Threshold Gas Cherenkov

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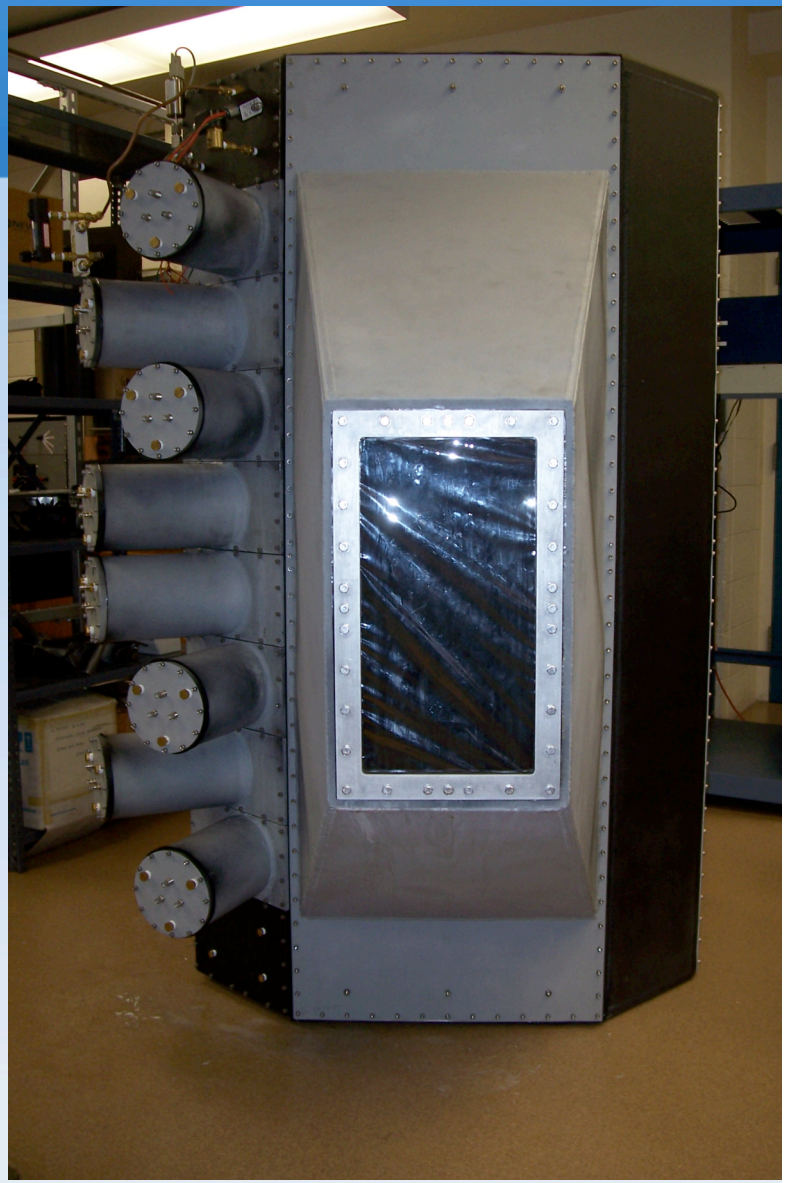
Front view of the Gas Cherenkov

- Status
  - Tank Gas System
  - Mirrors
  - Simulations

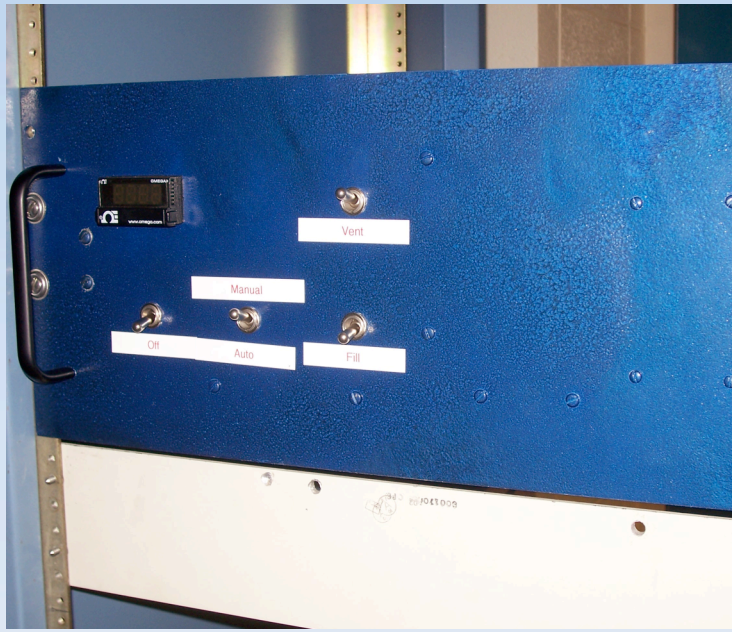


Tank Gas System

- Leak rate < 1scfh
  - This is equal to about 12.5 days per bottle of compressed nitrogen
  - Gang 6 bottles together to ensure a solid 2 month o more of continuous operation
- To be measured:
  - Leak rate vs Pressure Differential (in case of storms)
  - Filling time and gas volume needed per opening

