

# PRad RC Report

## (Week of June 6 - 12)

### Highlights:

DAQ issues resolved; ran with 15 nA current since Friday  
@ 15 nA trigger rate ~ 5kHz, data rate ~400 MB/sec and 87% live-time.

Largest set of GEM detectors ever built, running at the highest DAQ rate achieved with an APV based system.

Most weekdays beam was restored within 2-4 hours after closing the Hall.

**Reached production goal for 1.1 GeV beam on Hydrogen.**

(over 500M events collected, about 25-30% are background. Also collected over 50M events with empty target.)

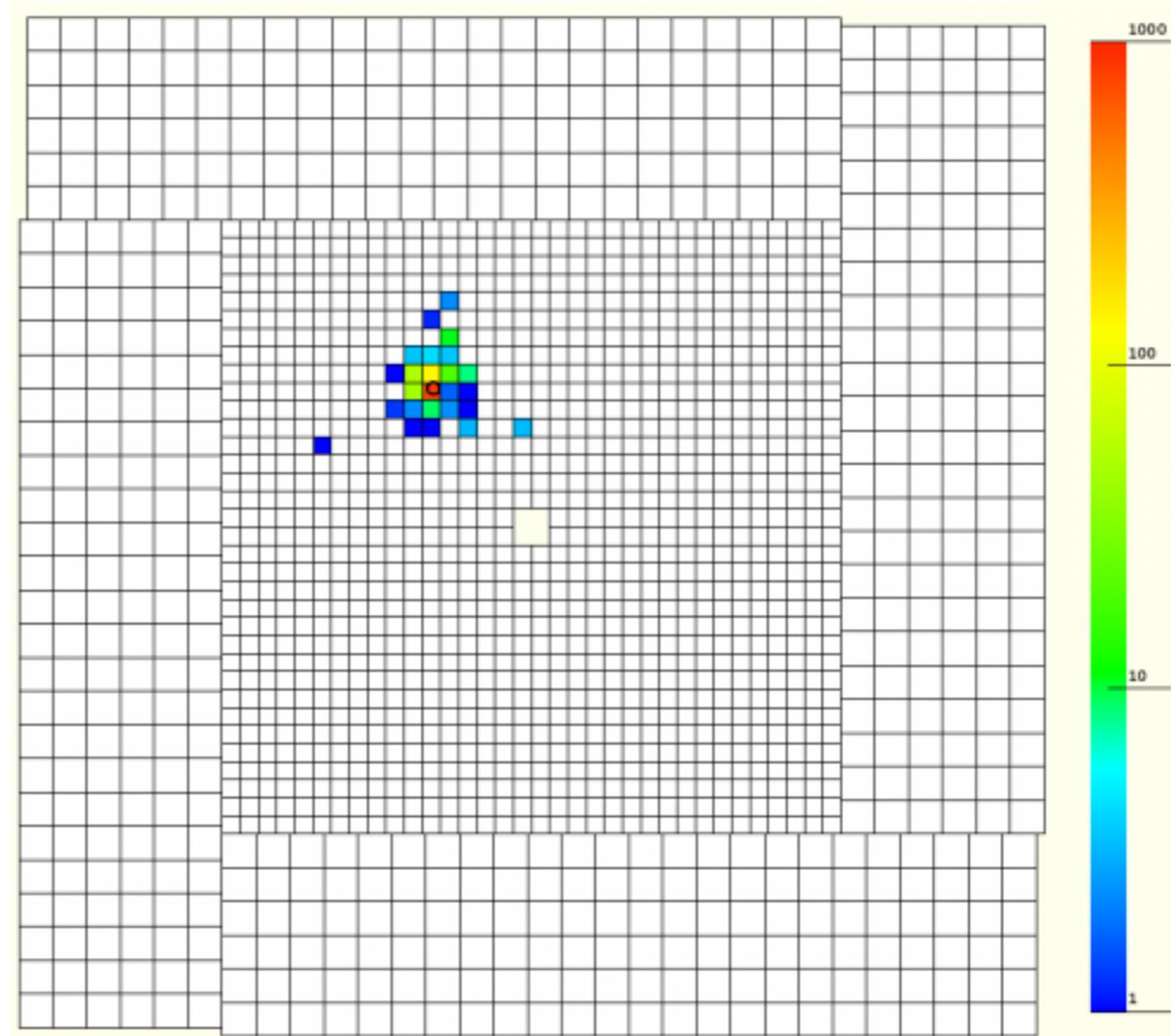
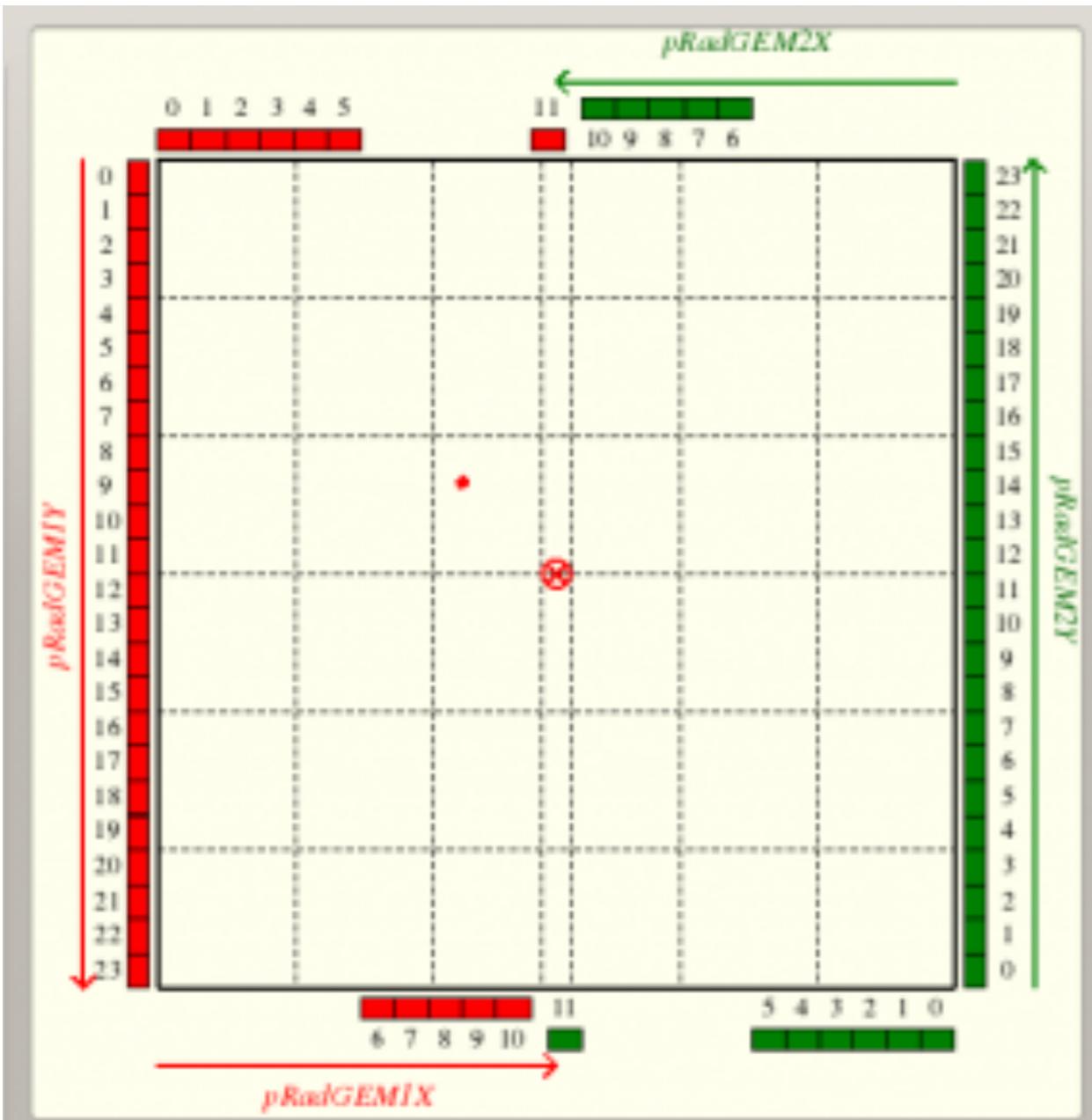
A reference measurement on a 1um thin Carbon target will be completed Sunday night.

