Stefan Spratte
Uni–Dortmund
HERA–B Collaboration
Meeting

Plenary Talk Feb. 5th, 1998

HERA–B Target
Status, Results & Plans

- Review of the 1997 running period
- Important results
- Plans for 1998

Review of the 1997 Run

What was the Run used for ?

- Radiation studies for the ITR and OTR
- Standalone tests with all subdetectors
- Common DAQ running
  - ▷ Synchronization procedure established
  - ▷ Development of monitoring tools
  - ▷ Tests of the ECAL pretrigger
  - ▷ DAQ evolution to the final system
- ECAL calibration
- Trigger tests & Farm studies
- Search of J/Ψ–signal with calibrated ECAL
- Targetstudies
  - ▷ Improvement on the automatics steering
  - ▷ Studies for wires rate equalization
  - ▷ Investigation of the interaction with the machine and the other experiments

    → new WIP (Wire Insertion Procedure)

Runstatistics

Target operation from Feb. 21st – Oct. 31st, 1997

HERA

- Time of operation: 5017 hours
- Luminosity declared: 2117 hours

  $\rightarrow$ 42,4% of operation time

  (Oct.: 54%; july: 31%)

HERA–B Target

- Time of operation: 910 hours

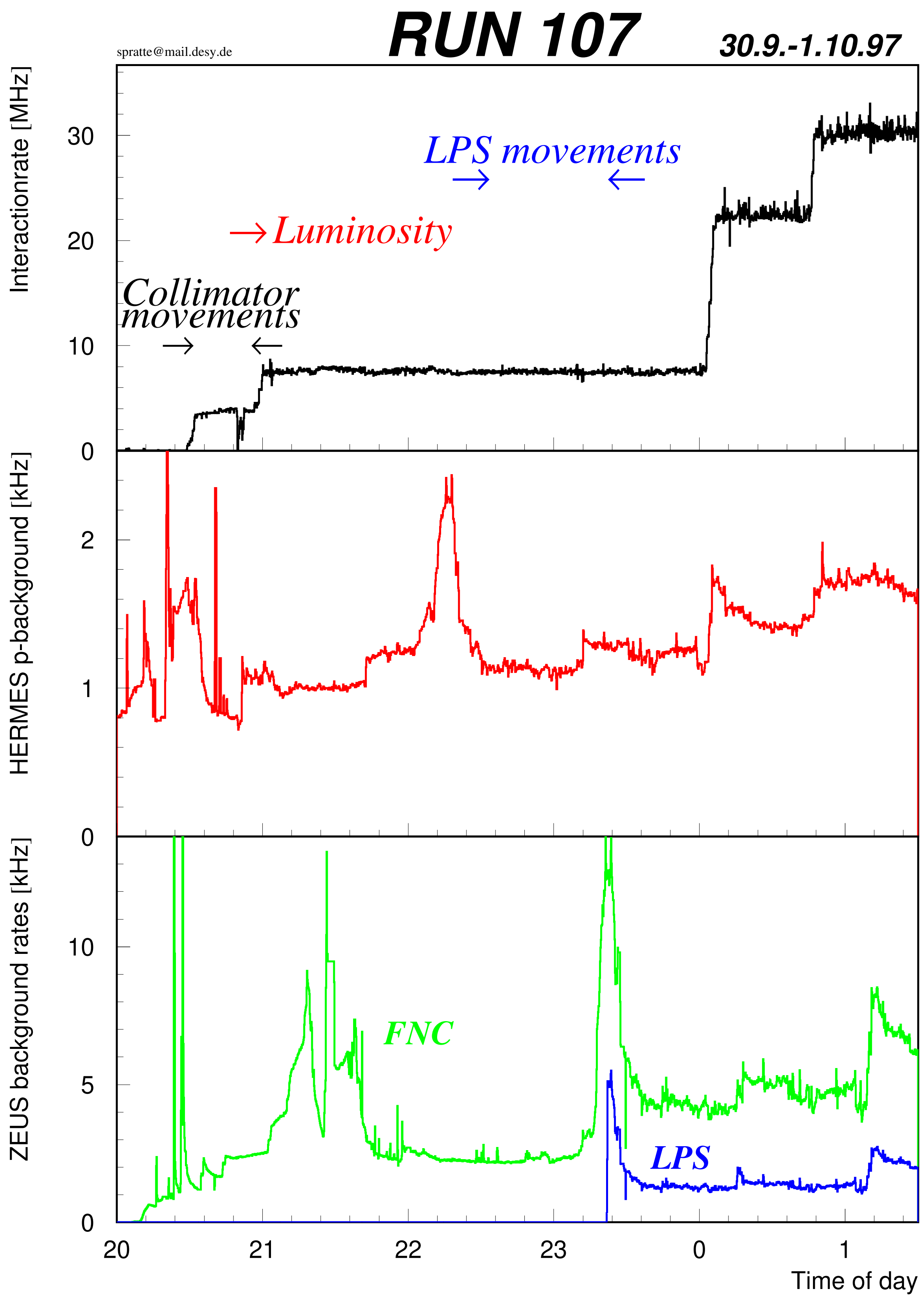
  $\rightarrow 3,3 \cdot 10^6$ seconds
- Number of interactions: $4 \cdot 10^{13}$