Tank Gas System

- Controller
  - RS232 interface
  - Manual switchs
- Transducer
  - Absolute pressure measurement
  - Can control to 0.1 torr

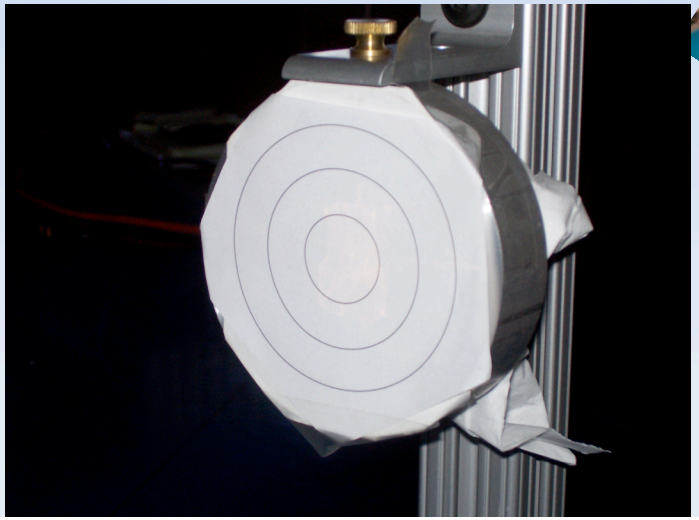


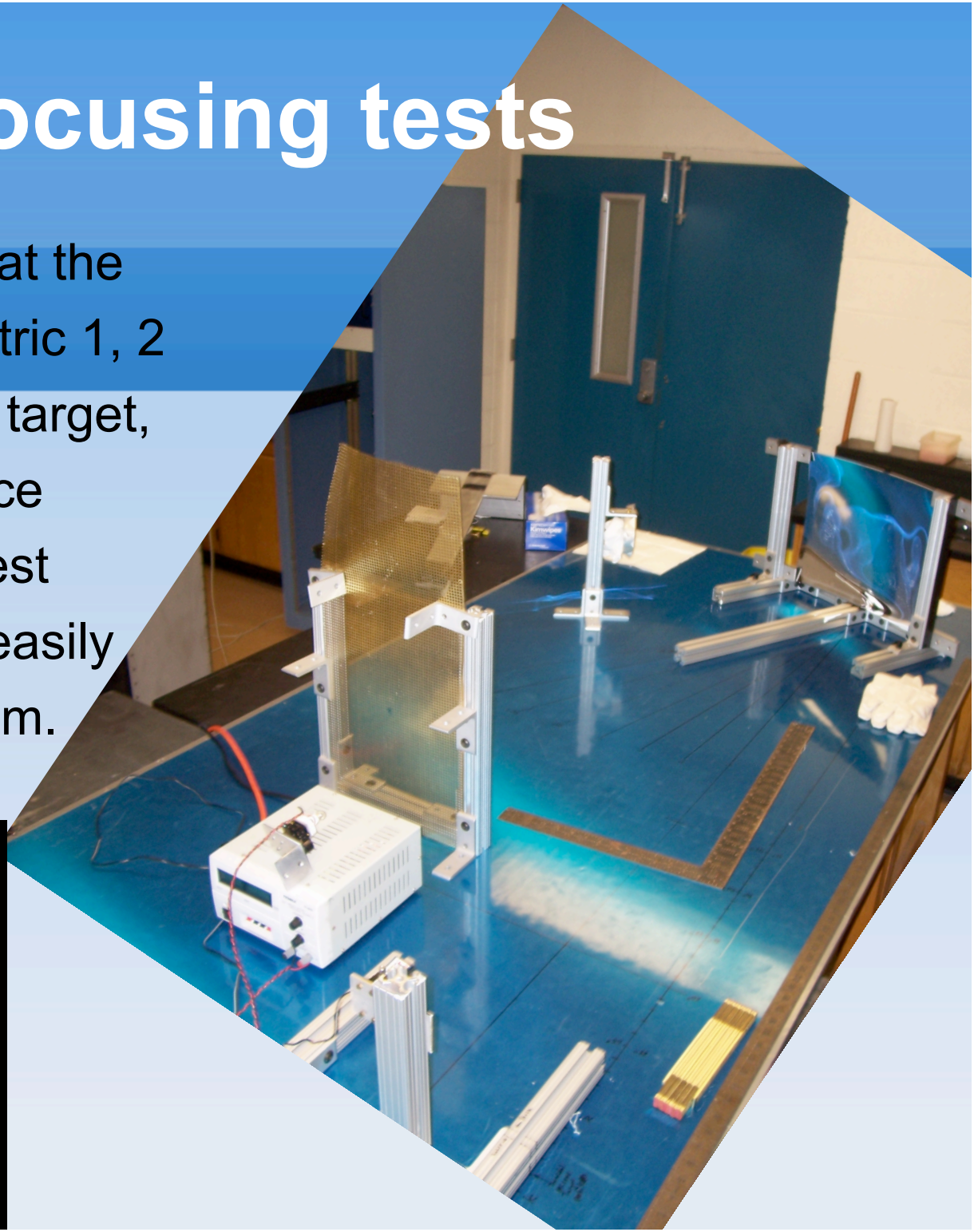
Mirrors (stored in nitrogen)

