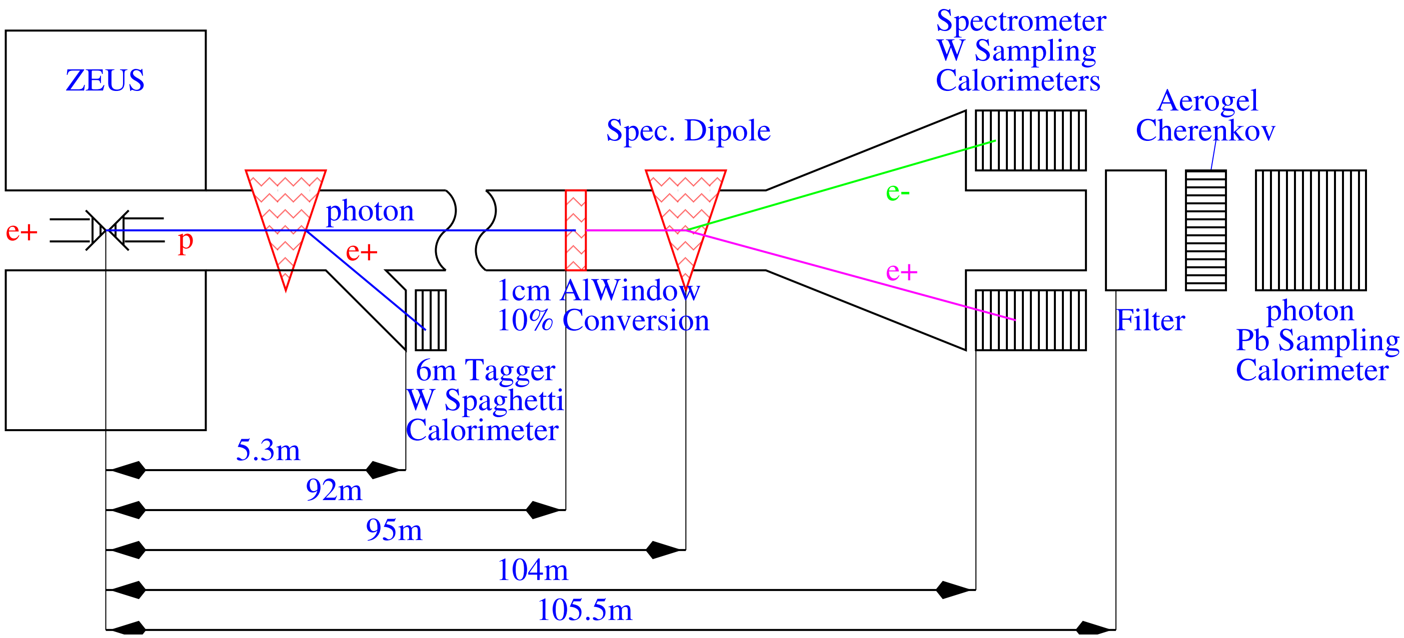
ZEUS Collaboration Meeting (DESY February 24 2001)

Luminosity Spectrometer for ZEUS

- Completed Tasks
- DESY II Test Beam
- Dipole Field
- Collimator Proposal
- Open Tasks
- Summary



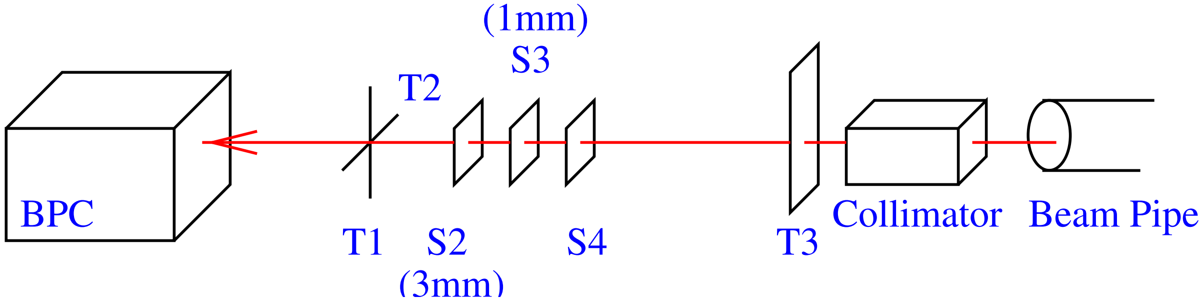
M. Helbich, S. Paganis, W. Schmidke, A. Caldwell, F. Sciulli (C.U.)

Spectrometer Completed Tasks

- BPCs rebuilding
- DESY Test Beam (both calorimeters tested)
- PMT tests using LED (61 pmts tested)
- Calibration Collimator design
- Helium Bag System design
- Dipole Magnet field measurements
- Operating Software at LINUX PC.

