SoLID EC Update

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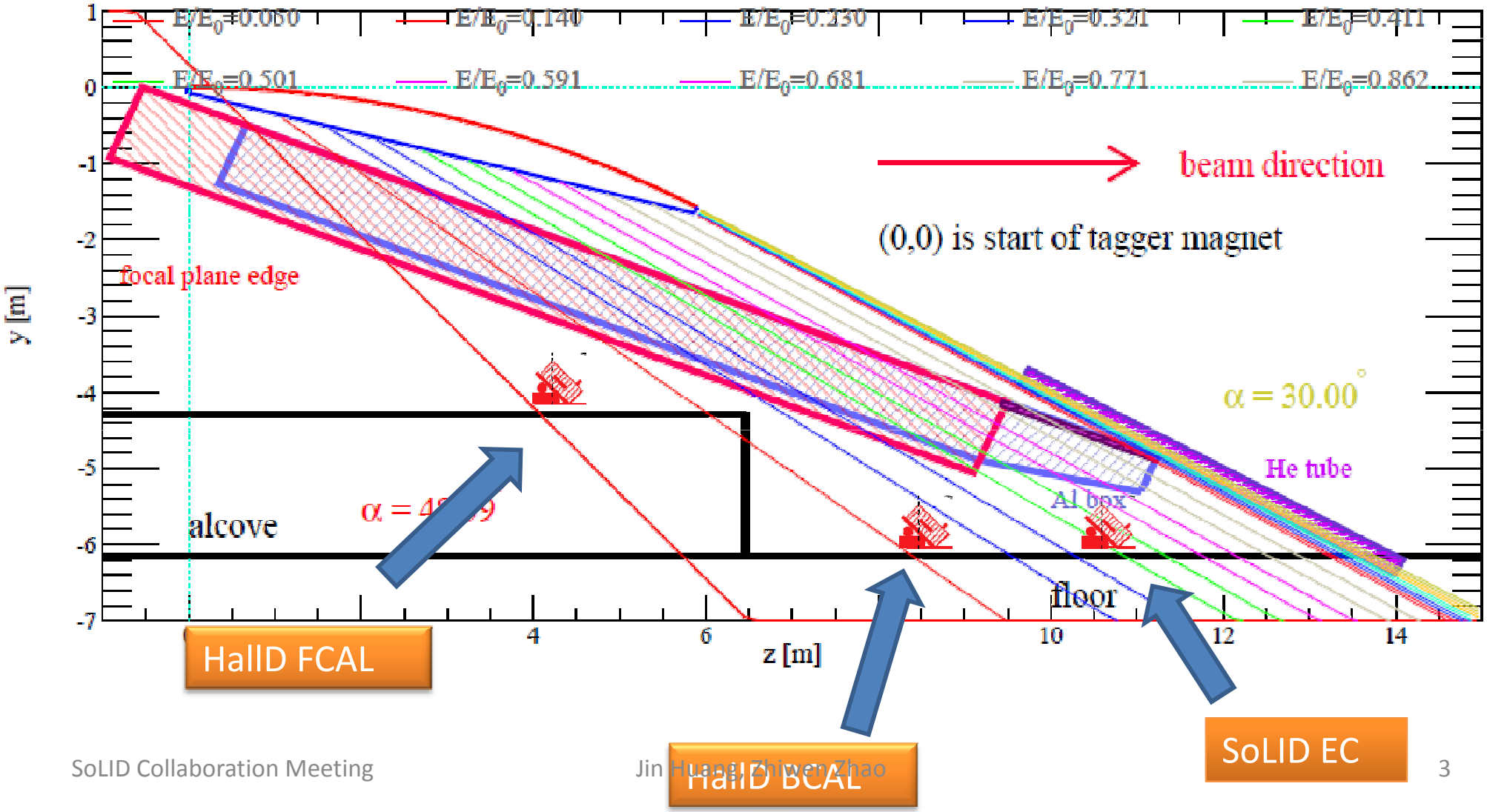
2012/05/22