- 5 Toroidal
  - One with shipping damage
- 5 Spherical
- Each to be attached to mounting clamp for easy mounting and storage

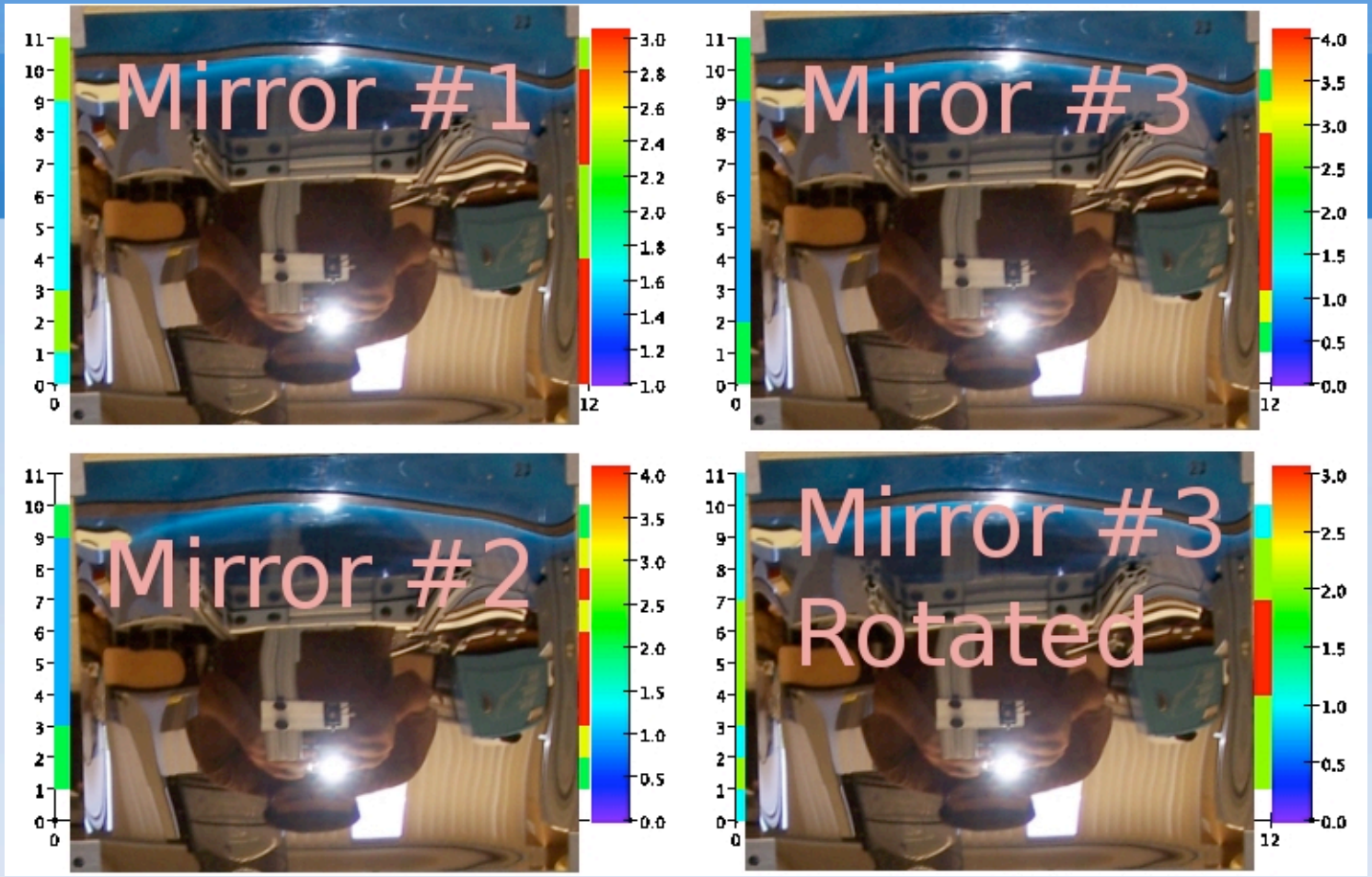
Focusing tests

With a laser+goniometer at the source, a grid, concentric 1, 2 and 3 inch circles for a target, one can map the surface quantifying by the largest circle. The results are easily shown in a 2D histogram.