DESY II Spectrometer Beam Test (Jan/22-Feb/15 2001)

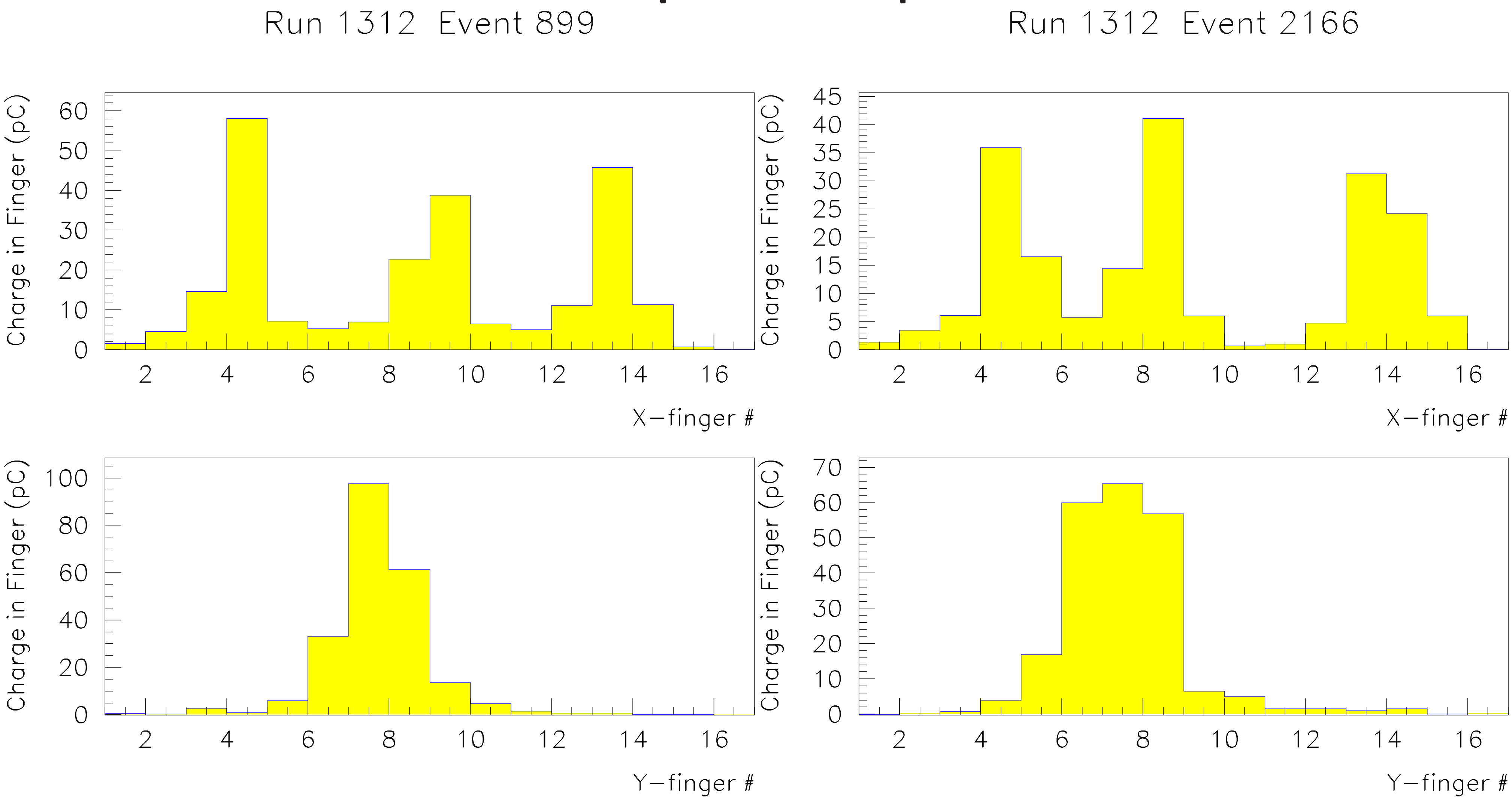
- 2.8 Mevents Collected
- Both BPCs tested
- Energy, Position Resolution
- Gain calibration
- Linearity of Calorimeters
- Fiducial Volume Studies
- ADC Gate width dependence