  $\rightarrow$ 13% of designrate

- Usually continuous target operation.
- Lost much time because of movements of the ZEUS LPS detector.

  (new WIP increases time of target operation by $\geq 30\%$)

The new WIP



RUN 107
spratte@mail.desy.de
30.9.-1.10.97
Interactionrate [MHz]
LPS movements
→Luminosity
Collimator movements
HERMES p-background [kHz]
ZEUS background rates [kHz]
FNC
LPS
Time of day

Results of the new WIP

- New WIP successfully tested since end of Sept. '97 (standard procedure for 2 weeks)
- High run efficiency (gain $\approx$ 30%)
- Low background at other experiments (inside rate limits most of the time)
- No significant increase of background at higher interactionrate
- High LPS efficiency with new WIP
- Usually no further collimator optimization necessary

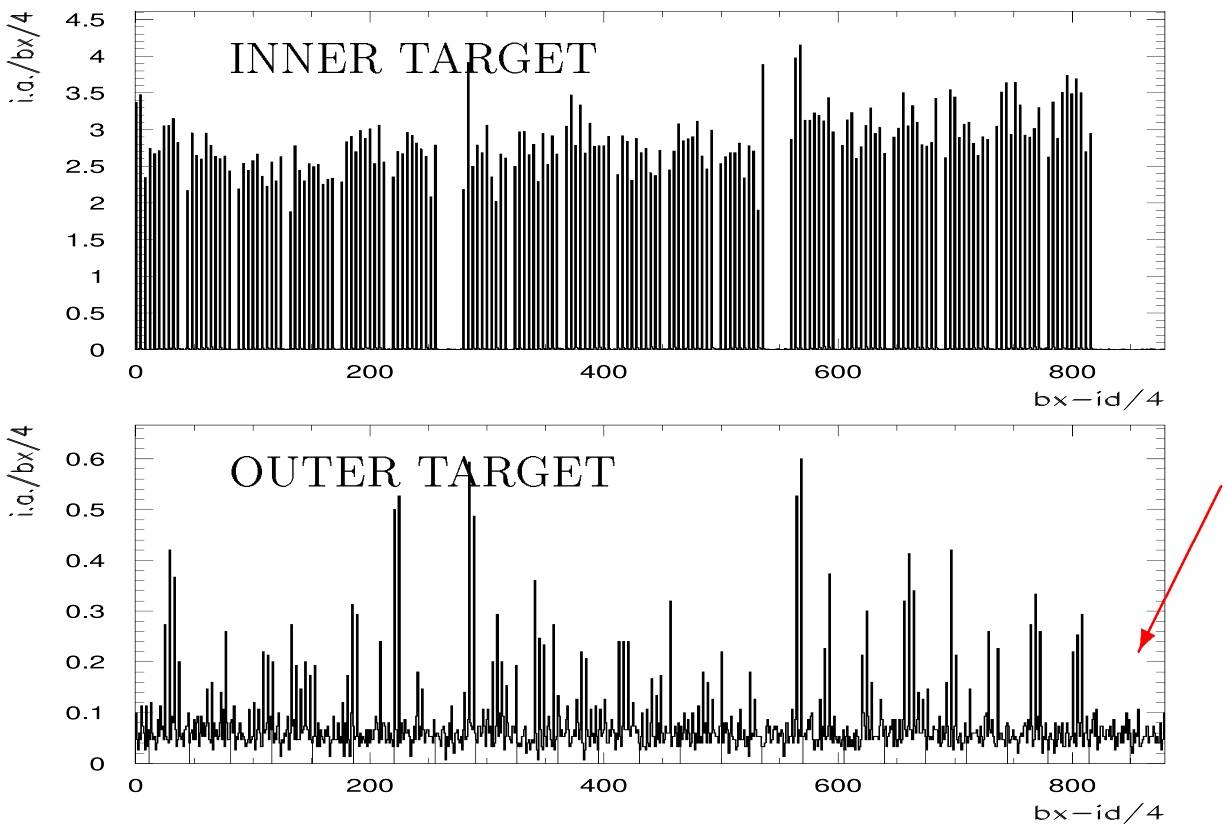
Plans for 1998:

- Optimization of time for wire insertion and collimator positions
- Make available a graphical user interface for the HERA shiftcrew

$\Longrightarrow$ WIP default procedure in 1998

Off–Bunch protons & Fluctuations

S. Schaller/J. Klenner



- Big difference between contribution of individual bunches

- Contribution of protons between filled bunches (Off–Bunch protons)

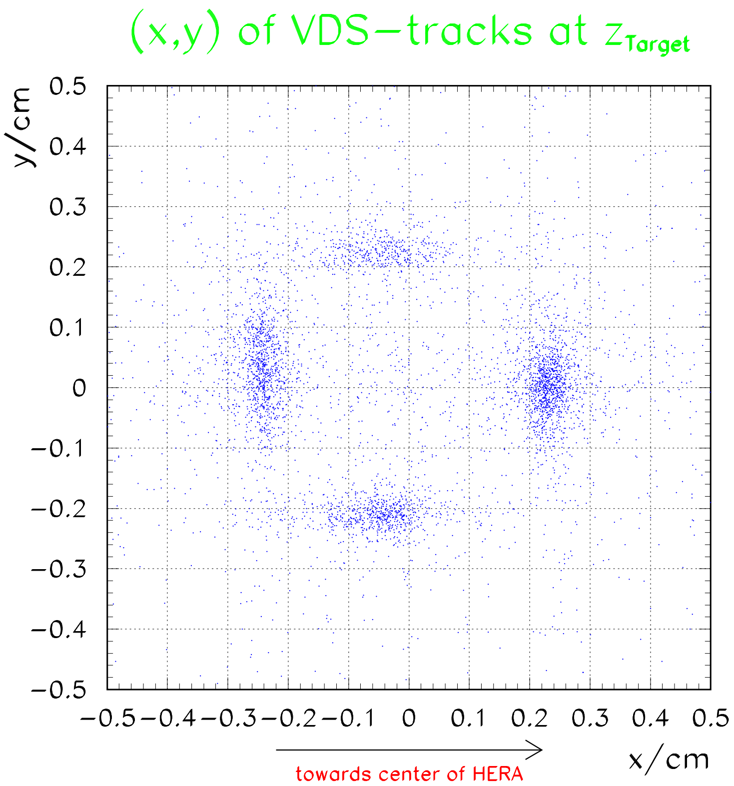