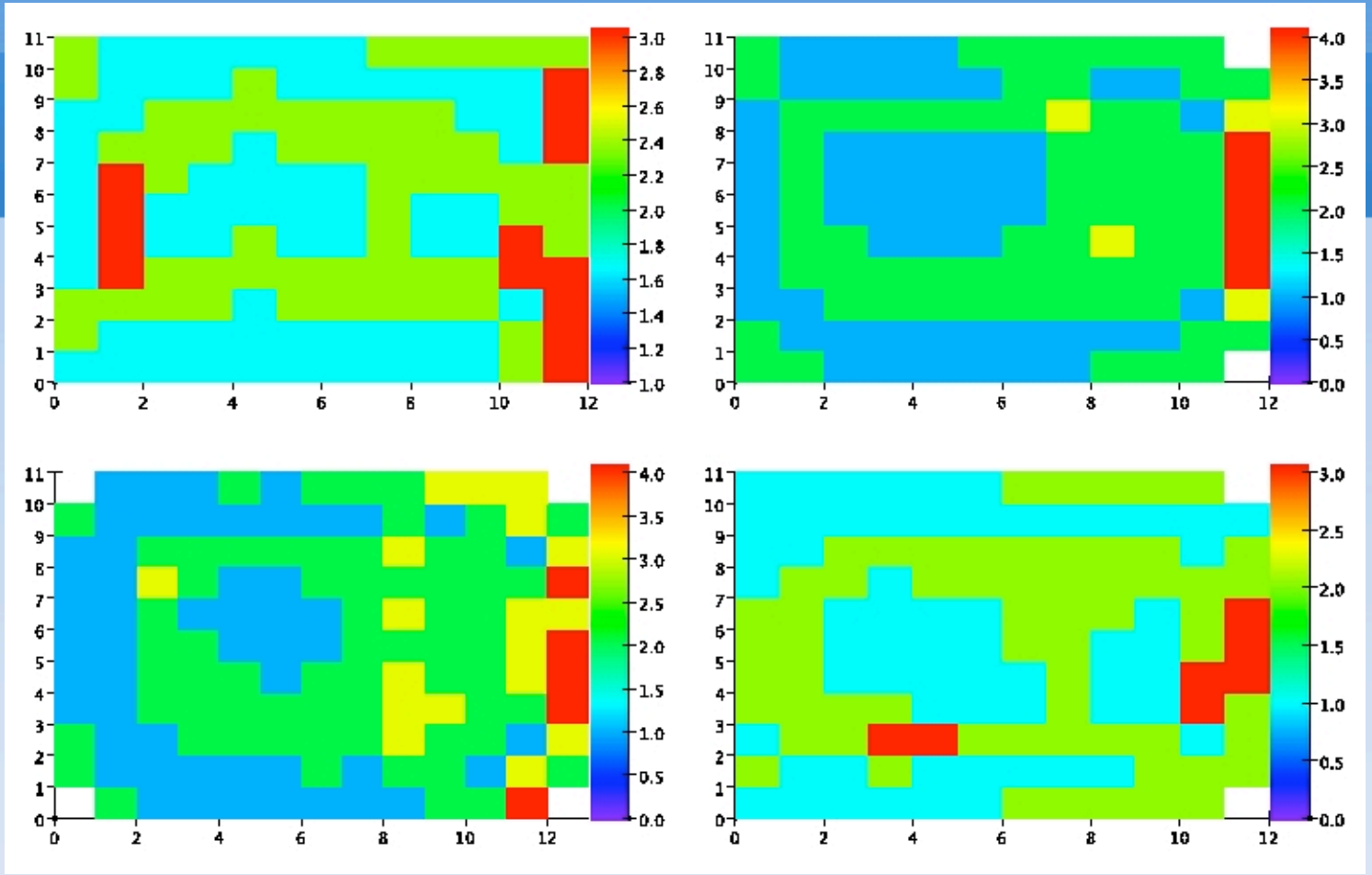


Mirrors



Results of a few toroidal mirrors.