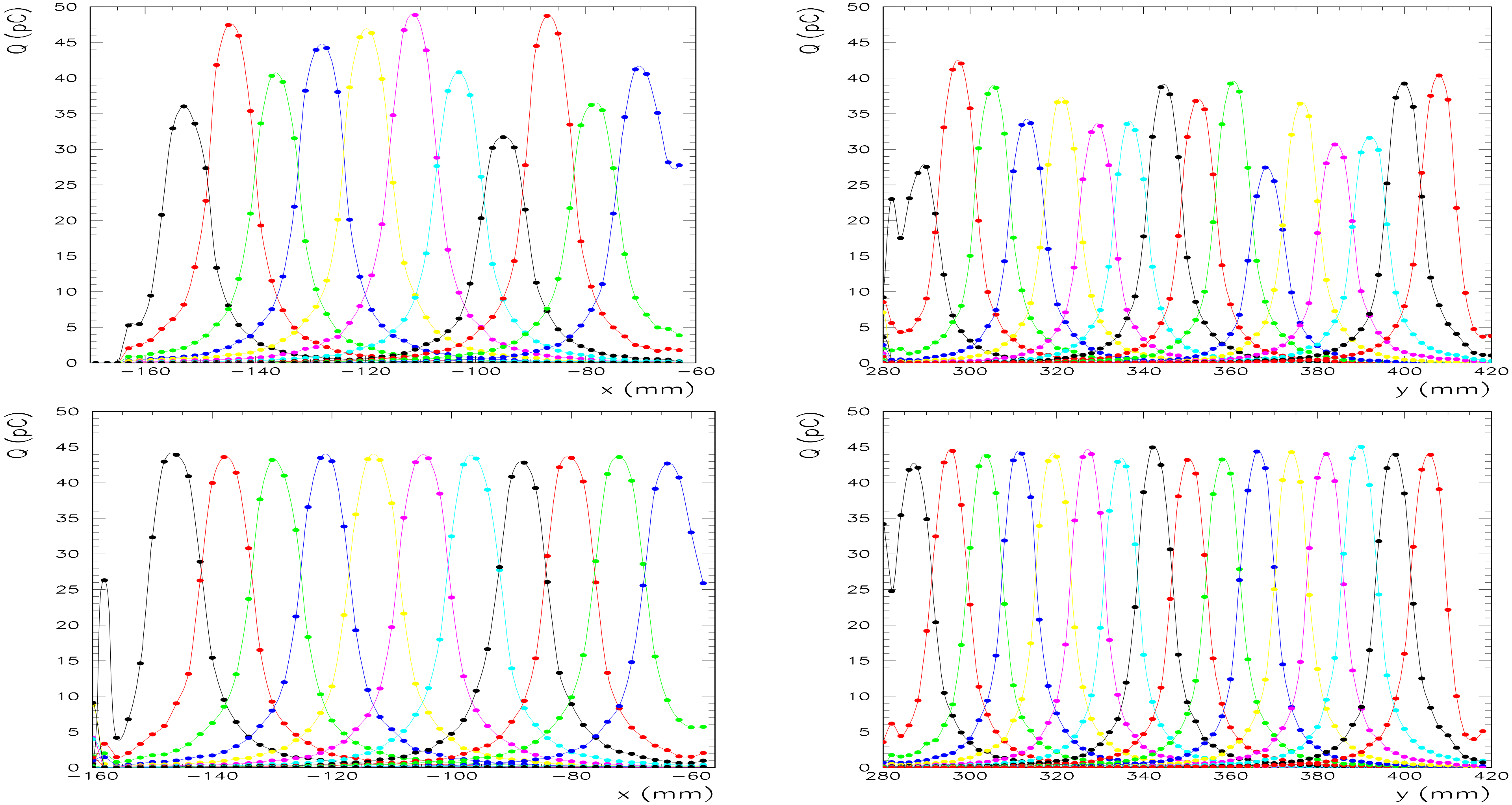
M. Helbich, S. Paganis, W. Schmidke (C.U.)