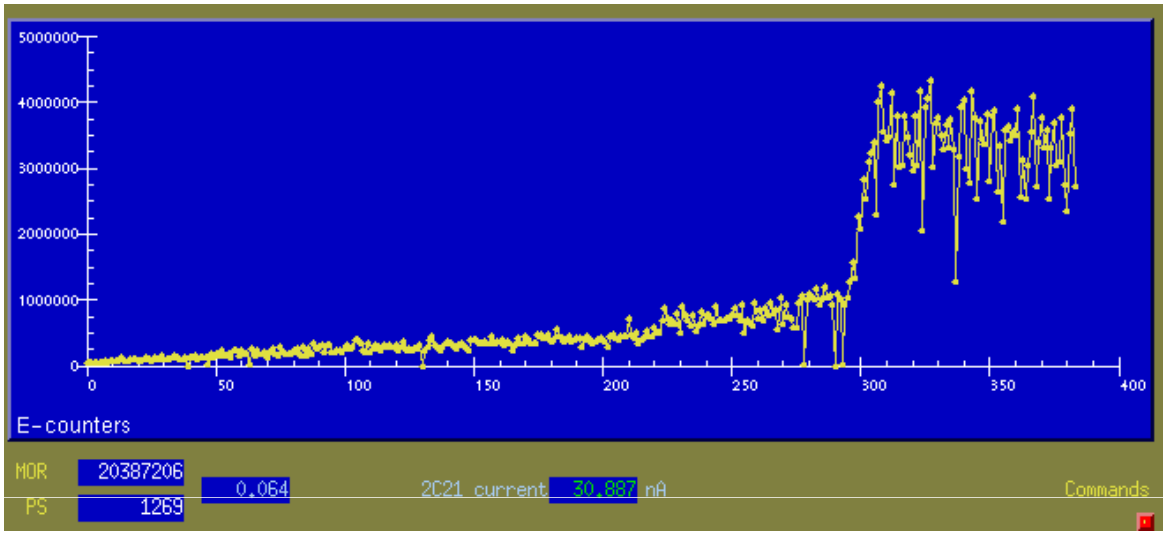
- Beam test update
- Coverage for PVDIS
- Road map

