+}p$ cross section is measured by H1 with 5.8% statistical and 4.8% systematic error at $33 \pm 2\%$ right-handed polarization.
- For $P = 0$ it has been measured at HERA I with 2.7% statistical and 4.3% systematic error.
- It is consistent with the Standard Model expectation.
- We now take data with left handed polarization.
- High polarization improves significance.

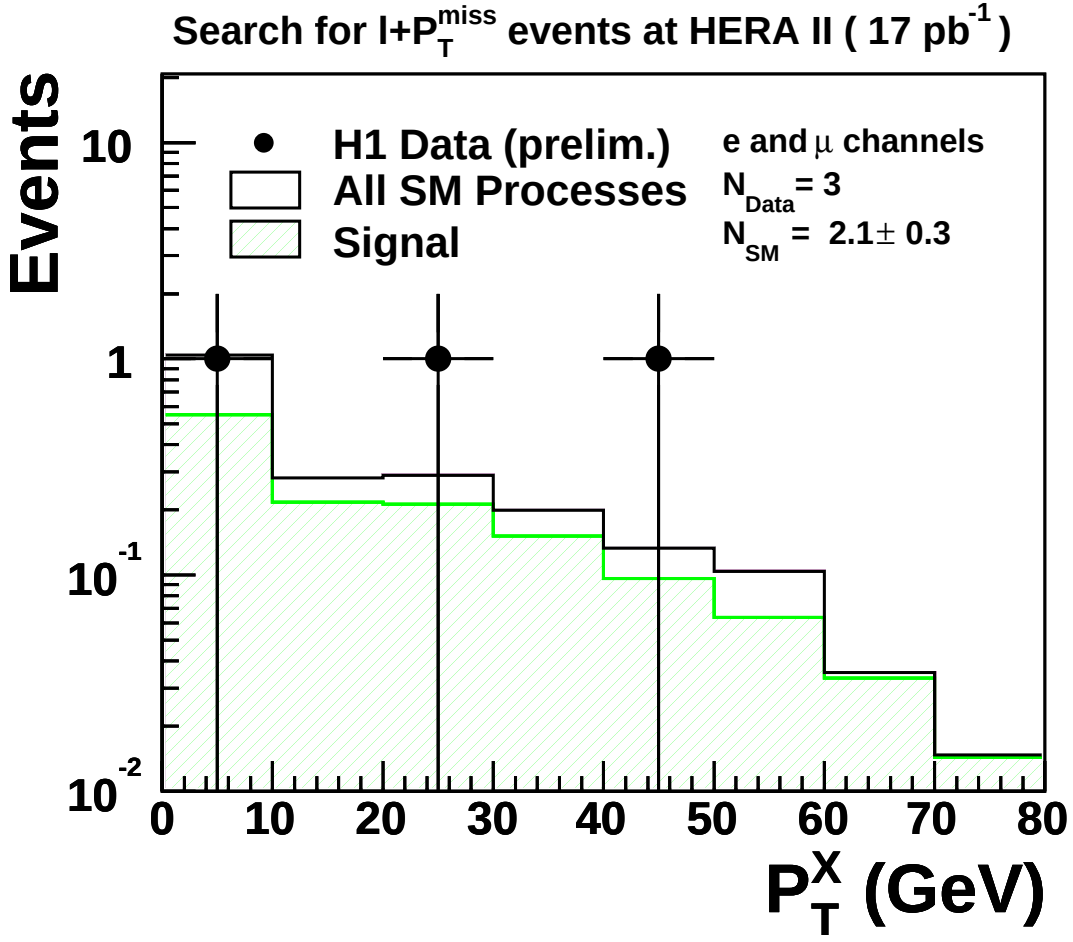
Events with isolated high p_T lepton and missing p_T from HERA II





$p_T^e = 37\,\text{GeV}$, $p_T^{\text{miss}} = 44\,\text{GeV}$, $p_T^X = 29\,\text{GeV}$.

p_T^X distribution



SM Signal is mainly real W production.

- H1 observes 3 events in $e + \mu$ channels in $17\,\mathrm{pb}^{-1}$ of HERA II data, expecting 2 ± 0.3.
- H1 observes 2 events with $p_T^X > 25\,\mathrm{GeV}$, expecting 0.6 ± 0.1.
- In $105\,\mathrm{pb}^{-1}$ e^+p data from 1994–2000 H1 observed 10 events with $p_T^X > 25\,\mathrm{GeV}$, expecting 2.9 ± 0.3.
- This channel needs to be investigated with highest e^+p luminosity before the 'discovery window' closes.

High luminosity physics program

e^+p

- Clarify isolated high p_t leptons.
- Clarify multi-electrons.
- $F = 0$ leptoquarks.
- d density from charged current.
- Searches: RPV stop, SUSY with c, u.

e^+p and e^-p

- u and d couplings to Z^0.
- Valence density at 'low' x from xF_3.
- DVCS charge asymmetry.

Reduced E_p

- F_L.
- High x densities .

any ep

- Substructure, contact interactions.
- Large extra dimensions.
- Precision F_2, u density at high x.
- G_2, parity violation, d/u at high x.
- Pentaquark spectroscopy.
- QCD tests with jets, charm, beauty.
- Diffraction, DVCS, low x physics.

e^-p

- $F = 2$ leptoquarks.
- Excited neutrinos.
- Susy with b,s,d.

Future running

- Collection of high luminosity and clarification of the anomalies observed in e^+p scattering are of highest priority in the H1 physics program.
- Therefore, H1 would like to collect 300 pb^{-1} in continued e^+p running.
- The H1 collaboration is ready to operate the detector beyond the end of 2006 and wants to complete the original HERA II program including e^-p and low energy running.

Shutdown Summer 2004

- Upgrade of the FPS Roman pot moving system at NL 61, 80, and 90 m.
  Includes installation of new proton beam pipe sections.
  Coordination with BU repair still to be done.

- Repair of a few EM Spacal cells.

- Repair of the Central Silicon detector (1/4 dead) would require a 10 week shutdown and is not requested. Spare components are available, if the shutdown is extended otherwise.

- Repair of a few channels of the CIP chamber would require 11 weeks and is not requested. It could be performed on short notice.