Mirrors



Toroidal mirrors (counter clockwise from top left) #1,#2,#3 and #3-rotated

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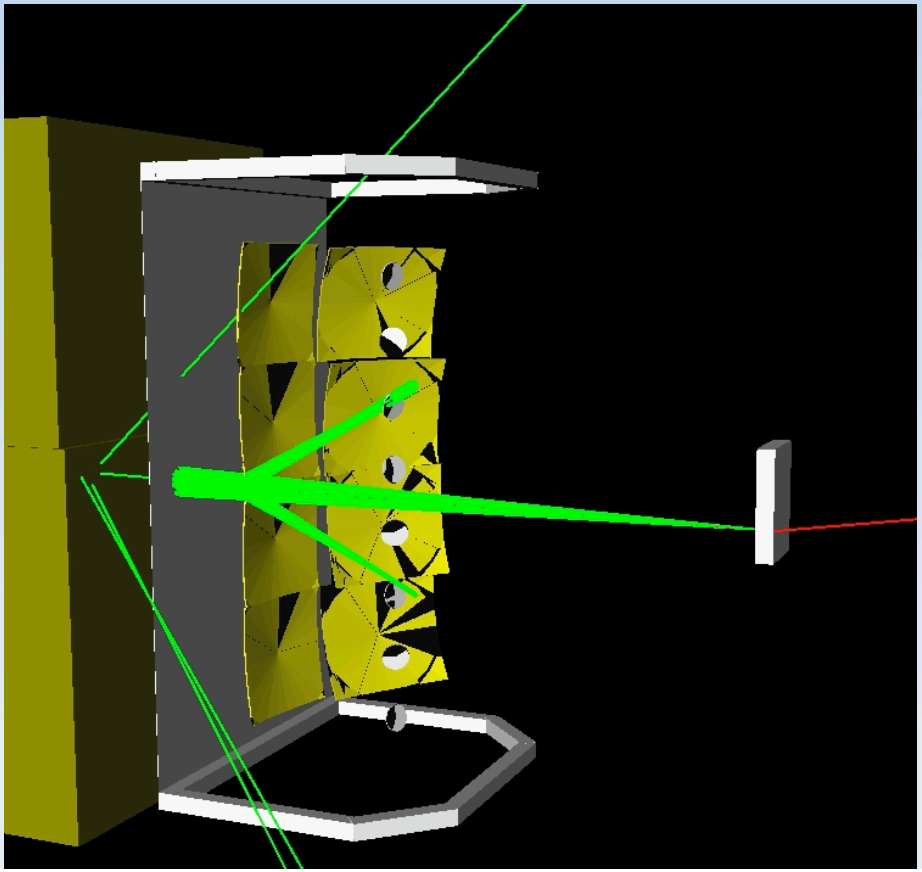
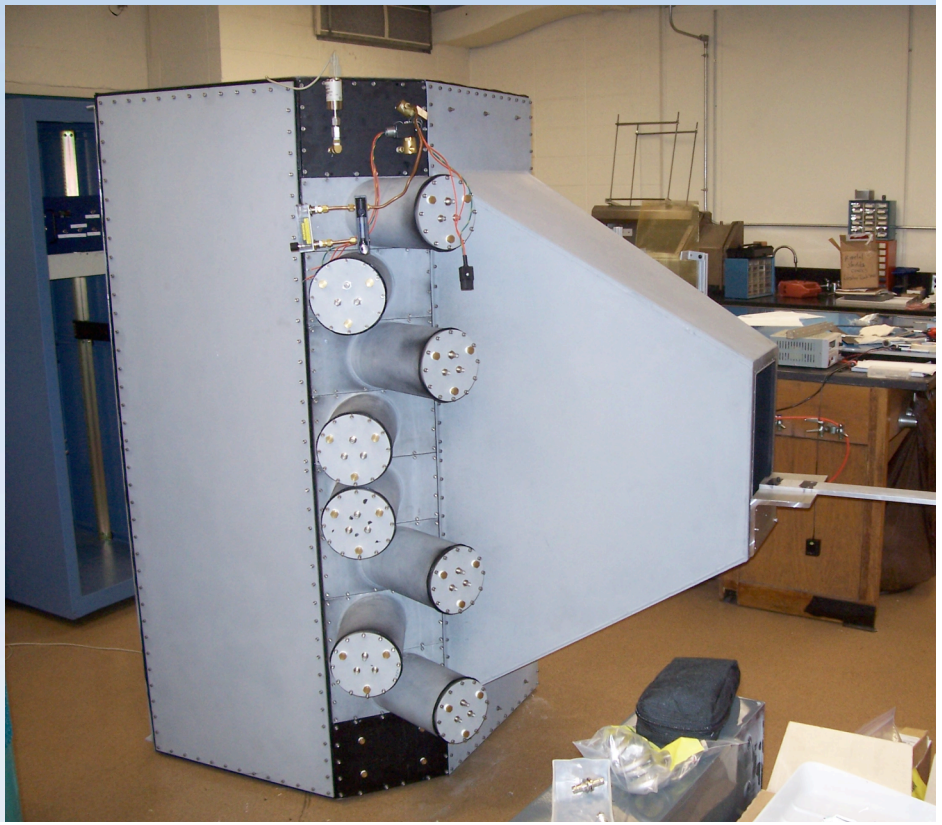
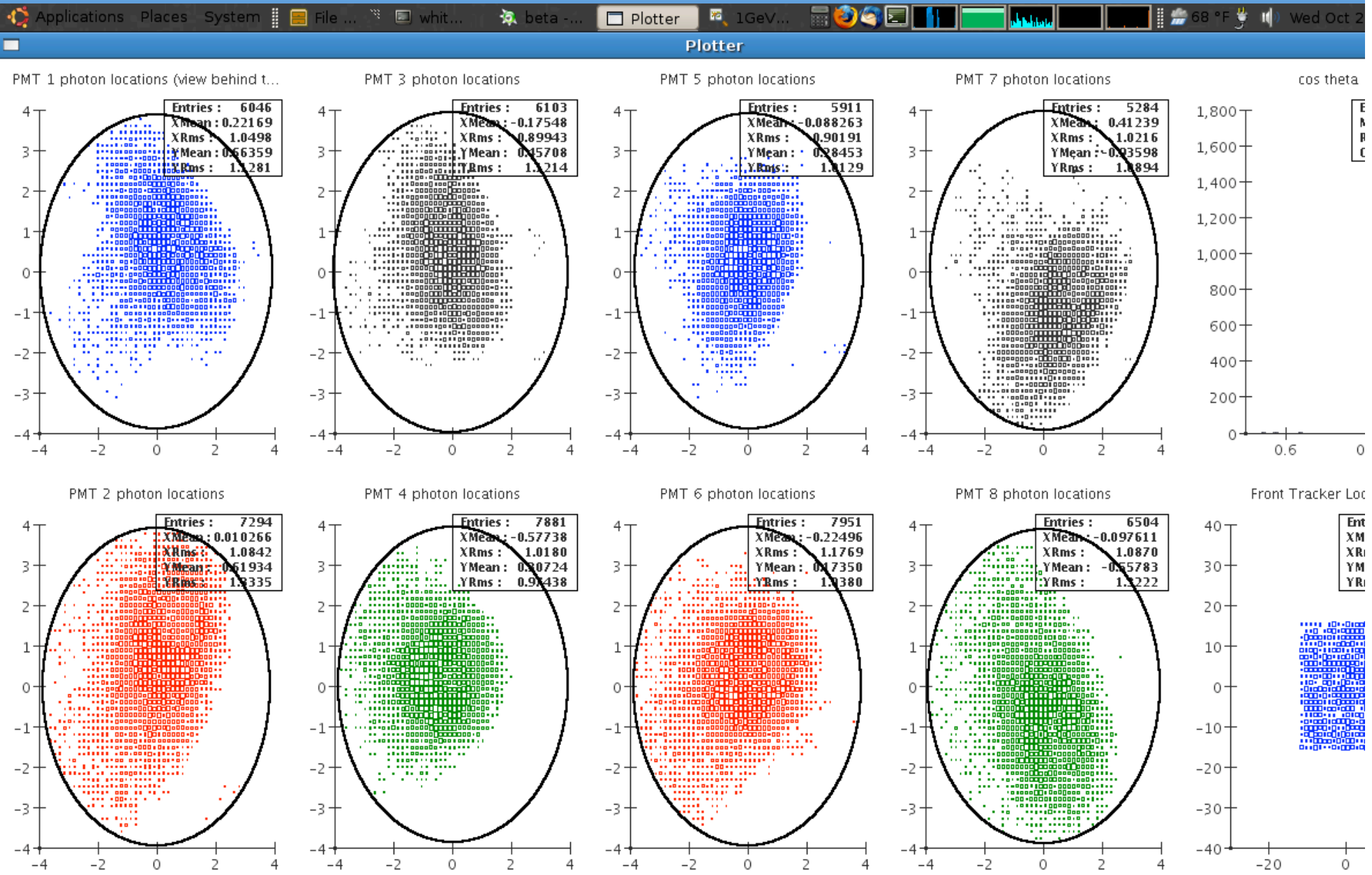
Simulations