http://www.nevis.columbia.edu/~paganis/projects/lumi/TestBeam01.html

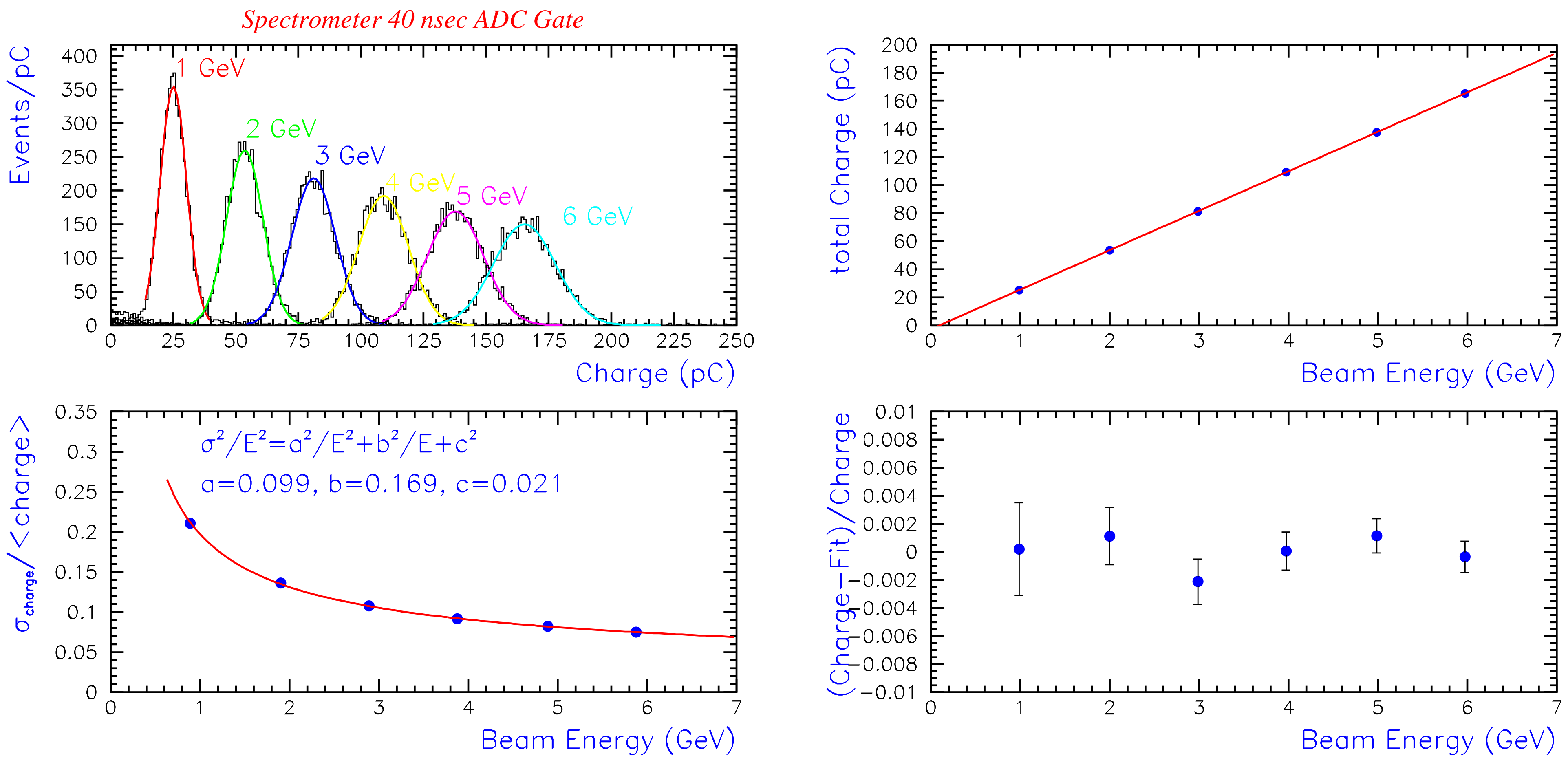
Beam Test Triple hits on Spectrometer



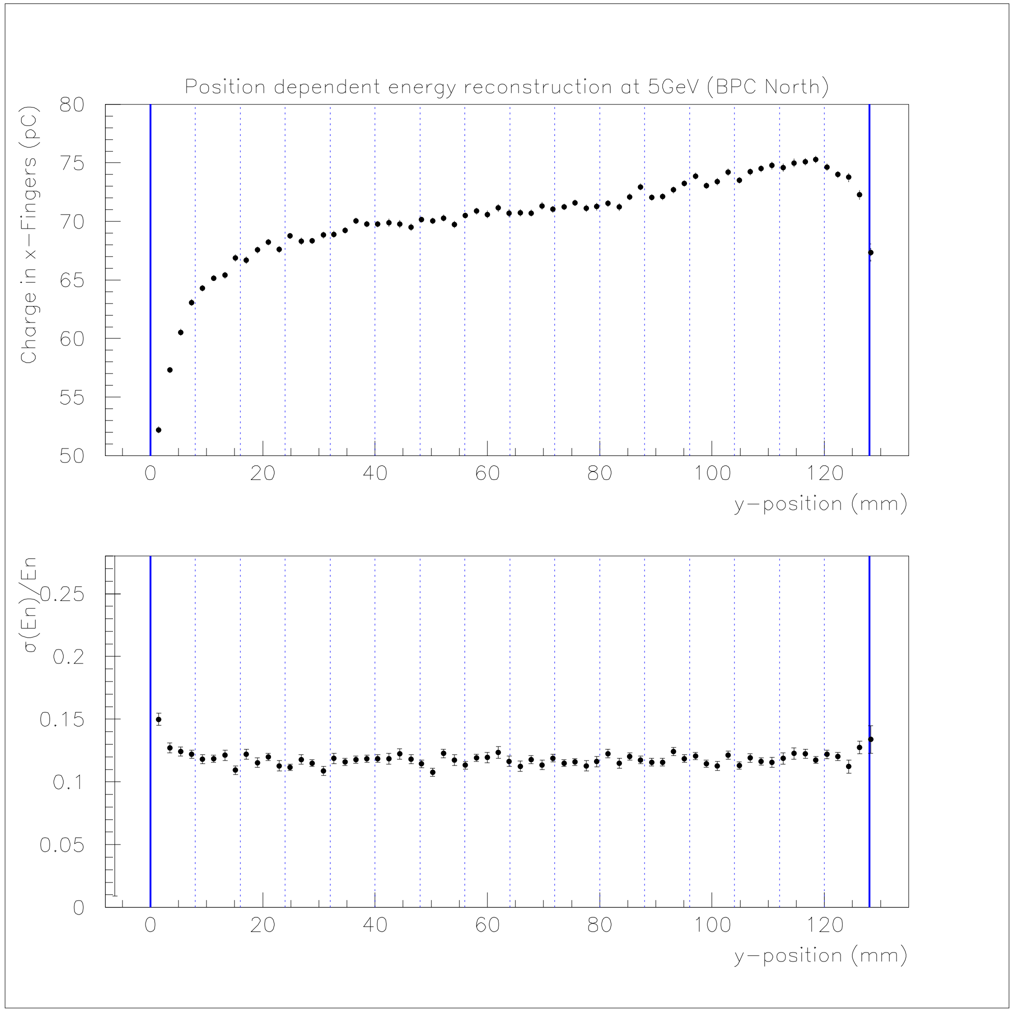
Rebuilt Calorimeter (BPCs) Gain Adjustment using PMT LED tests