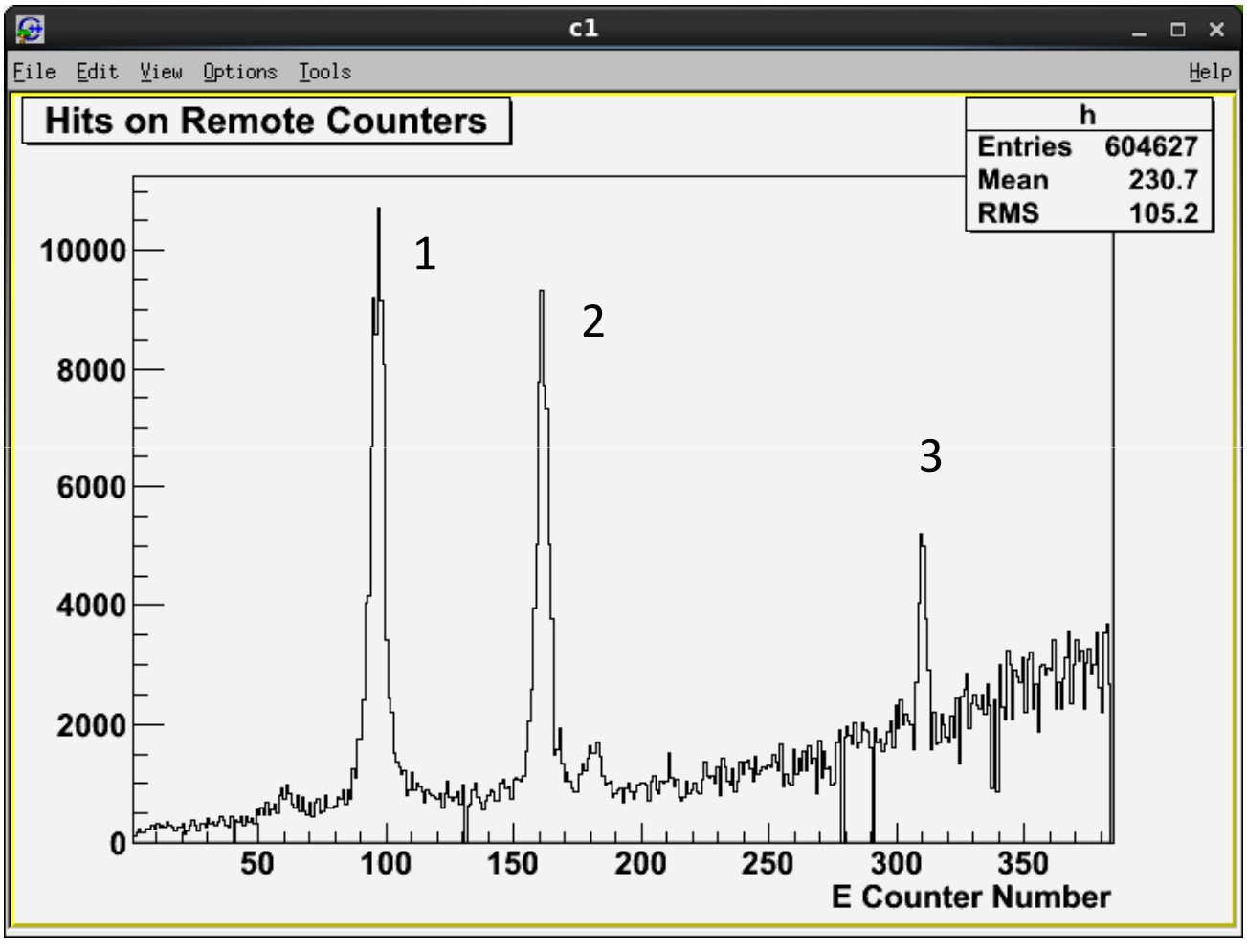
Test under CLAS photon tagger

- Electron with known energy and impact angle
- Variable energy, variable impact angle



CLAS Tagger Scalers when running linearly polarized photon by coherent Bremsstrahlung.





Special Tagger run with three small scintilators to find out the electron energy at three test locations.

For 5 pass beam,:

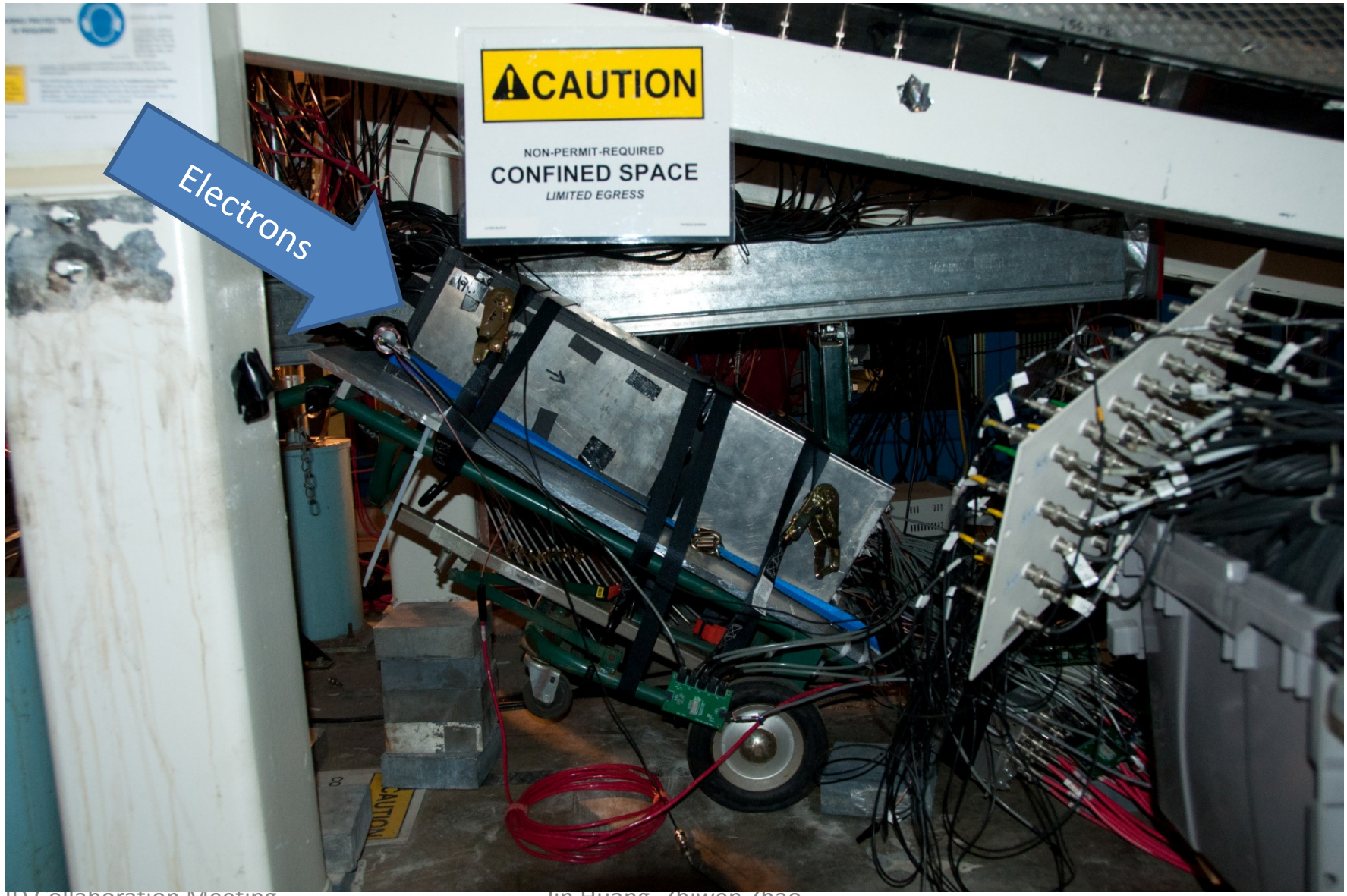
1 1.3 GeV

2 2.1 GeV

3 3.6 GeV

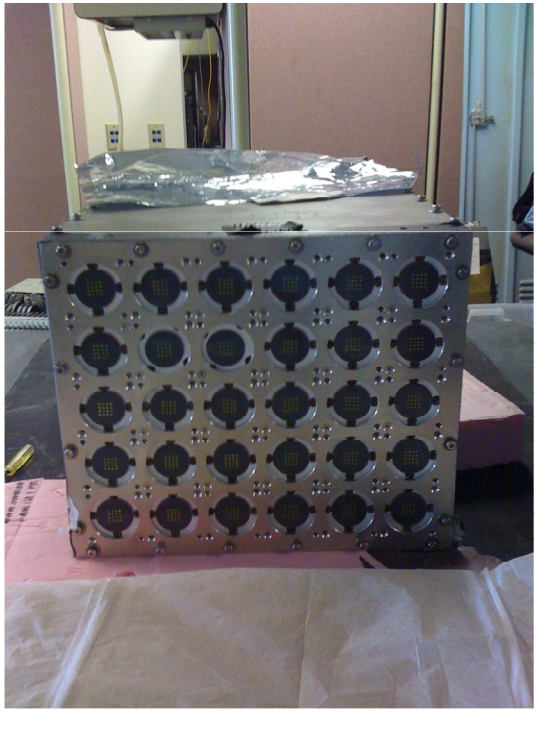
The plan was to have tests at 2 and 3.

Tilting at about 32 degree to start with small angle beam impact



Noise Noise

- What: large ground noise above 30mV appears after moving into HallB. It was not a problem on 2nd floor of counting house.
- Why: PMT and base were not properly shielded.
- Fix: wrap around every tube and cable with Al foil and grounding stripe to make it under 7mV
- cost: it took long time to debug the source, take everything apart, wrap 30 tubes and assembly everything back with only limited access to the hall.



