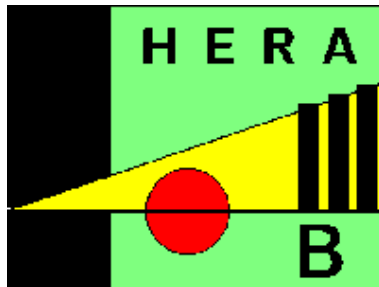


HERA-B Vertex Detector



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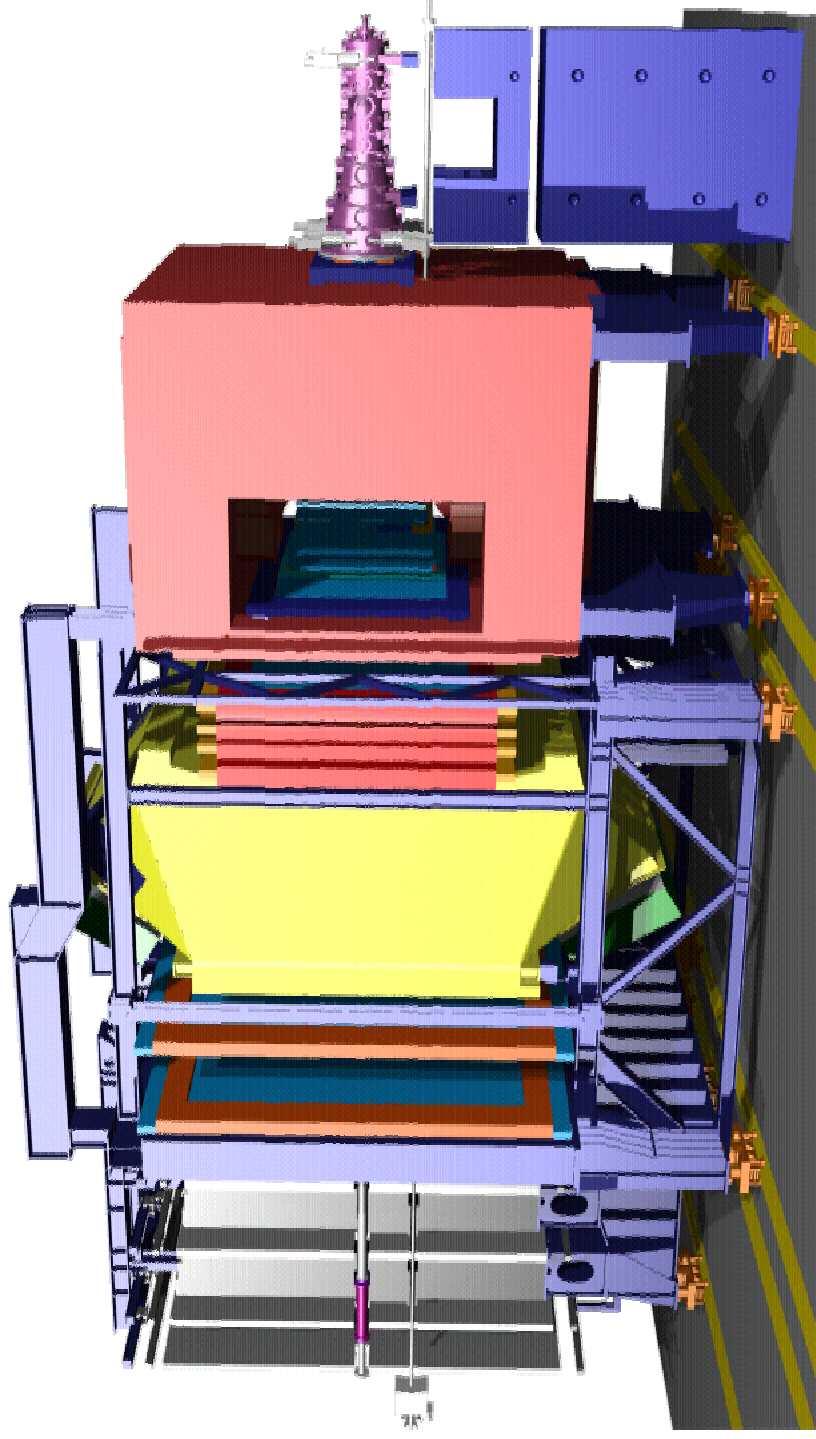
June 23, 1999

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What am I going to talk about

- Basic Design
- Technology
- Status
- Signal/Noise
- Cluster Sizes
- Tracking Performance
- Conclusions

HERA-B Design



Silicon Vertex Detector

The Vertex Detector also does independent tracking.