Beam Test Energy Resolution and Linearity for 100ns ADC gate

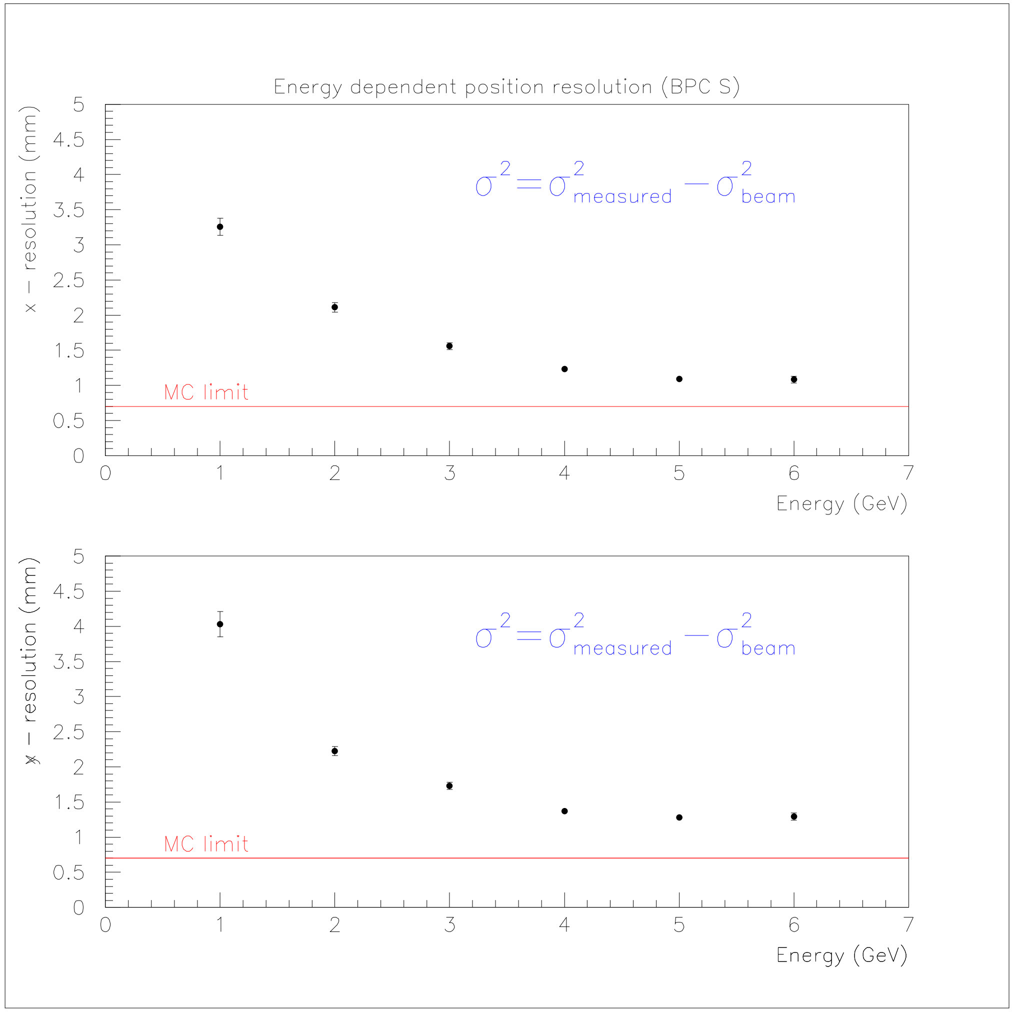


Energy Resolution dependence on Position



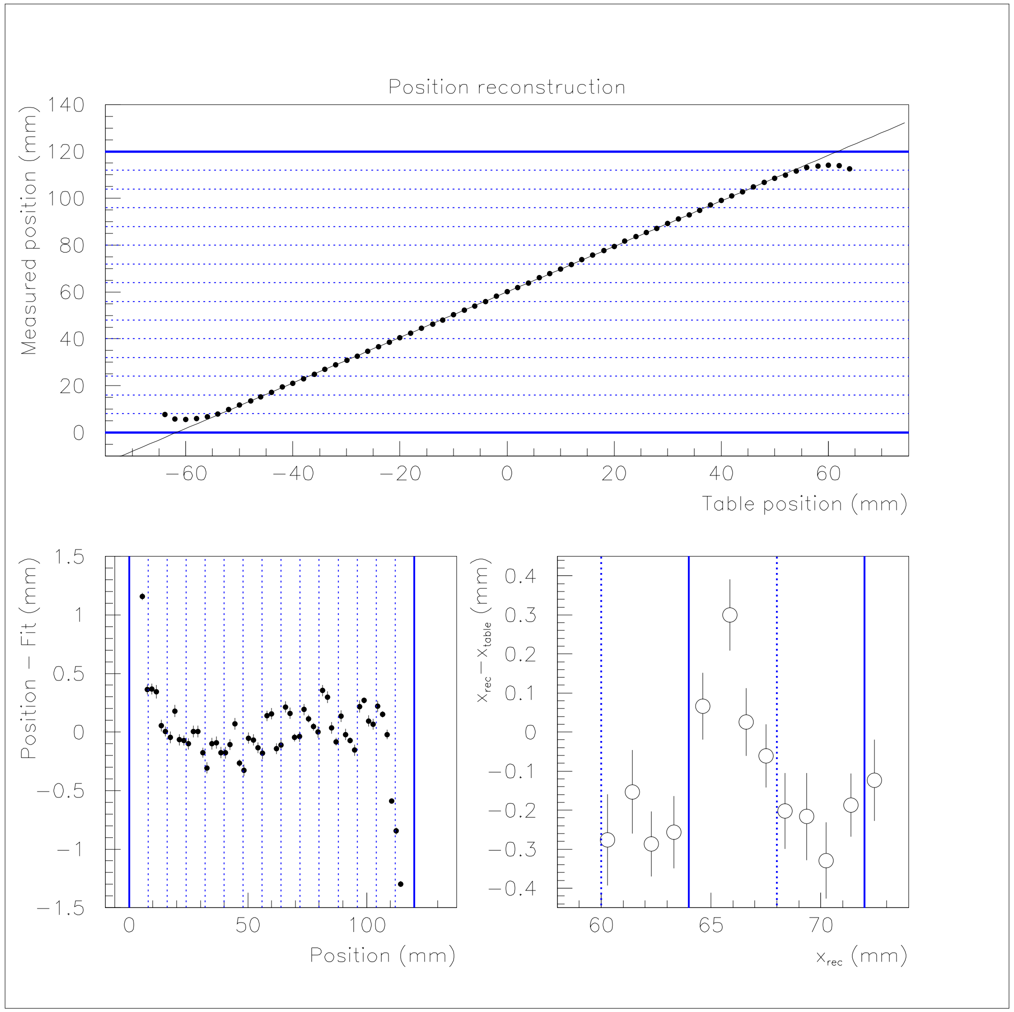
- Scan along Y (2mm step, fixed X).
- X Scintillator Attenuation $\simeq 10\%$.
- Energy resolution constant with position.

Spectrometer Position Resolution Studies