Bunch and Off–Bunch IA

Contribution of protons between filled bunches

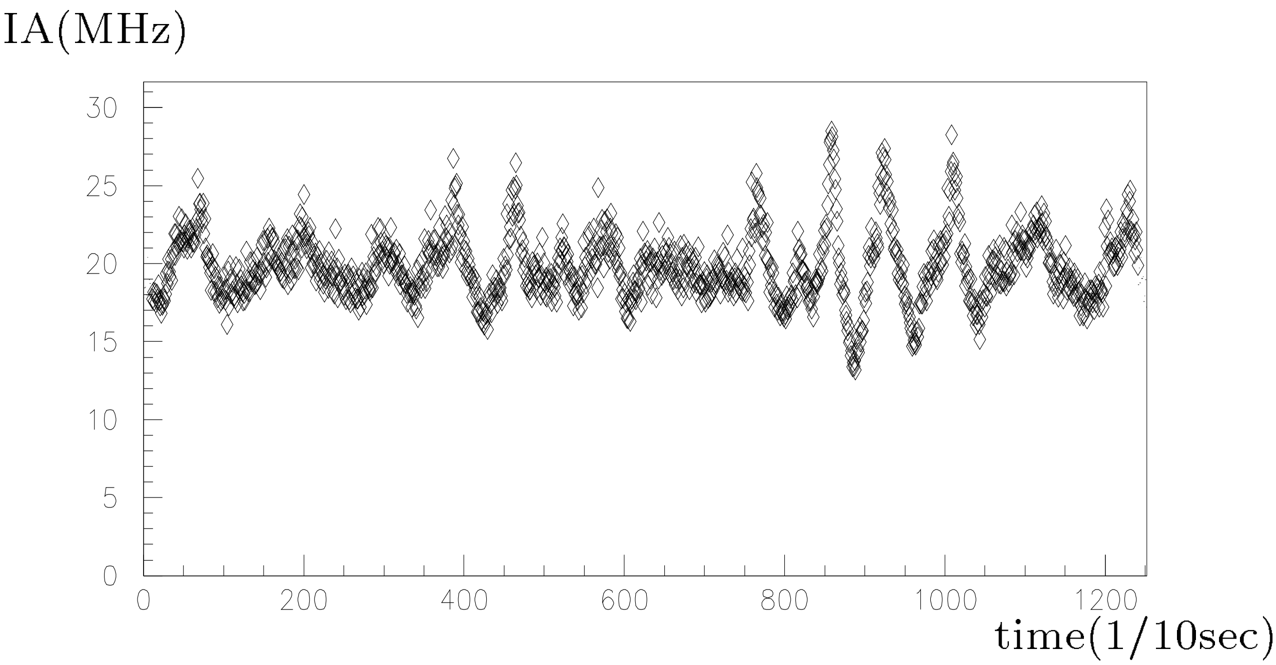
- at the outside part of the beam intensively
- no or only small contribution at the inner part of the beam
- only small variations for different HERA fills
- doesn't disappear for high interaction rates

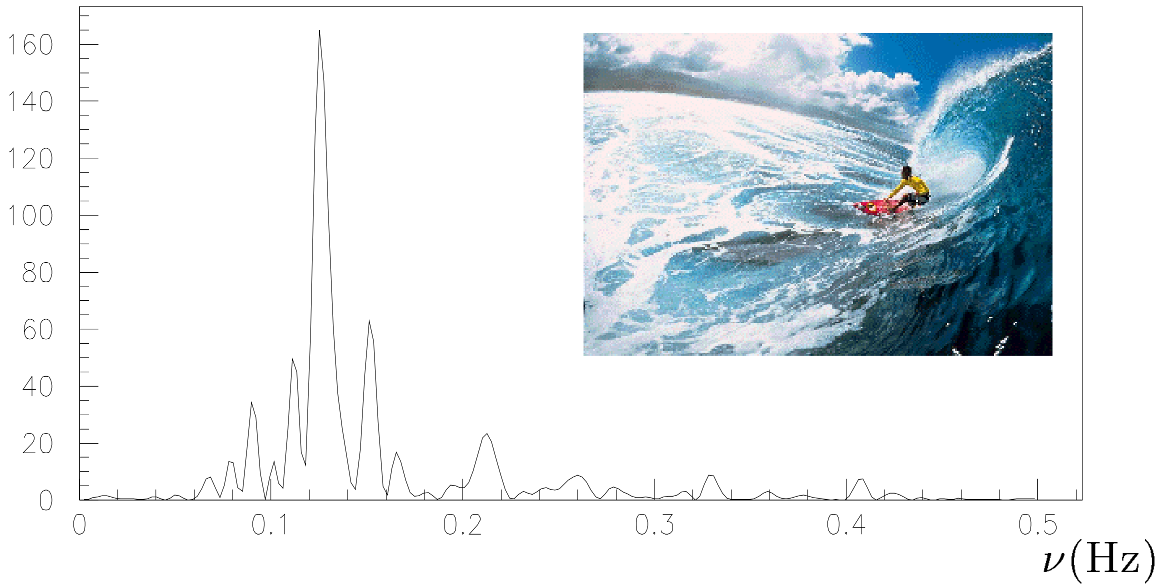
Possible explanation:

- Protons become longitudinal instable due to energy loss inside the target
- Horizontal dispersion (-0.47 m) at the target location



Periodic rate fluctuations





Now we're able to see the undulation of the north sea !

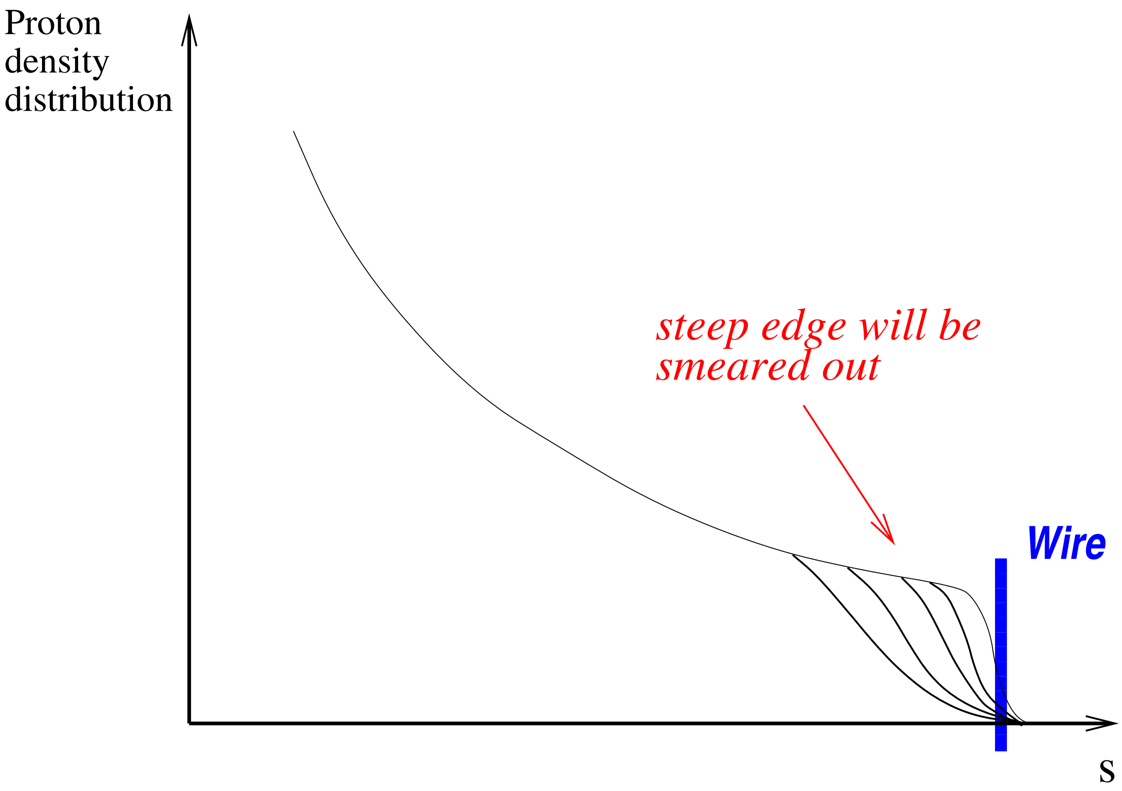
Proposed HERA timeschedule 1998

mid april – begin june	Technical Start Up
mid may – end dec.	HERA Tunnel closed
end may – mid june	Startup beam operation
mid june – end july	e–beam cleaning, 820 GeV protons Targetstudies (Functionality tests, investigation of fluctuations and Off–Bunch protons, calibration of counters, BEAMEXCITATION)
mid july – end july	Machine studies
begin aug. – mid dec.	Luminosity operation WIP optimization (development to standardprocedure)
mid dec. – end dec.	Machine studies