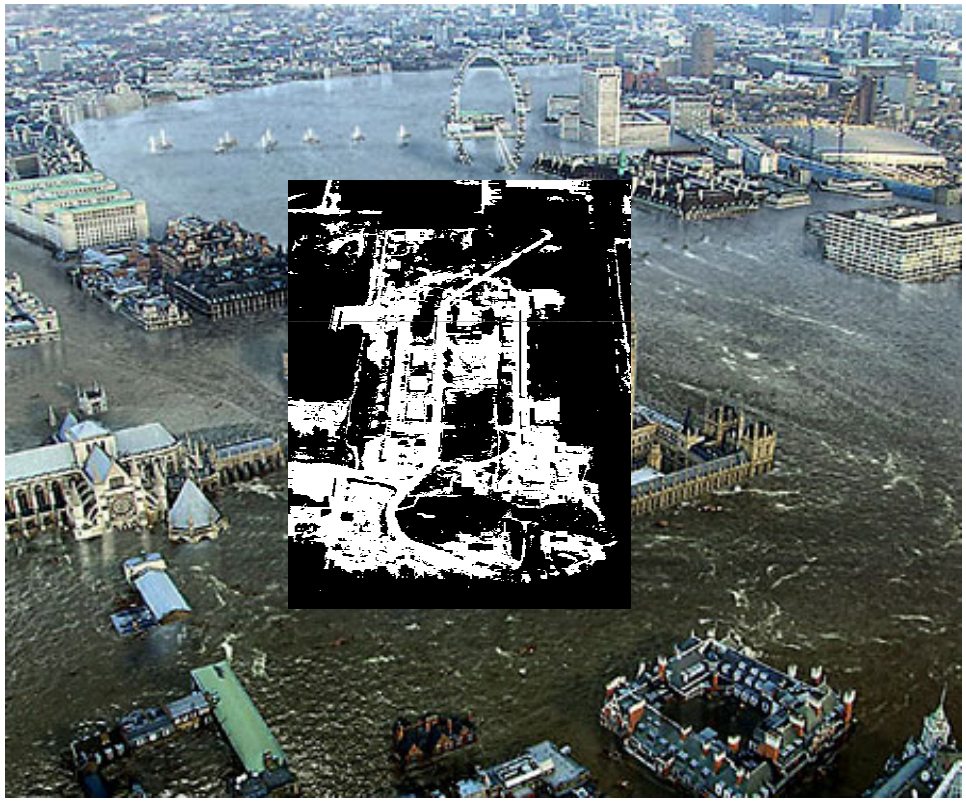
data set

- Cosmic run in horizontal position
- Cosmic run in vertical position
- Beam data at location 2
- Beam data at location 3

washed away by flood.