- Geant4 simulations:
  - Mirror efficiency vs Electron momentum
  - Effects on optimal mirror/pmt alignment

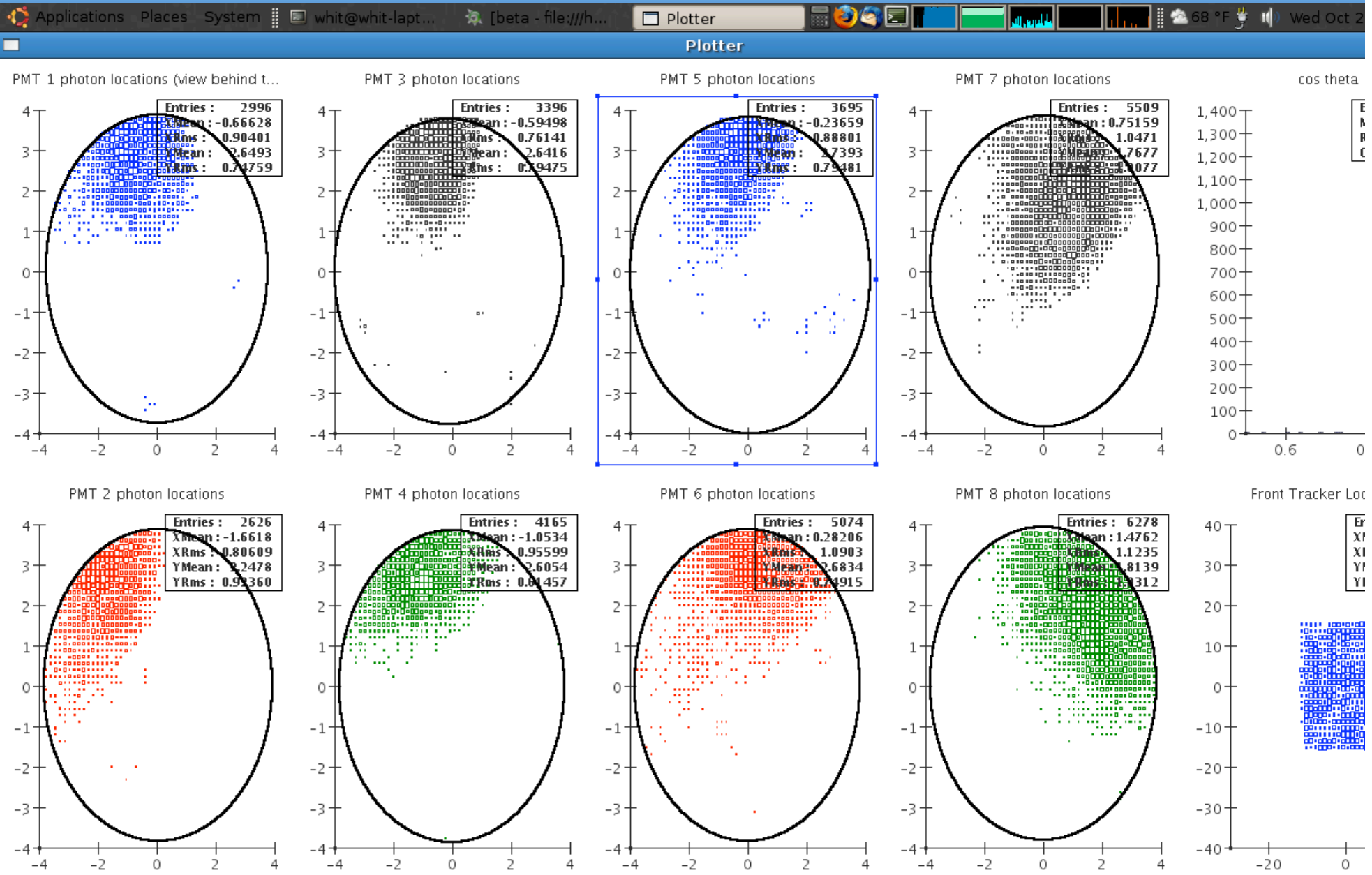




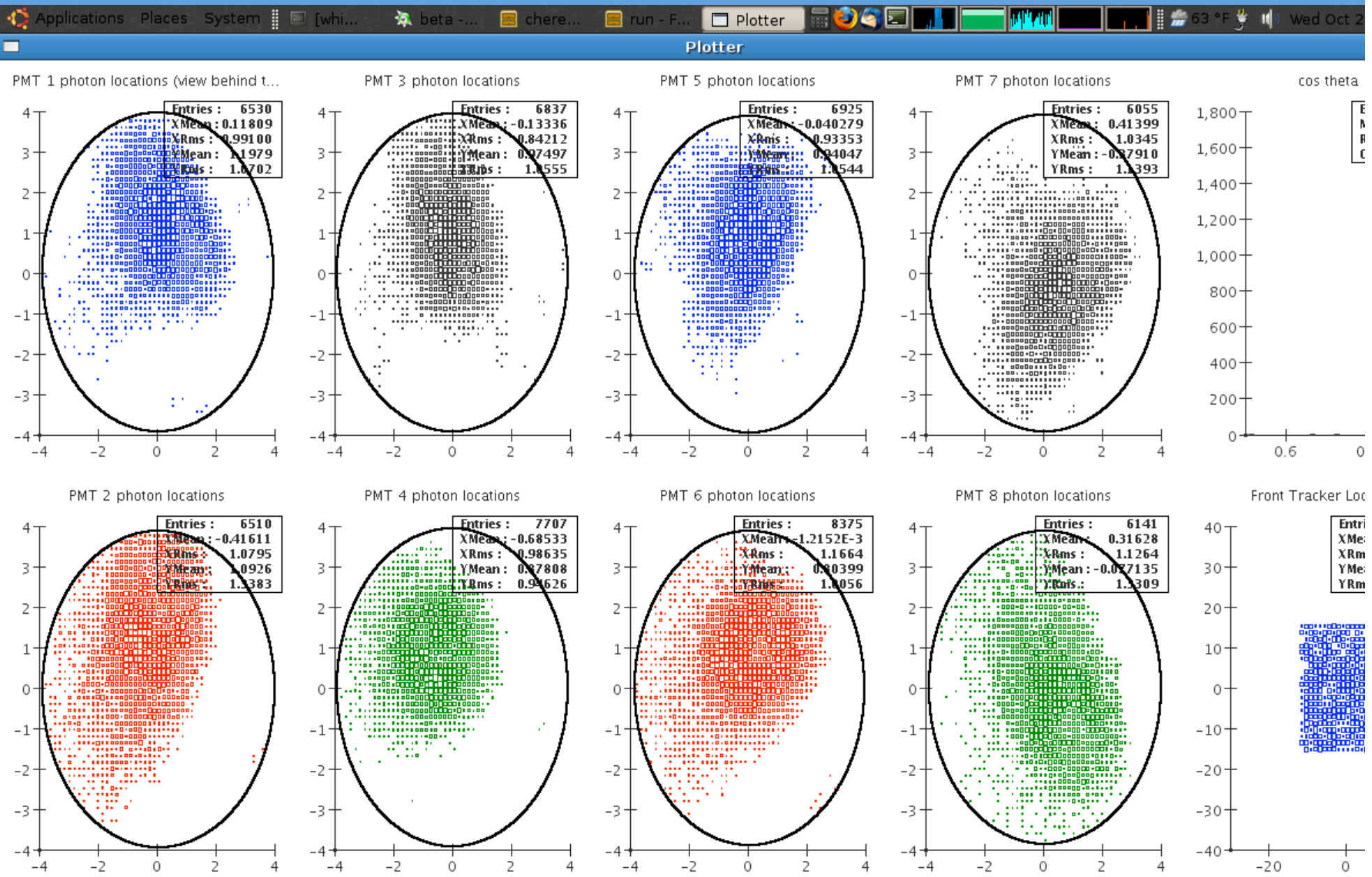
1GeV Electrons – No Field



1GeV Electrons – With Field



5GeV Electrons – With Field



Simulations

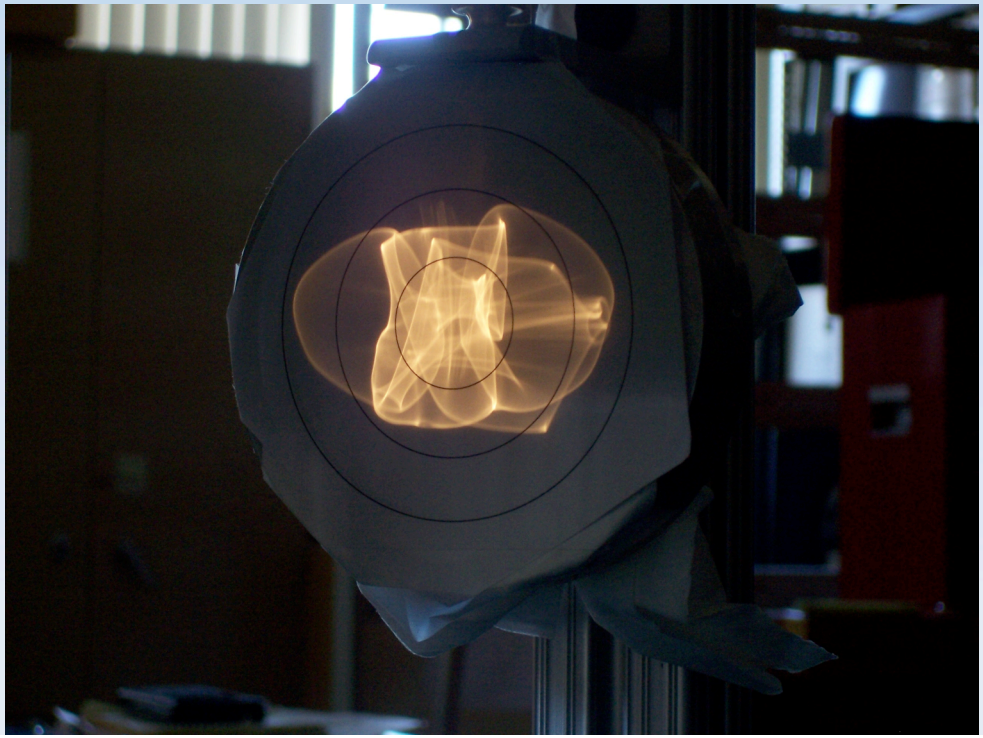
- Mirror/PMT efficiency = (# of photons hitting the mirror)/(# reaching face of pmt)
  - With NO FIELD and 1GeV electrons, the efficieny is ~ 98%
  - With Field and 500MeV electrons, the efficiency is ~ 2%