- Proton beam: 820 GeV / 80 mA
- New e–ring NEG pumping system
  - ▷ e–beam cleaning
- HERA–B target operation routinously
  - ▷ more complicated operations

Beamexcitation

- Target has to scrape proton beam permanently to deliver high rate
- Target is very sensitive to disturbances because of steep edge: $(\Delta\text{Rate}/\text{Rate})/\Delta w_{pos} \approx 2/10\mu\text{m}$
  $\rightarrow$ Loss of efficiency and development of spikes (dangerous)
  $\rightarrow$ possible solution: Production of more Halo with beamexcitation



Counter setup 1998

Vetocounter	background measurement
3 component TMS (Kiev)	single wire interaction measurement
Triggercounter	between magnet & RICH (temporary), necessary for calibration
Hodoscope counter	in front of ECAL outer part, used for interaction rate measurement
E-beam counter	electron background measurement

Additionally:

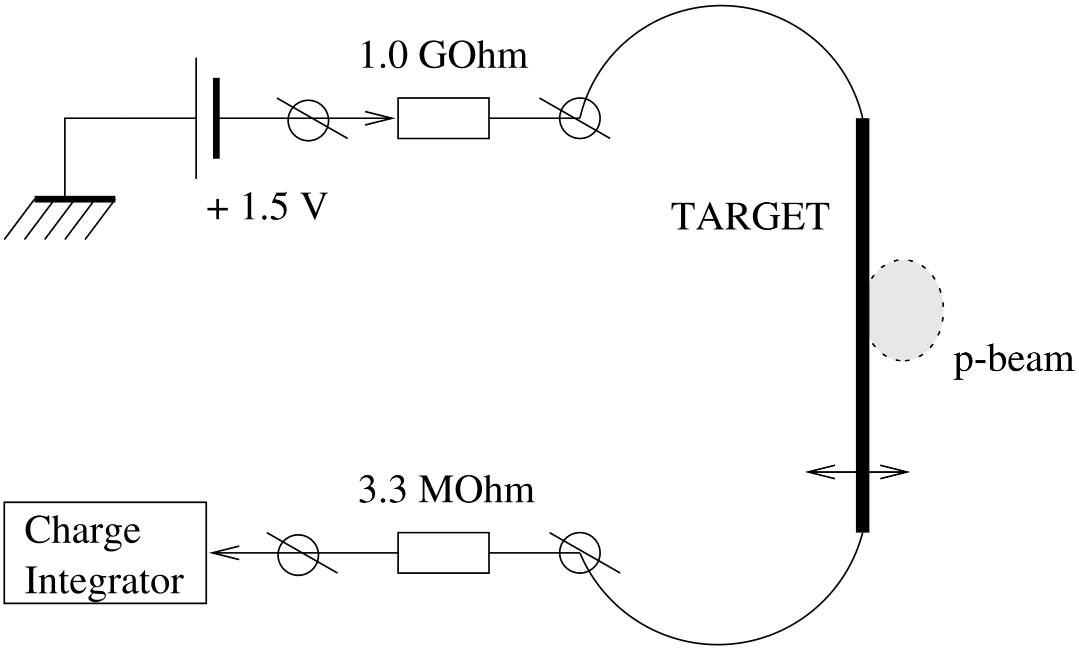
High precision rate measurement with the ECAL Energy Inhibit card (EEI)