- Cosmic run afterward

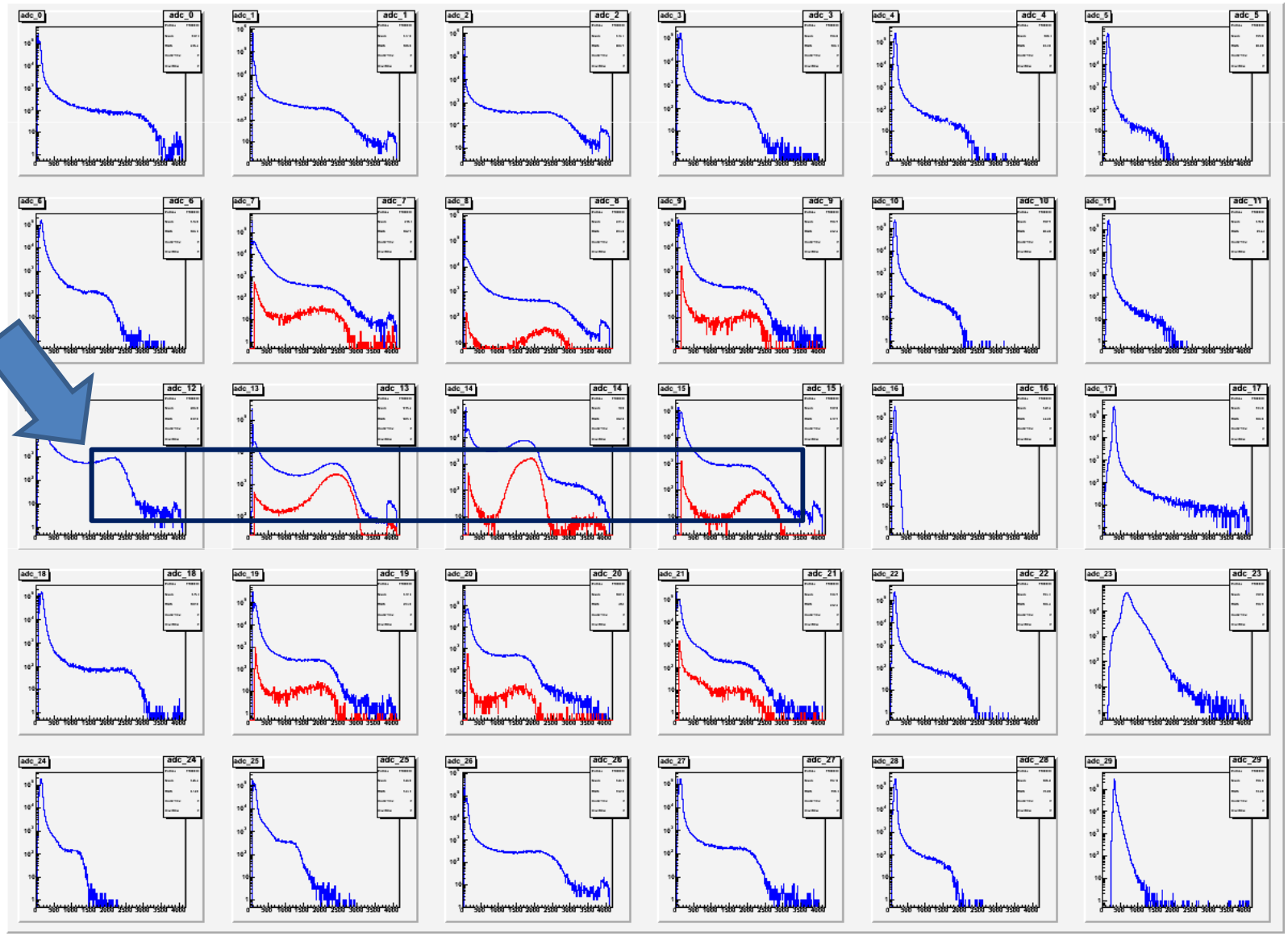
impossible due to damaged equipment and scheduled module disassembly.



Raw ADC (Blue)

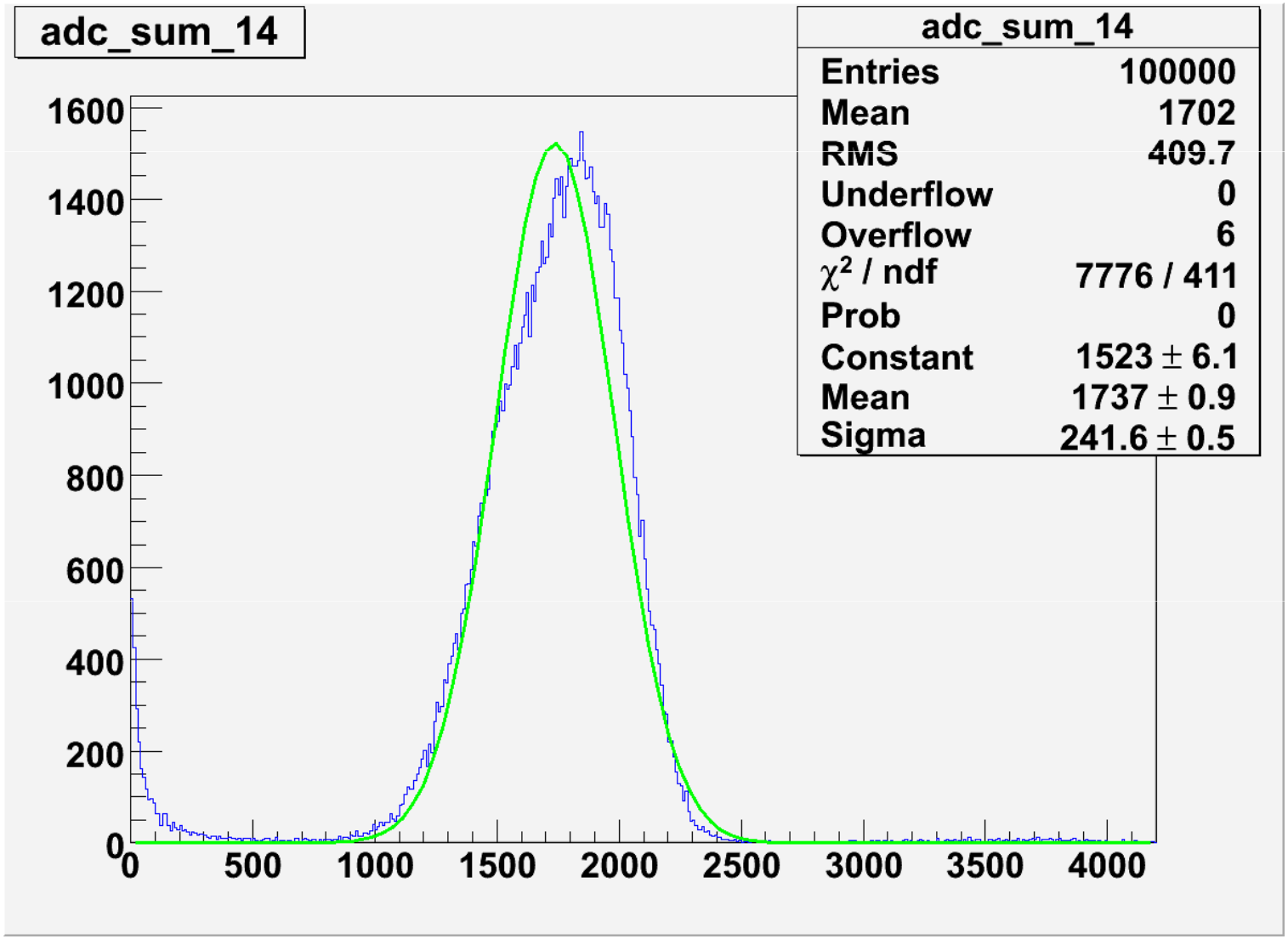
cut (Red) by selecting module with most of energy depostion