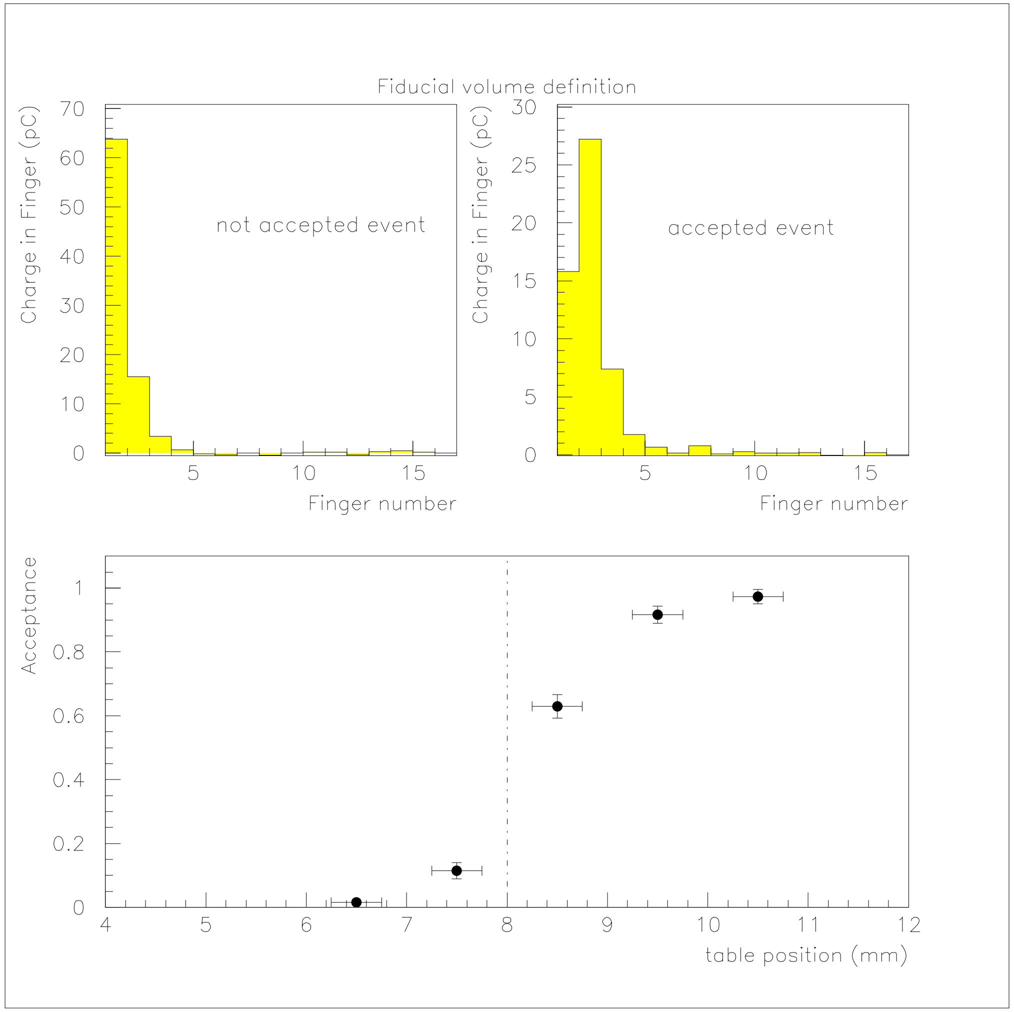
- **Log-Weighting Method used.**
- **3mm hole Veto Counter used.**
- **Beam at the center of the detector.**

Position Reconstruction



- Scan along a BPC side (2mm step).
- 3mm hole Veto Counter used.
- Position Reconstruction fails at the outer strips.
- 1mm scan along a single scintillator width (8mm wide) with 1mm hole Veto.