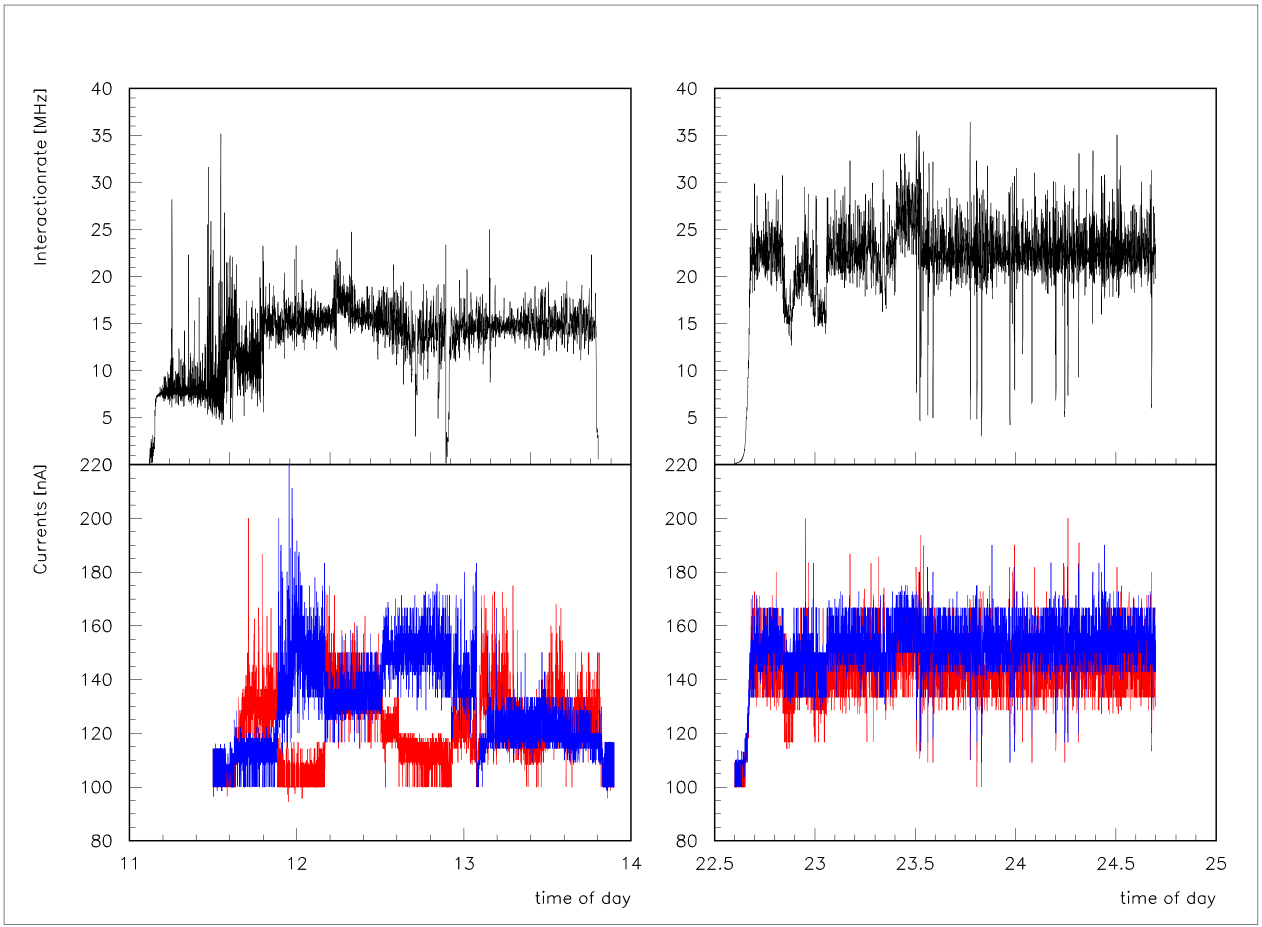
→ processes energy sum signals from inner part of the ECAL

- Rate measurement every bunch crossing
  → individual bunch contribution with high statistics
- Fluctuations, frequency spectra