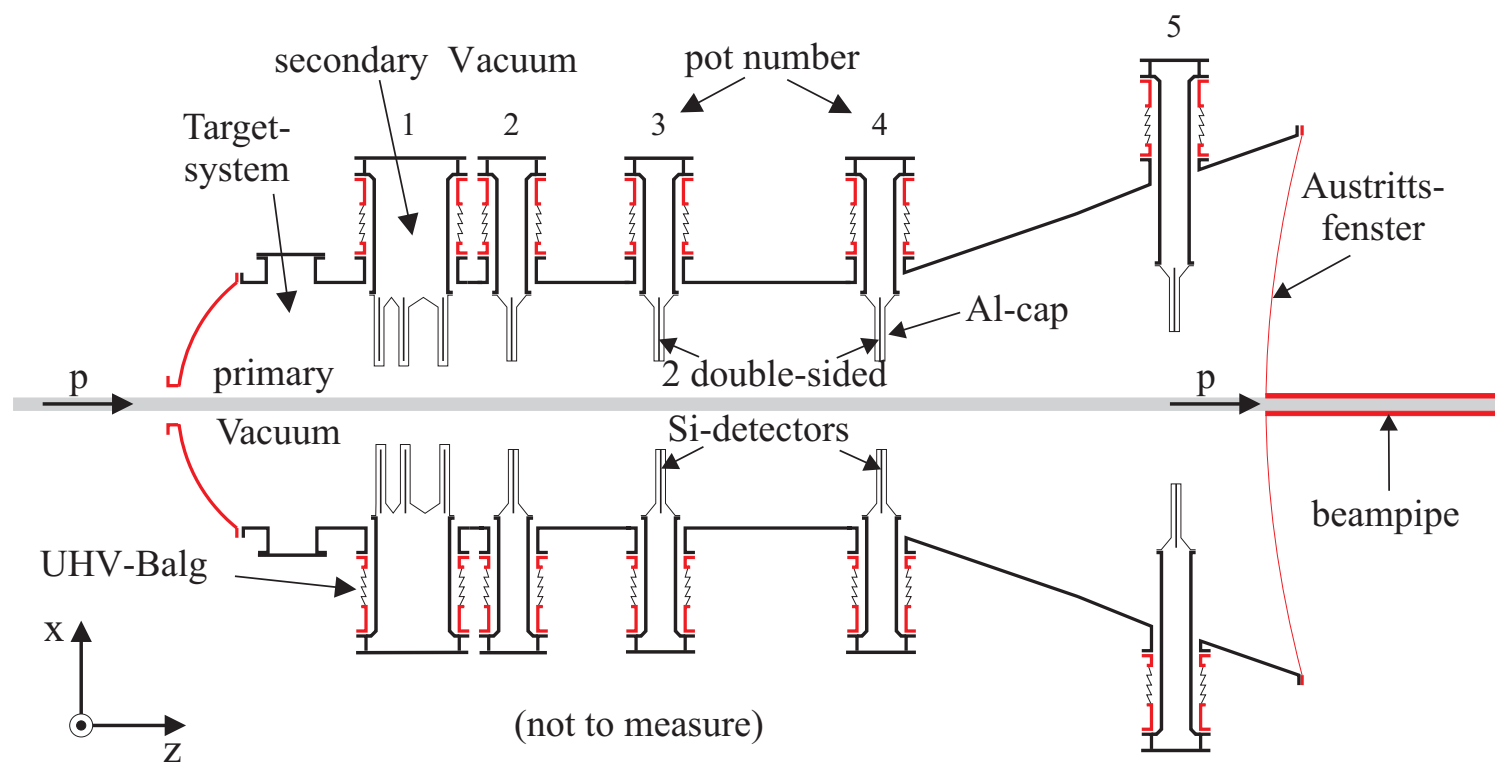
Technology	Silicon Strip Detectors Double Sided
Radius	1 cm – 7 cm
Readout pitch	50 μm
# of channels	147000
Occupancy [max.]	5%
Aging	Max. dose 100 kGy Exchange once per year

Impact-parameter resolution:

$$\sigma \approx 25\mu\text{m} \oplus 30\mu\text{m} p_t^{-1} \text{ (in GeV)}$$

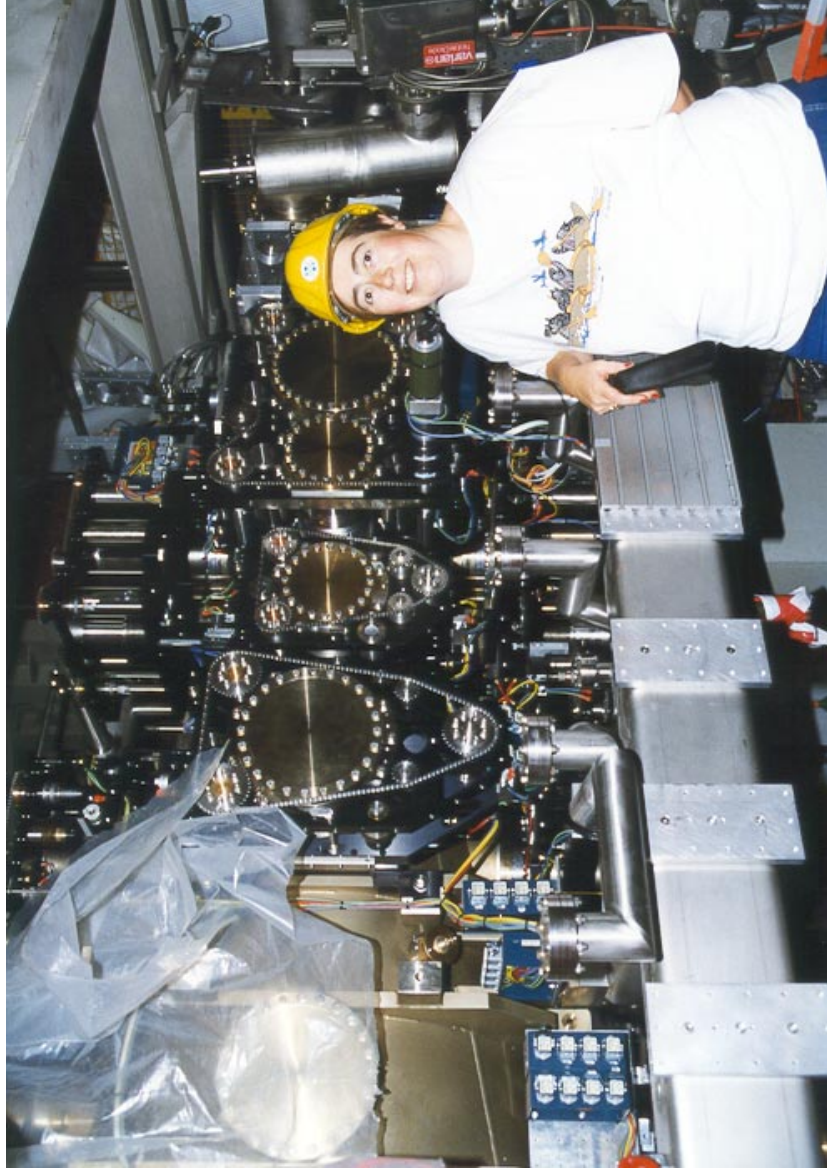
B vertex resolution: $\sigma_z \approx 500\mu\text{m}, \sigma_{xy} \approx 25\mu\text{m}$