Fiducial Volume Boundary Determination

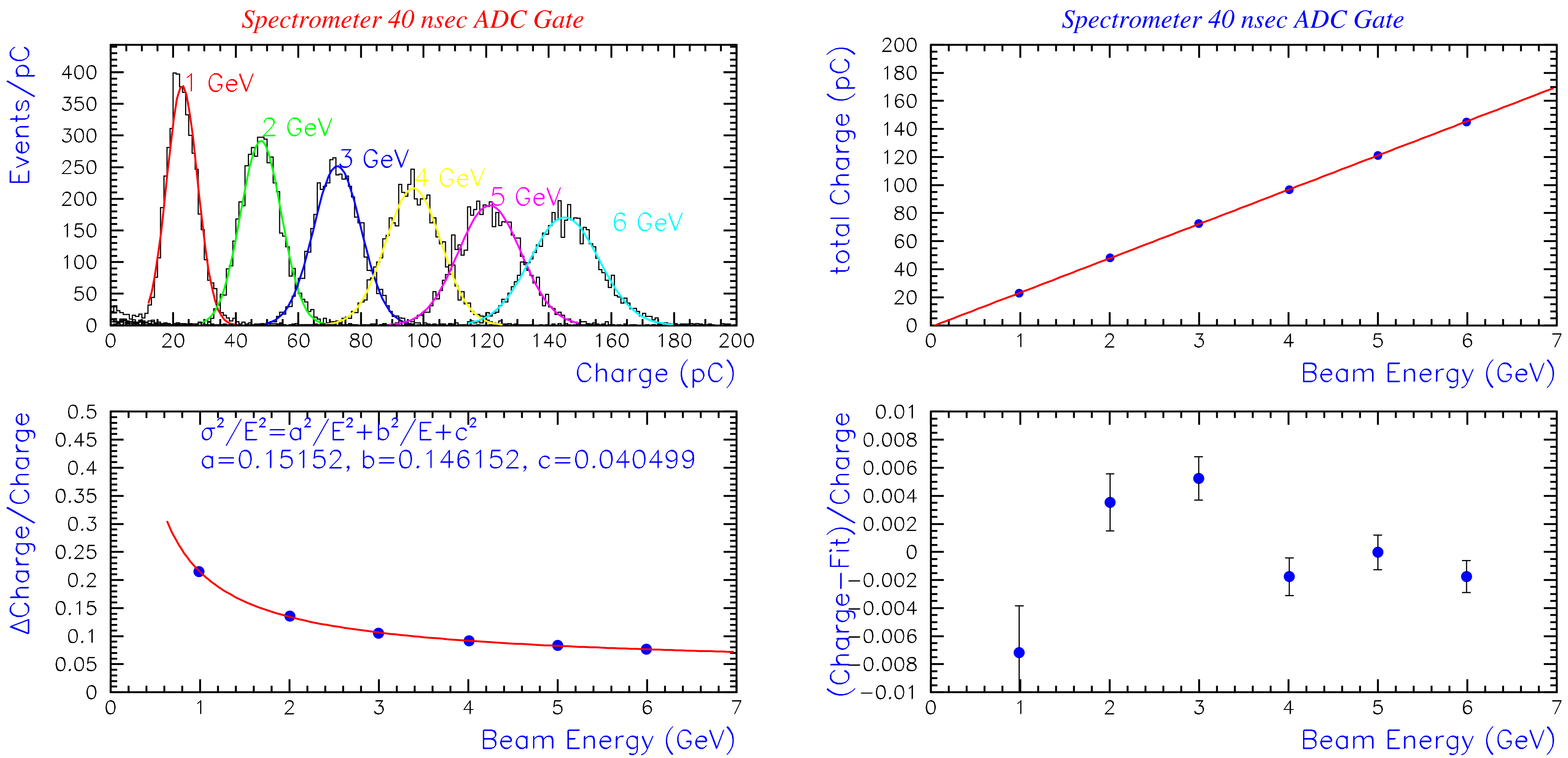


- Scan along the boundary region of two outer scintillators (1mm step).
- 1mm hole Veto Counter was used.
- Events outside acceptance give maximum signal at the outer scintillator.
- Acceptance changes from 0 to 1 within $2mm$.

Spectrometer PMT signal Pulse Shape after 130m of RG213

- Risetime: $5nsec$.
- FWHM $\simeq 15nsec$.
- $\frac{Baseline}{Amplitude} \simeq 4\%$ after $90nsec$.
- $\frac{Baseline}{Amplitude} \simeq 10\%$ after $70nsec$.
- Currently proposed Integration Time $\simeq 70nsec$.