**Asking to switch to 2 pass beam on Monday.**

# Online matching between GEM and HyCal hits

GEM

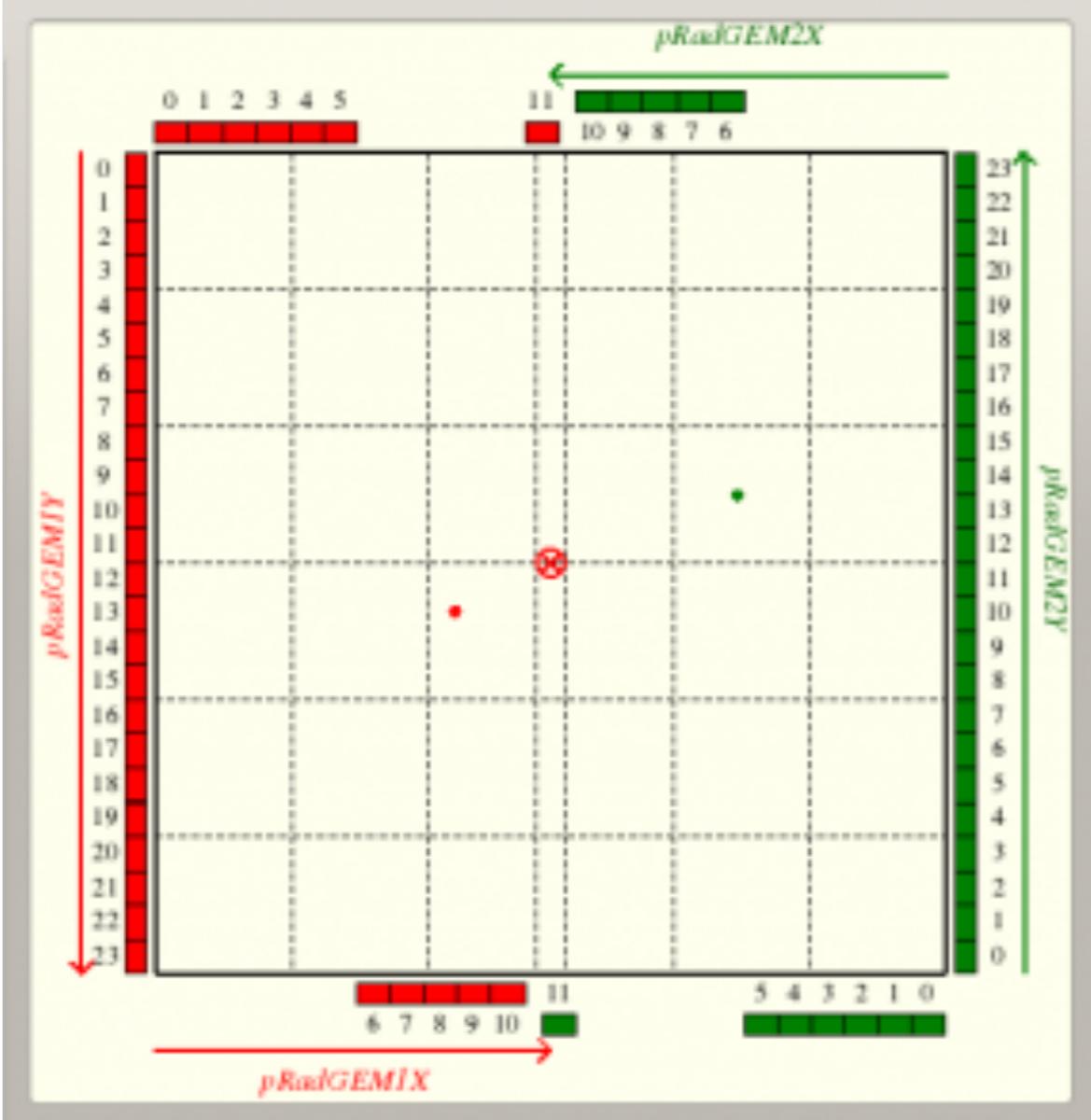
HyCal



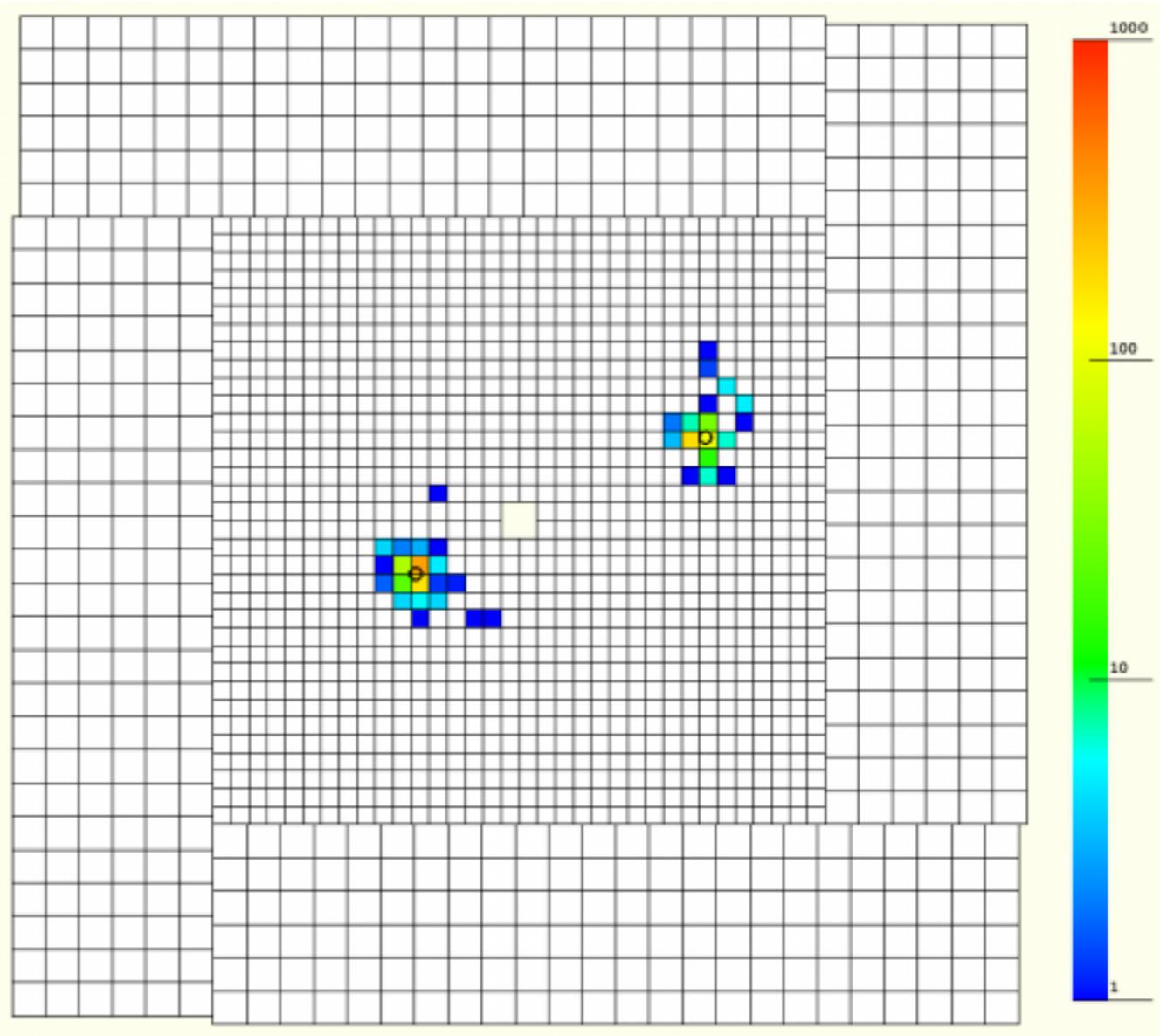
An e-p elastic scattering event