Vertex Vessel

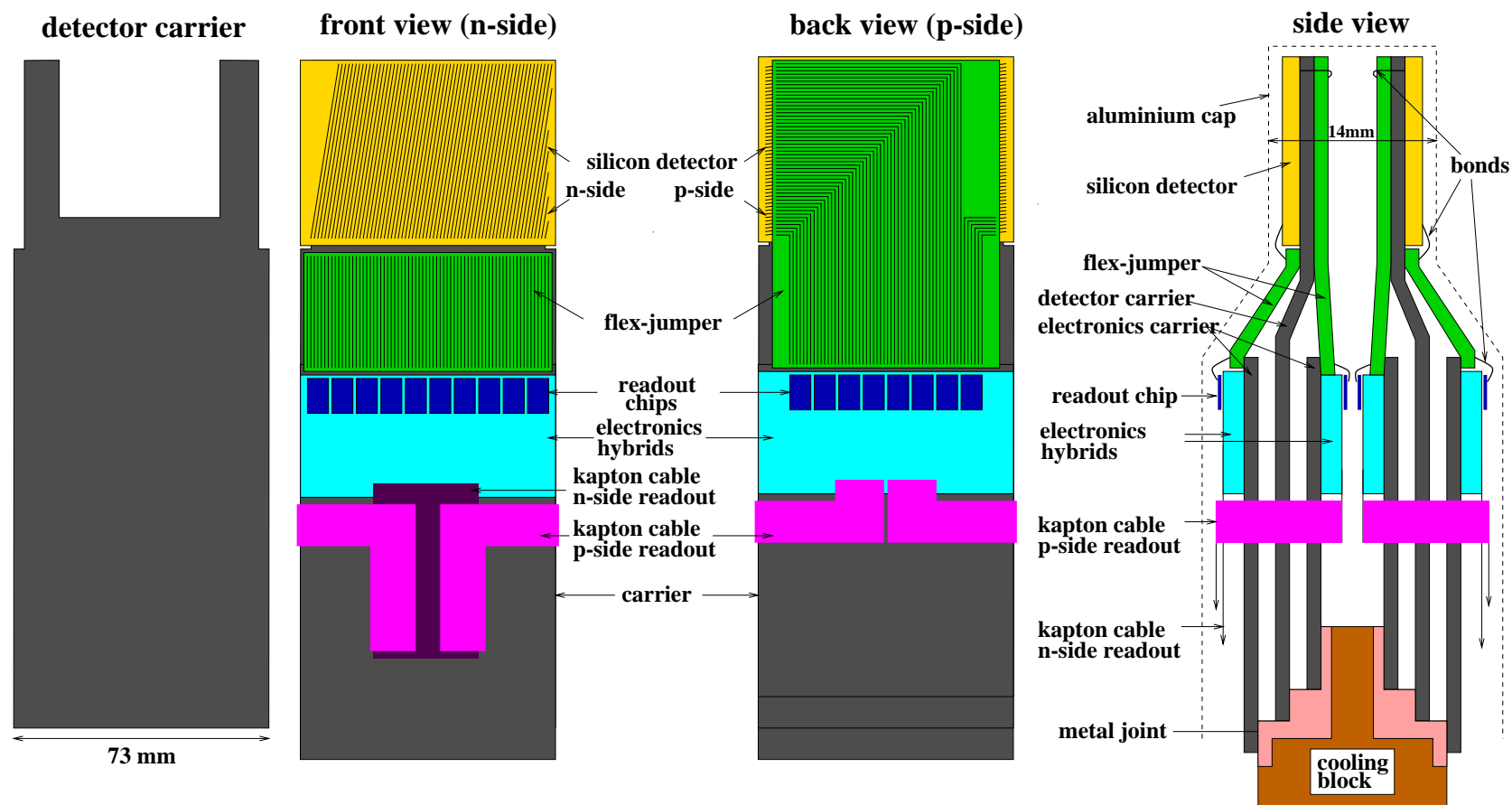


Vacuum Vessel with Roman Pots for 56 Silicon Detector Modules

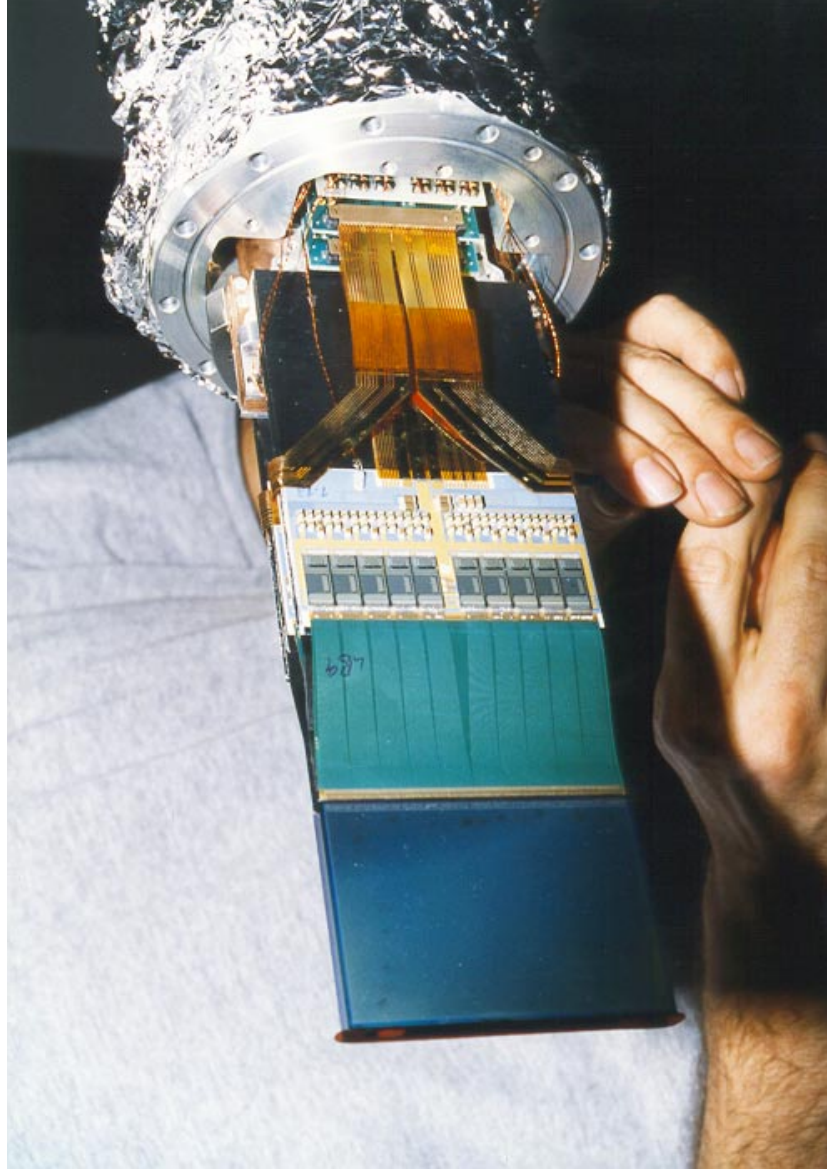
Vertex Vessel



Detector Modules



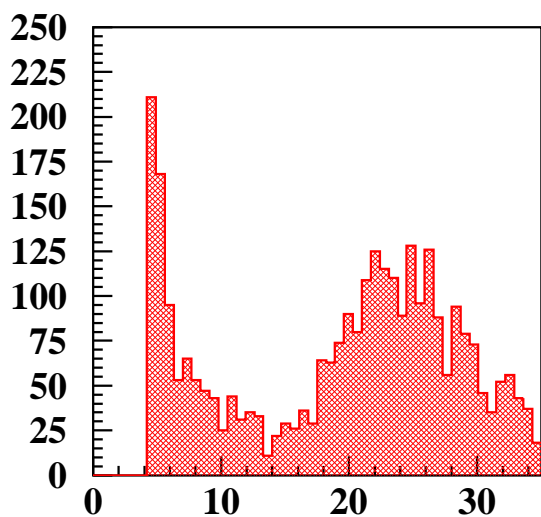
Silicon Module



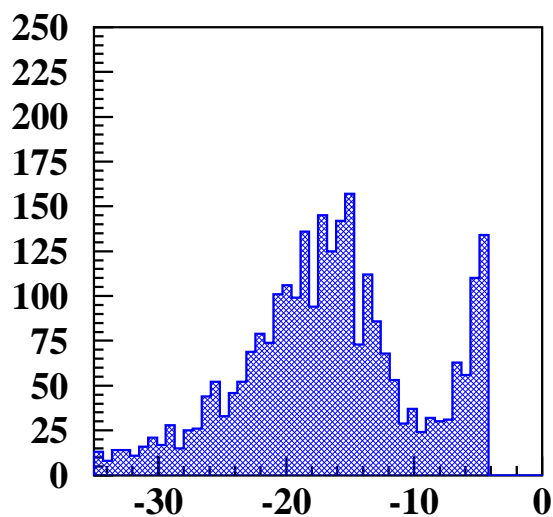
HERA-B Vertex Detector History

- 1994 Approval of the experiment.
- 1996 Vertex vessel installed.
3 prototype detector modules
HF test
Radiation Studies - Si
- 1997 3 improved prototype modules installed.
Common Data Taking of ECAL and VXD.
Ad hoc high- p_T trigger.
First analysis.
- 1998 25% of the VXD installed.
Detector commissioning:
VXD running with Common DAQ.
Data sparsification on 2nd-Level-Farm.
Online Monitoring.
Analysis ongoing.
- 1999 Vertex Detector is completed.