Beam Test Energy Resolution and Linearity for 40ns ADC gate

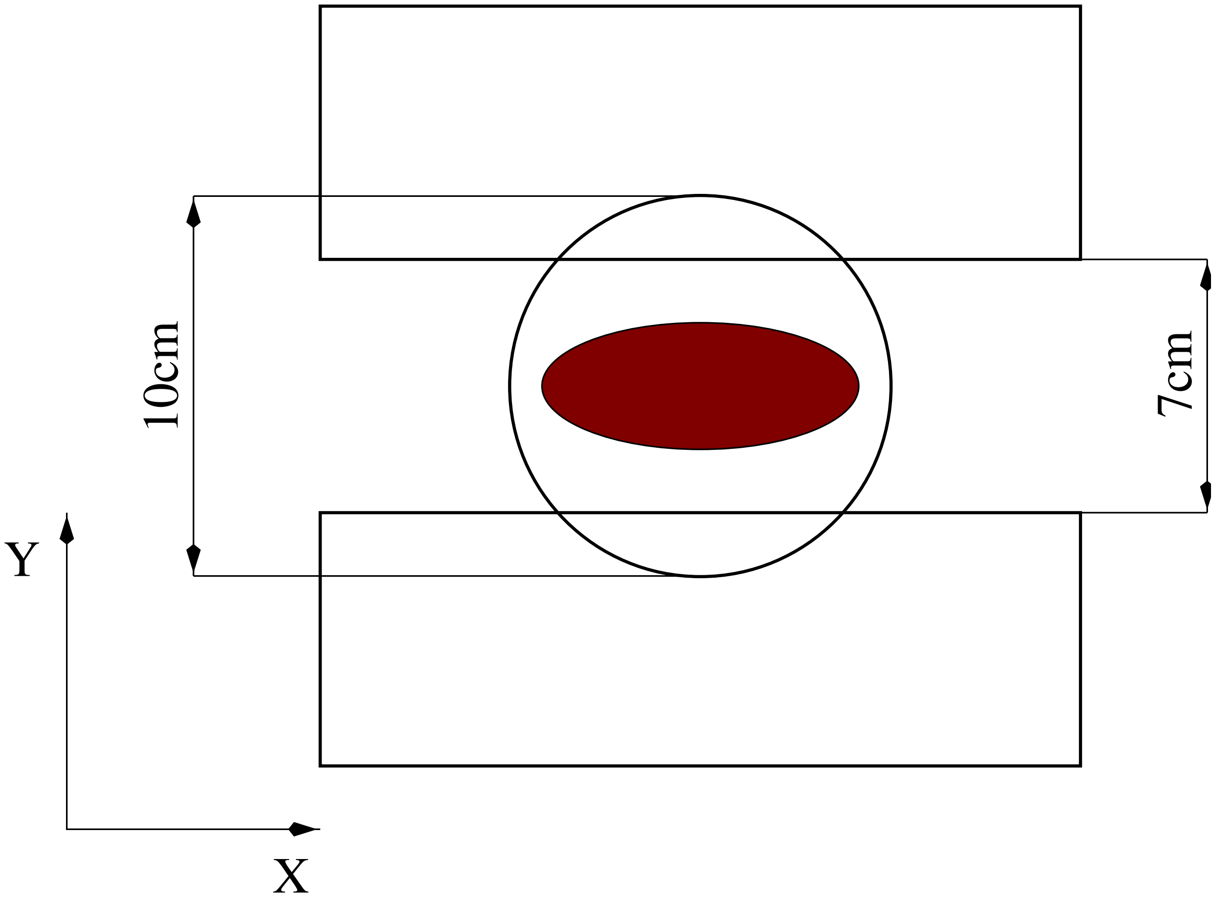


Spectrometer Test Beam Summary (preliminary)

- All calorimeter channels working
- PMT LED tests adequate to adjust gains at $\leq 2\%$ levels
- Energy resolution $17\%/\sqrt{E}$ in agreement with EGS4
- Linearity $\simeq 0.2\%$ (better than previously determined)
- Position Resolution $\leq 1mm$ in agreement with EGS4
- Fiducial Volume Boundary determination $\leq 2mm$

Fixed Photon Beam Collimator for Lumi Monitors

- Spectrometer starts at $Y = \pm 4.2cm$.
- Proposed Collimator Aperture: $7cm$.
- Justification: protect spectrometer.
- Consequence: minimum loss of photon acceptance (assumed Gaussian photon distr. along y, $\sigma_y = 0.5cm$).



Spectrometer Open Tasks

- Support Structure: Before Tunnel Shutdown (April ?)
- Spectrometer Installation and surveying
- Calibration Collimator: construction and installation
- Beam Collimator: construction and installation
- Helium Bag System: construction and installation
- Dipole Magnet: installation
- New LED system: can we test it before installation?

Spectrometer Open Tasks

- Reconstruction and Histogramming Software (Qt C++ library and ROOT) on LINUX PC
- Trigger Board tests
- FEE+DAQ system test