# Online matching between GEM and HyCal hits

GEM

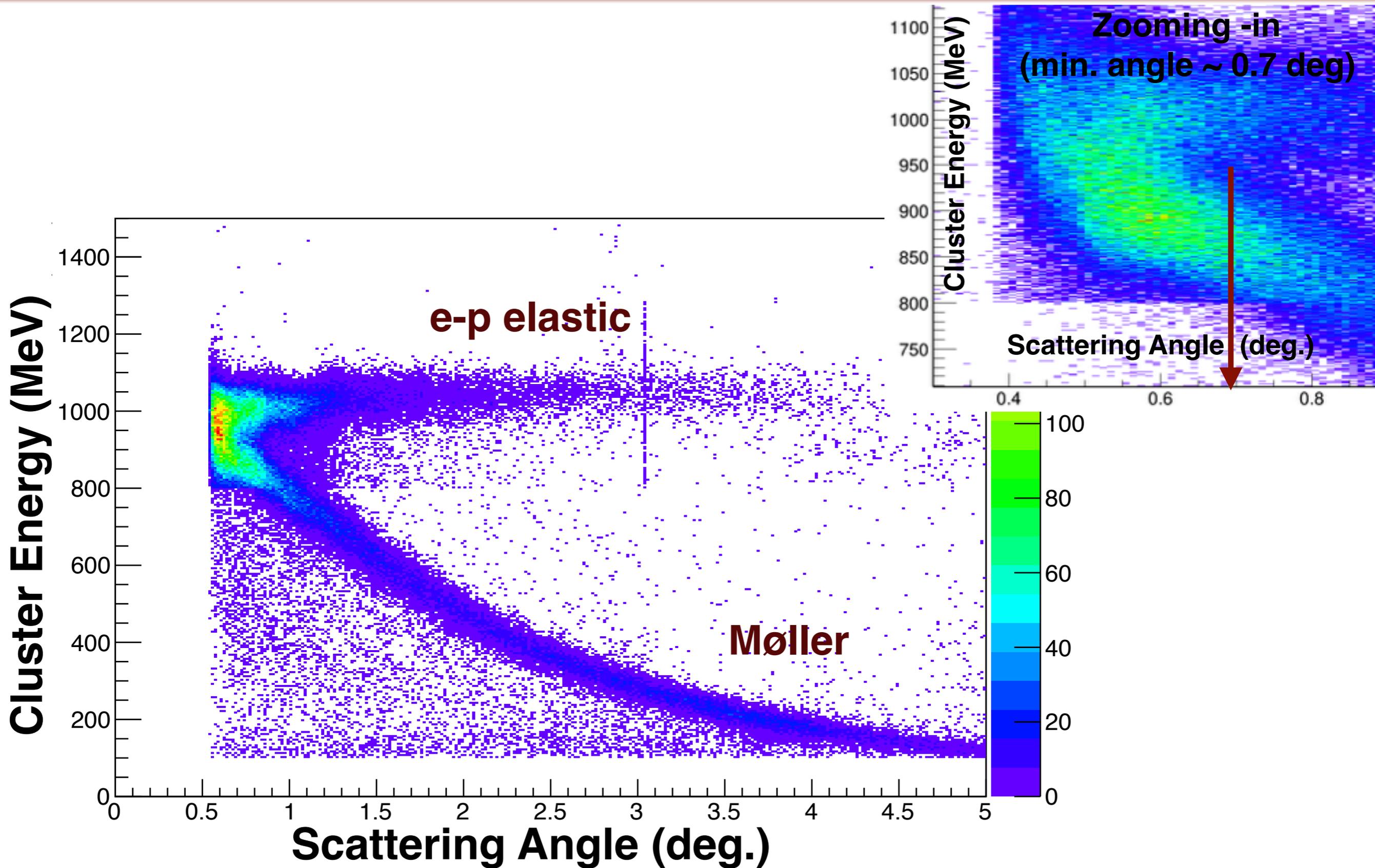


HyCal