Trigger Scintillator location



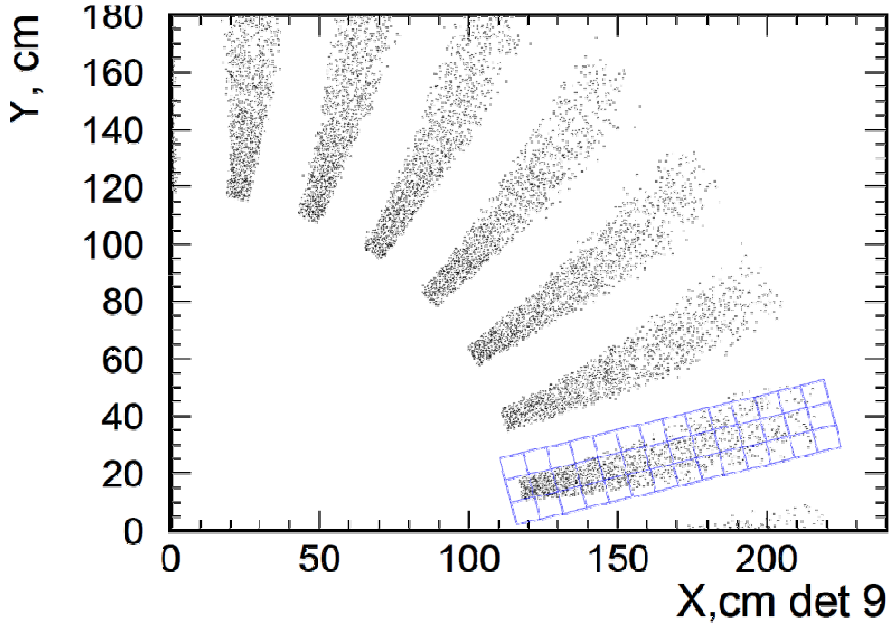
ADC Sum

(need further study like software gain match to minimize the resolution)