Target Monitoring System TMS

V. Pugatch
V. Aushev

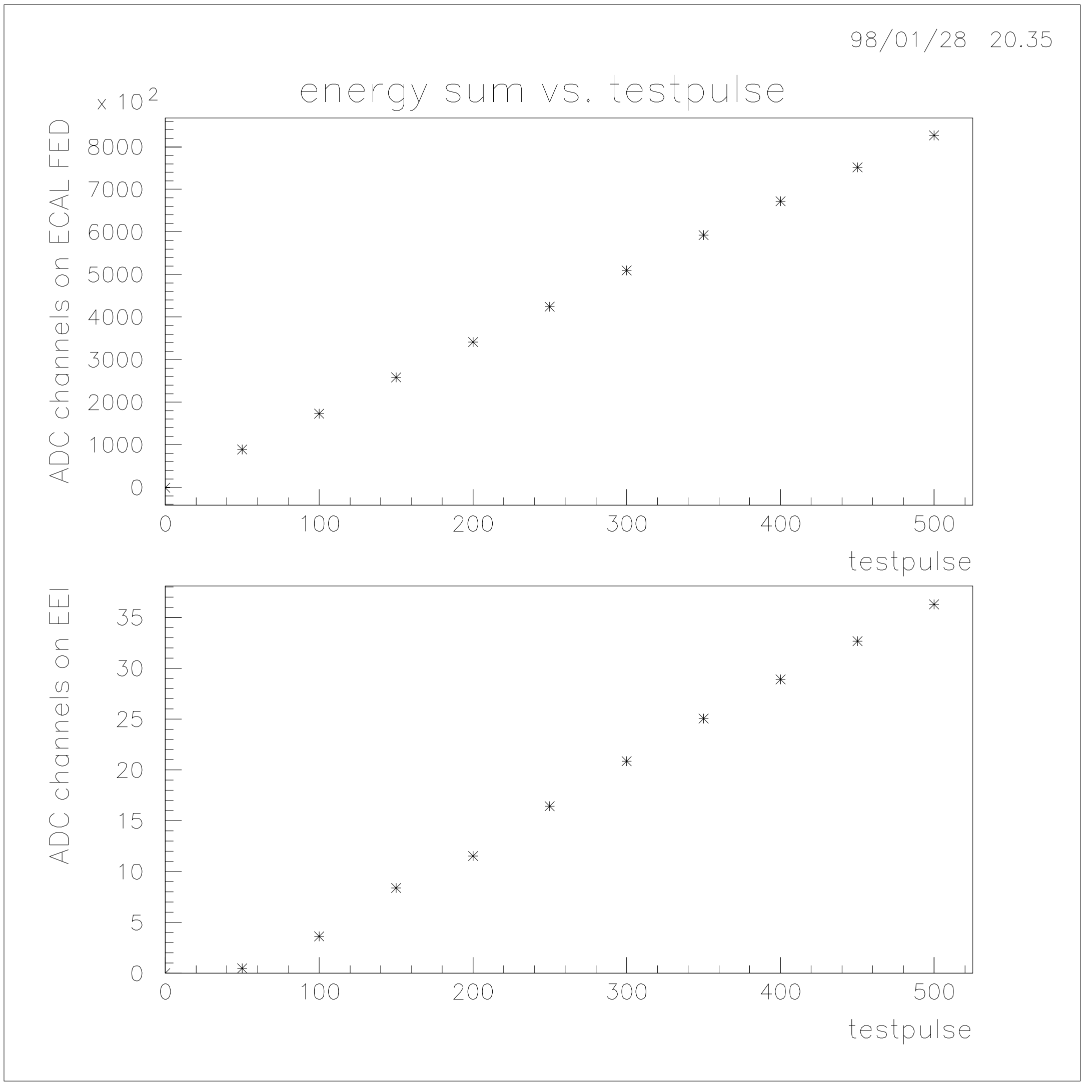




Test of the EEI card

M. Symalla

Test of EEI card was successfully done
→ linearity of testpulse height and
readout signals (FED/EEI)



to be done: Readout of the cache FIFO by the SHARC LINK, or via VME (if diagnostic mode is set)

Target setup 1998

- z-position of targets:
  station 1: z_1 = -7mm
  station 2: z_2 = -10mm
- wire material: Al, Ti (in any case), suggestions are welcome
- 2 targets of the 2nd station will be rotated by 45°

Software/Datalogging:

- Distribution of targetpositions under way
- information: 8 wirepostions + some rates (1 Hz)

Conclusion

- New WIP works successfully and will be optimated to a default procedure in 1998
- Reason for the contribution of Off–Bunch protons to the interaction rate seems to be detected, further investigations are forseen
- Stabilization of the rate by beamexcitation will be tested in 1998
- Interactions can be distributed equally on different wires by using the TMS
- New method for high precision rate measurement by the ECAL energy sum measurement is on the way and will be inserted 1998

Target ready for 1998