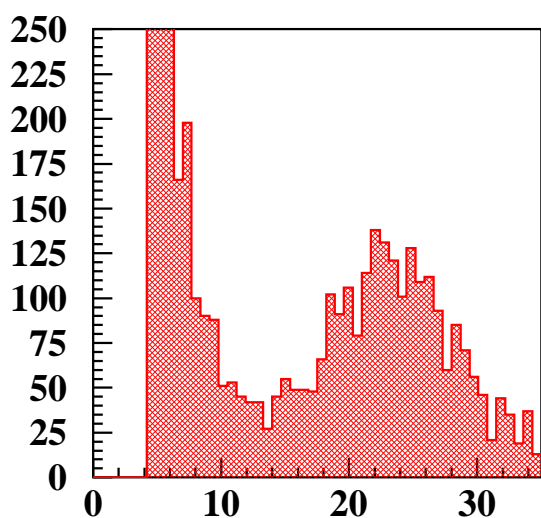
Signal to Noise



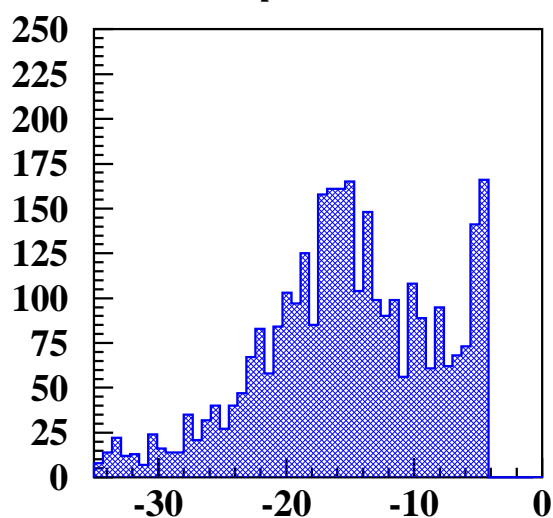
n-side 321



p-side 322



n-side 324

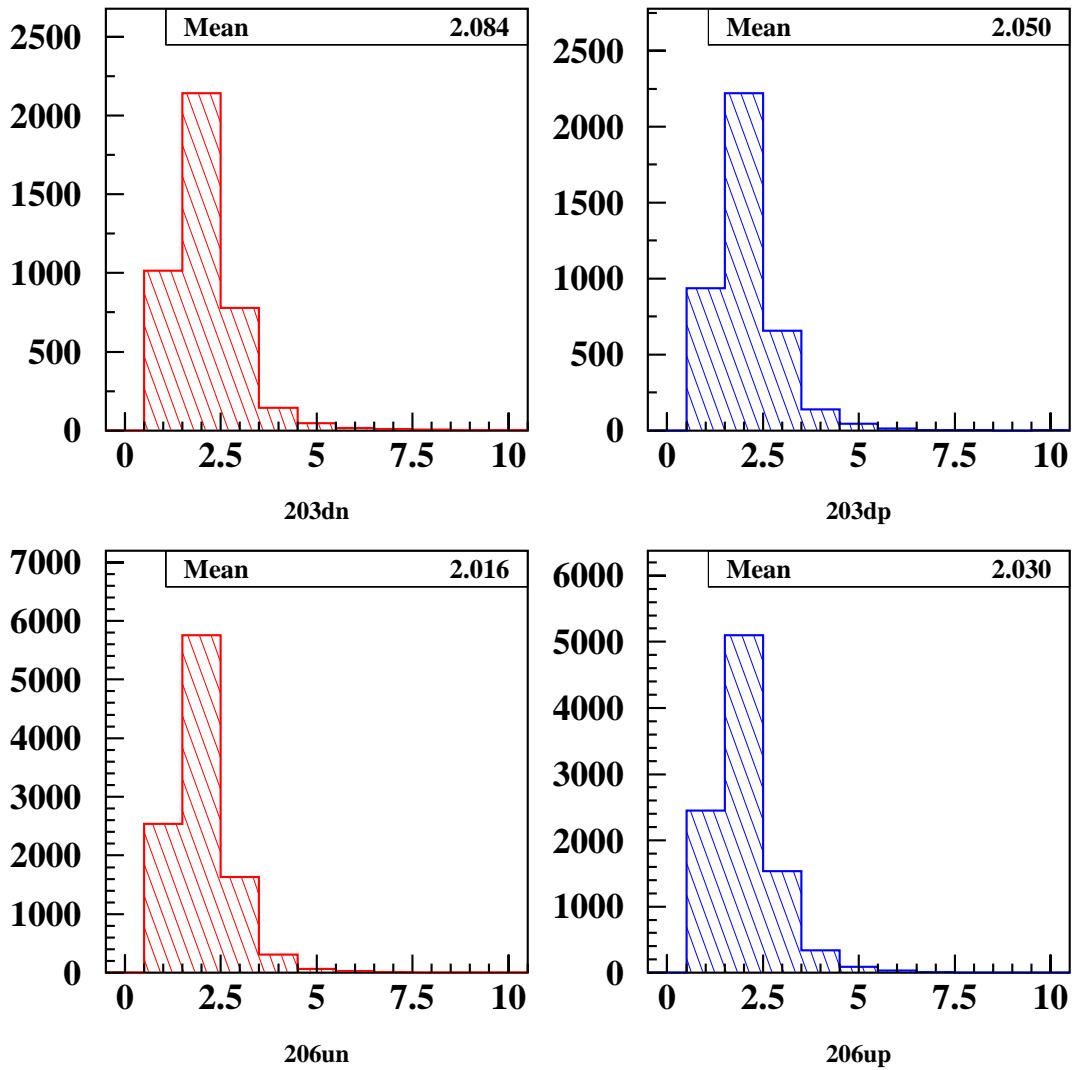


p-side 323

$$S/N \geq 20$$

single plane efficiency > 99 %

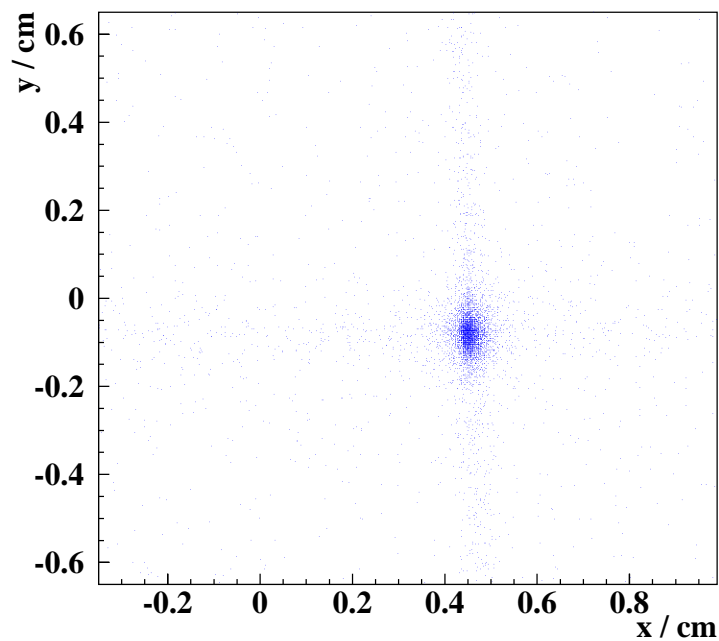