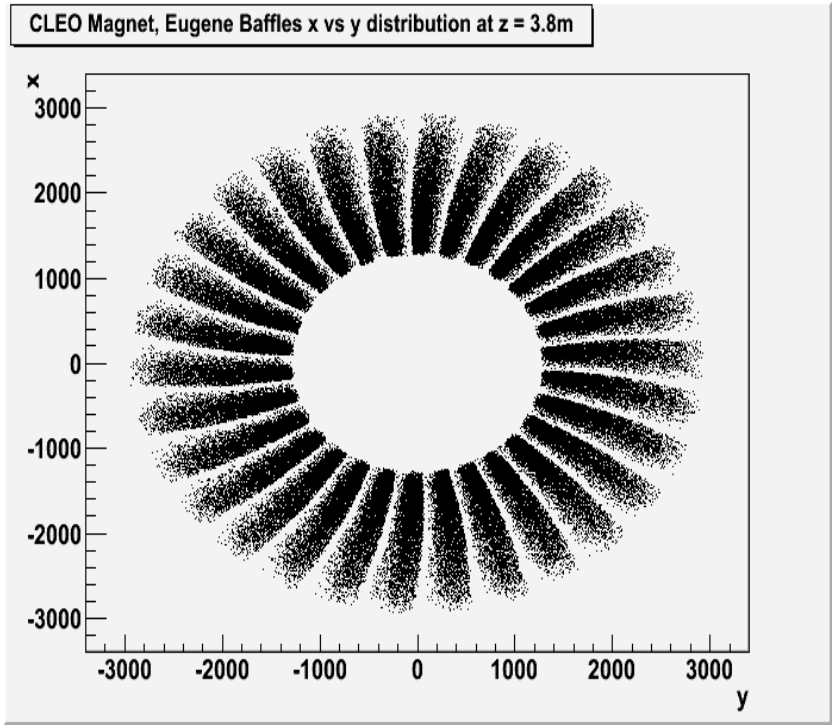


Coverage for PVDIS

- Received major change in calorimeter hit pattern from Seamus,
  - ~50% coverage (proposal) -> ~100% coverage needed
  - ~25%?+ higher cost (by reusing SIDIS LC to PVDIS)
  - Calorimeter will be placed along beam axis



PAC34 proposal



New from Seamus

Outline / Road map to Dry run and Director's review

- Requirement for calorimeter
  - e/pi separation
    - What's the final requirement in number?
      Need e/pi ratio (Zhiwen, Seamus)
      Need Cerenkov rejection/efficiency number
    - Can we achieve it?
      Improve with more realistic simulation. (Jin)
  - Radiation hardness, see next item
- Radiation hardness and material choice
  - Final background distribution (Zhiwen)
    to finalize radiation dose distribution inside the calorimeter (Jin)
  - **Need to simulate performance VS radiation dose (Jin)**
  - **Need to keep searching for possible better material, 10^6 rad (if possible) will be good (Mehdi)**
  - Background on fibers outside calorimeter (Jin)
  - **List of options to deal with it**
    - Swapping modules with smaller R with larger R
    - Replacing preshower part of calorimeter after damage
      - **Possibility, cost and labor (Zhiwen)**
    - Replacing inner calorimeter modules after damage
      - **Cost and labor (Zhiwen)**
    - **Redesign inner part of calorimeter with high quality PbWO4 crystal (Jin)**
- What type of calorimeter?
  - Shashlyk best fit because performance, easy to readout and mature in production
  - Give a table of popular calorimeter options (from Eugene's slides) and why Shashlyk is the best

Continued

- Energy resolution
  - Tuned by fraction of active material (scintillator)
  - **Improve with more realistic simulation (Jin)**
- Preshower/shower separation
  - **Polish detailed design and/or list realistic options (Zhiwen)**
- Lateral size
  - Balance readout cost and resolution (both position and energy)
  - **Improve position resolution simulation w/ background (Jin)**
  - **Improve chart on lateral size (Jin)**
  - **Determine final lateral size (All)**
- Layout
  - Square shape calorimeter best fit our need (Mehdi)
  - For PVDIS: we can tilt calorimeter to face target (Jin)
- Readout option
  - PMT readout in low field region
  - **Improve options for connecting WLS fiber to clear fiber (Mehdi)**
- Cost
  - **Polish cost estimation (Zhiwen, Mehdi)**
- Beam test
  - **Summary slide (Zhiwen)**
  - **Work on data analysis (Zhiwen & Jin)**