- Can we improve the lower momentum efficiency?

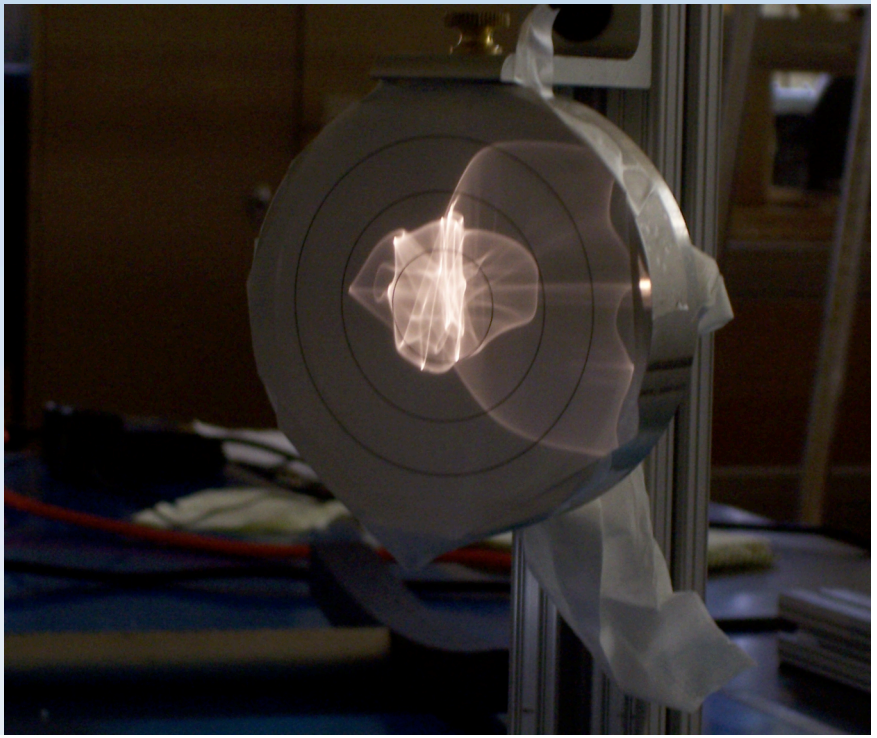
Simulations

Moving the PMT's 1cm vertically increases the lower momentu
efficiency with minimal loss of 5 GeV

Simulations

- If we place the pmt target 1cm higher we can increase the acceptance at lower momentum without sacrificing higher momenta.





Simulations

- Clearly improving the acceptance of lower momentum electrons (<1GeV), decreases the higher momentum.
- More simulations will help with selecting the alignment that optimizes the acceptance.