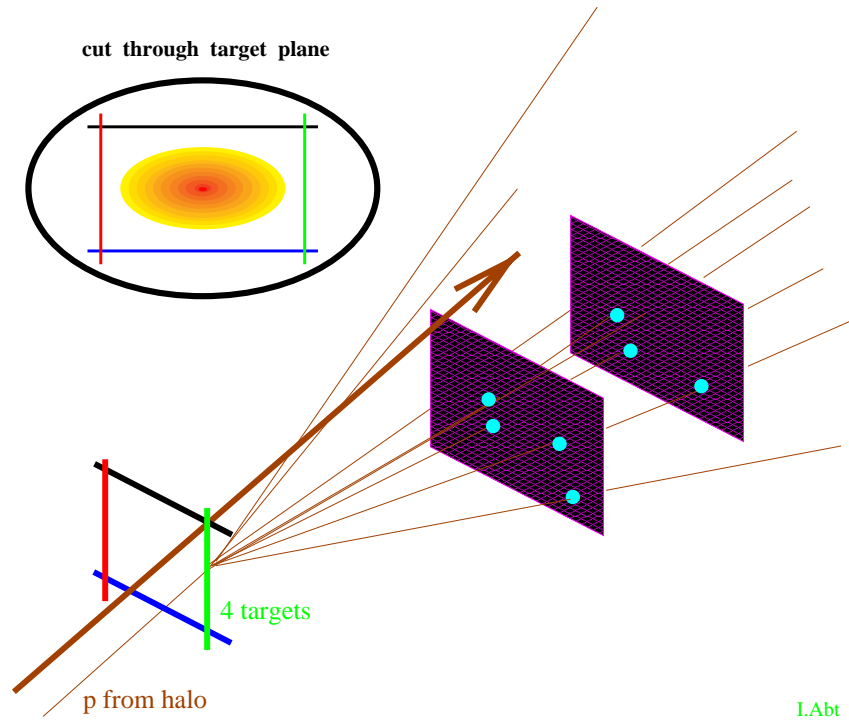
Cluster Width



of strips hit Percentage

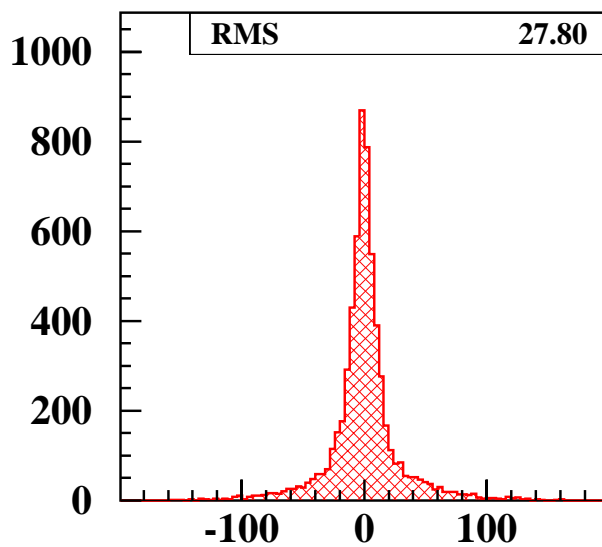
1	25%
2	54%
3	16%
4	3%
≥ 5	2%

Target Spot

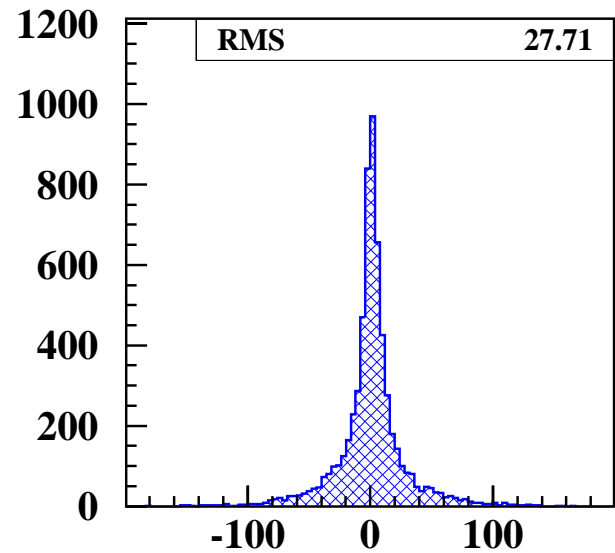


Tracks are extrapolated into the target plane.

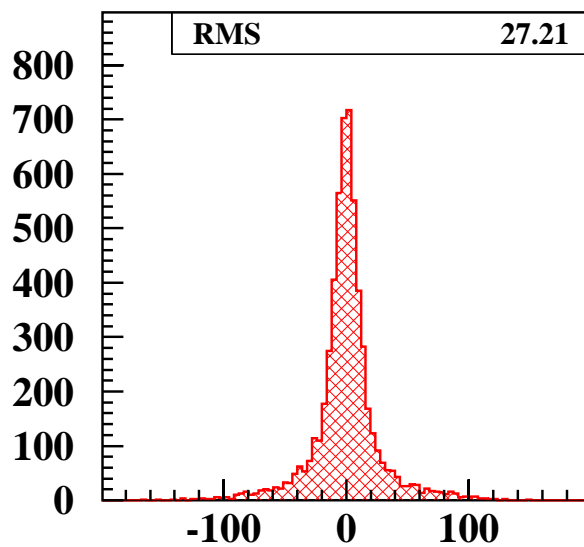
Residuals



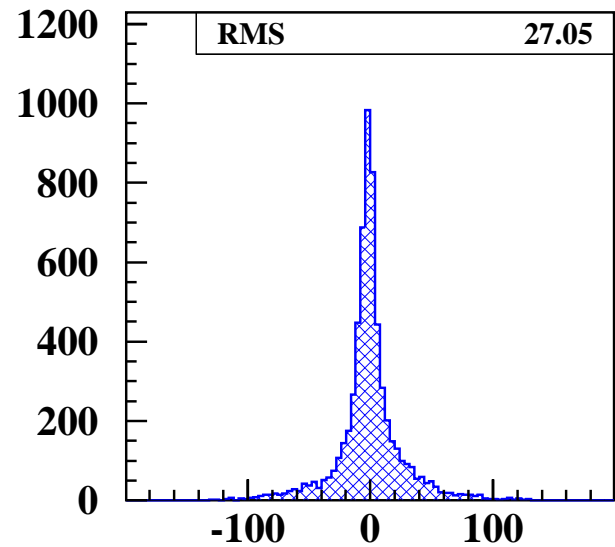
Residuals for 30300, 1/μm



Residuals for 30301, 1/μm



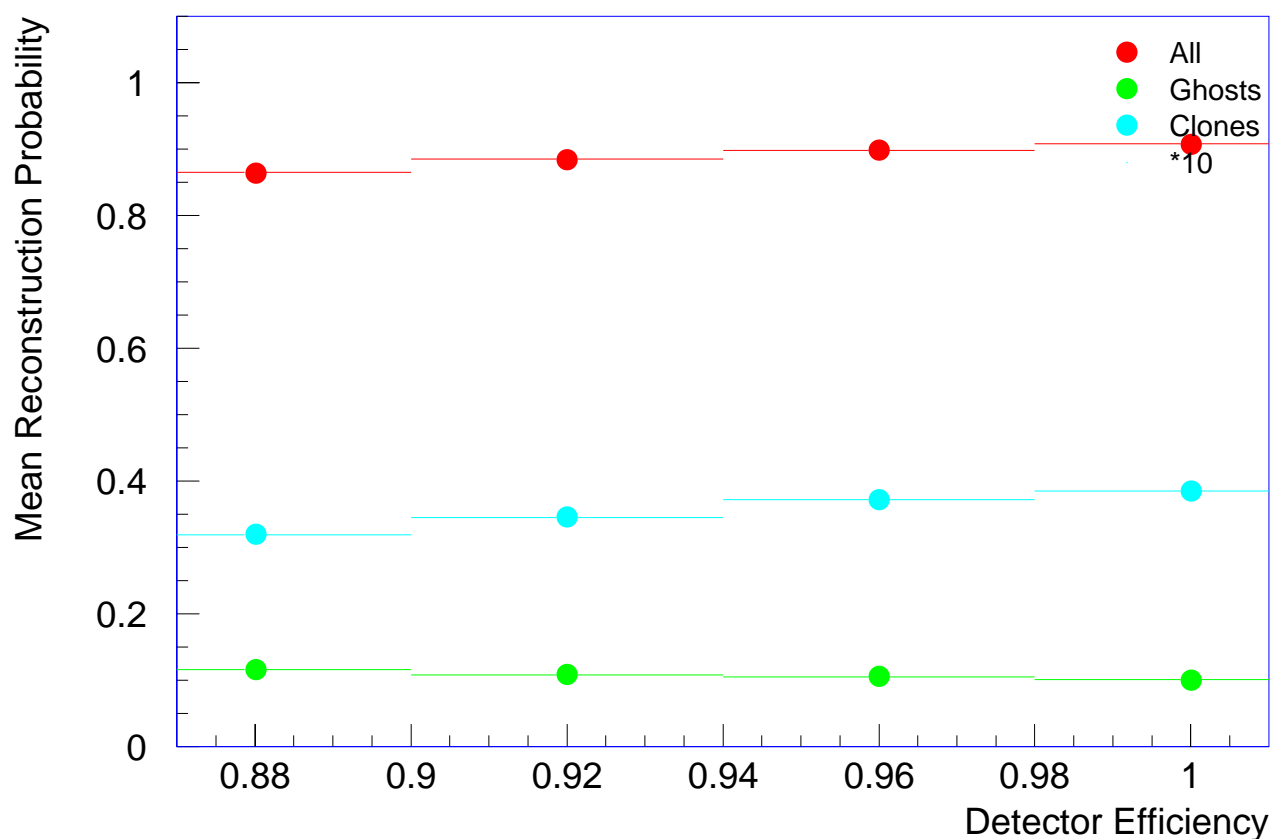
Residuals for 30303, 1/μm



Residuals for 30302, 1/μm

RMS of Residuals : $\sigma \simeq 30 \mu\text{m}$

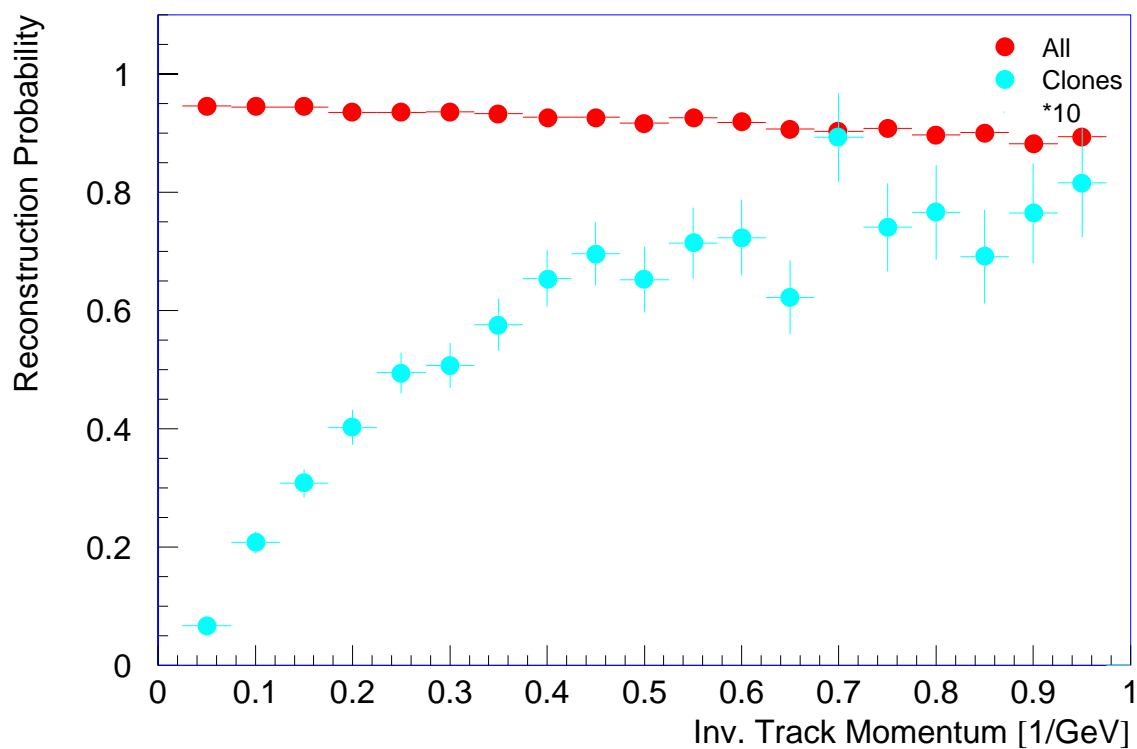
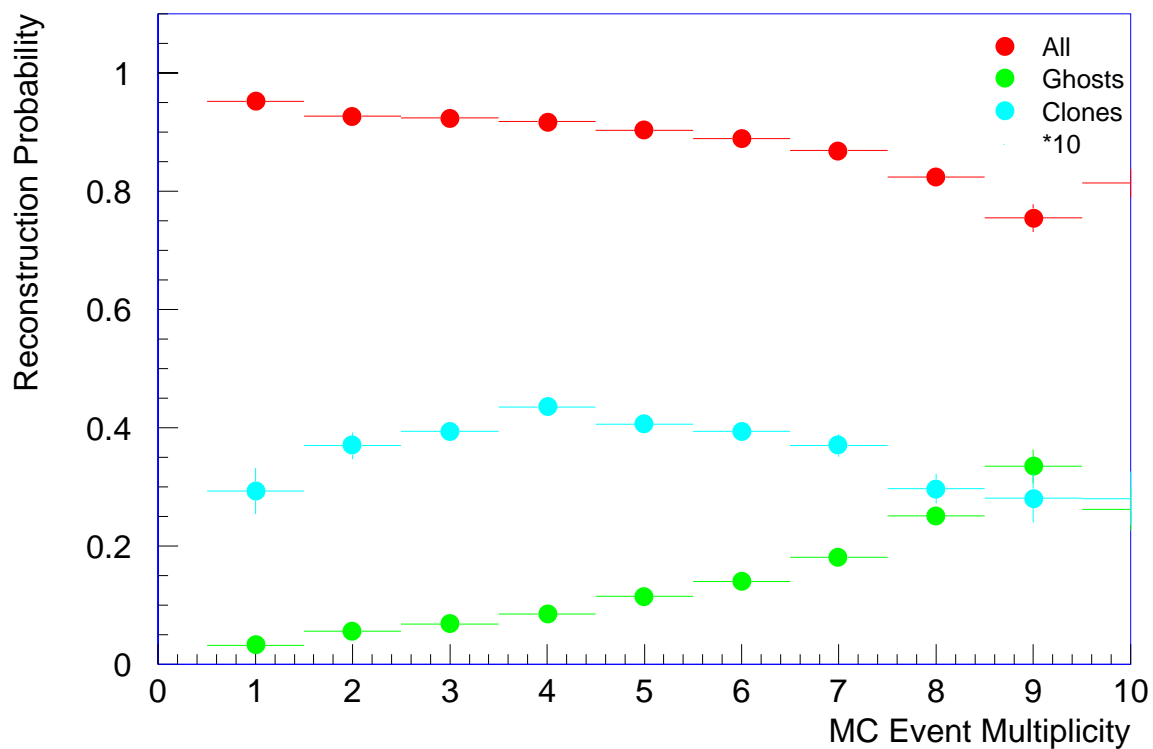
Tracking Efficiency



Det. eff.	All	Clones	Ghosts	Time
100%	88.3%	3.8%	15.2%	215 ms
95%	87.3%	3.5%	15.3%	190 ms
90%	84.9%	3.3%	16.3%	169 ms

1000 events were processed with a mean of 4 interactions each (Poisson distributed).

Tracking Efficiency



Conclusions

The Vertex Detector System of HERA-B has been completed in spring 1999.

With preliminary setups it was possible to gain the necessary experience to speedily commission the full system within a few months.