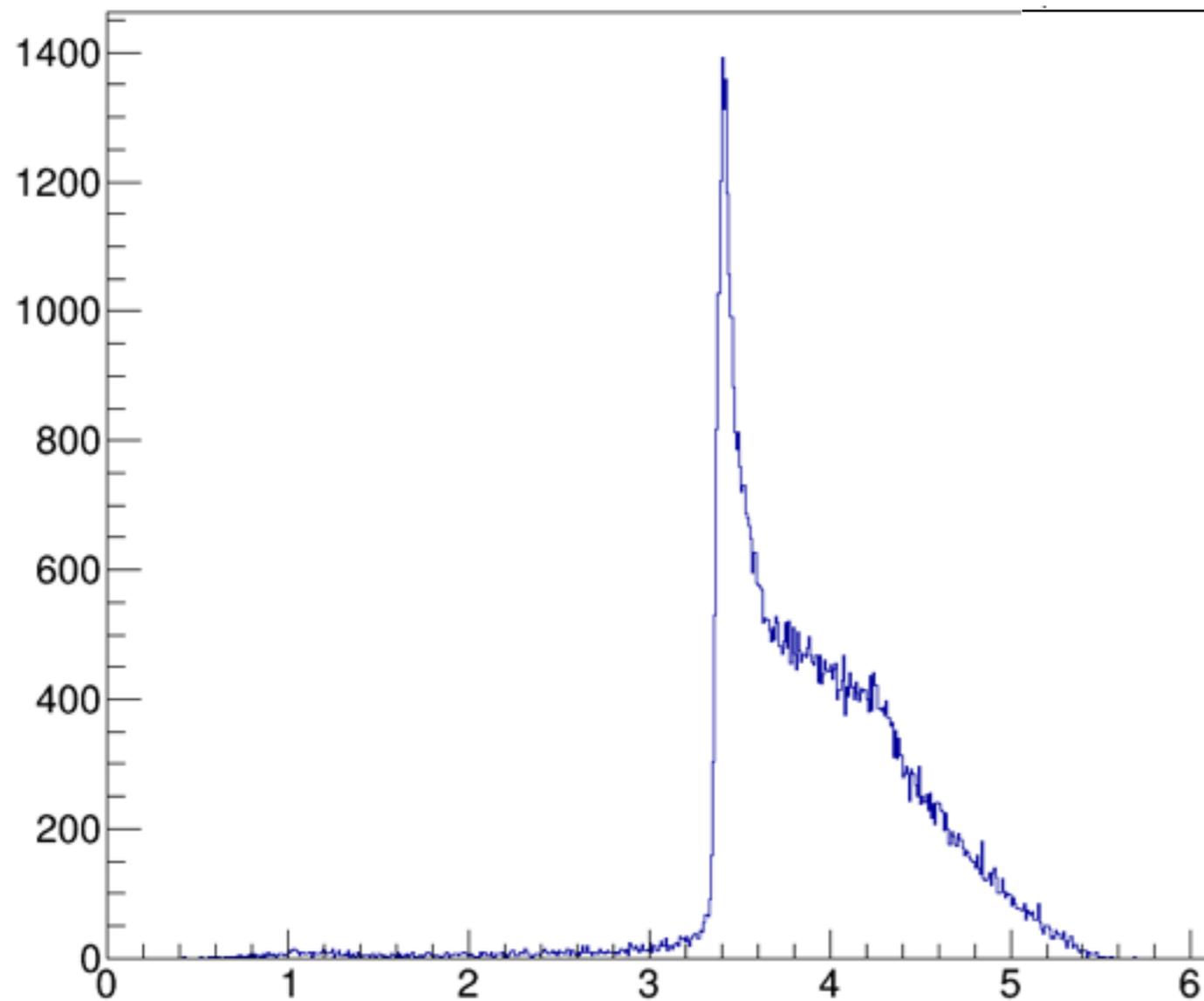


A Møller scattering event

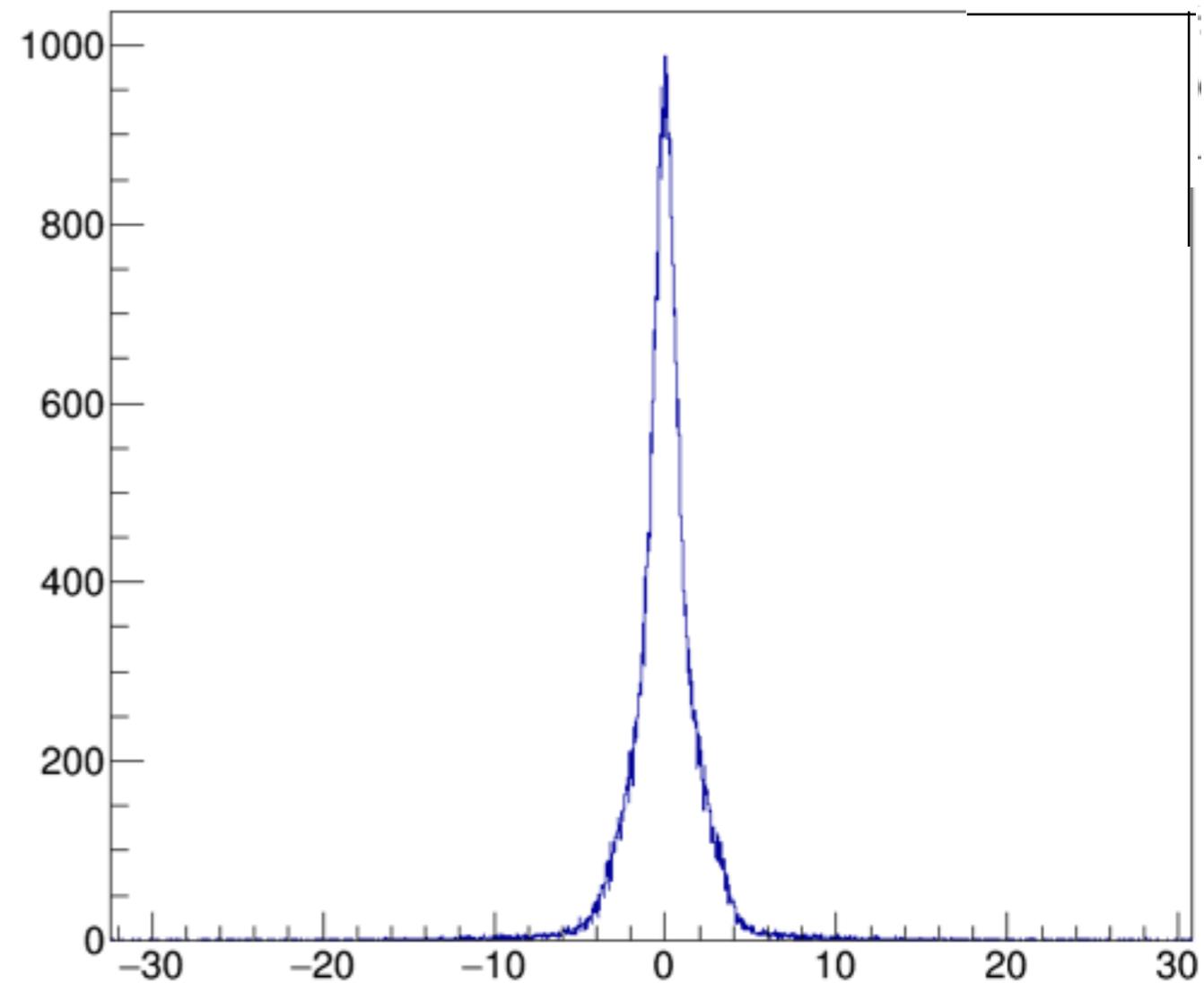
# Energy vs scattering angle with preliminary calibration



# Møller opening angle and coplanarity



**Møller opening angle (deg)**

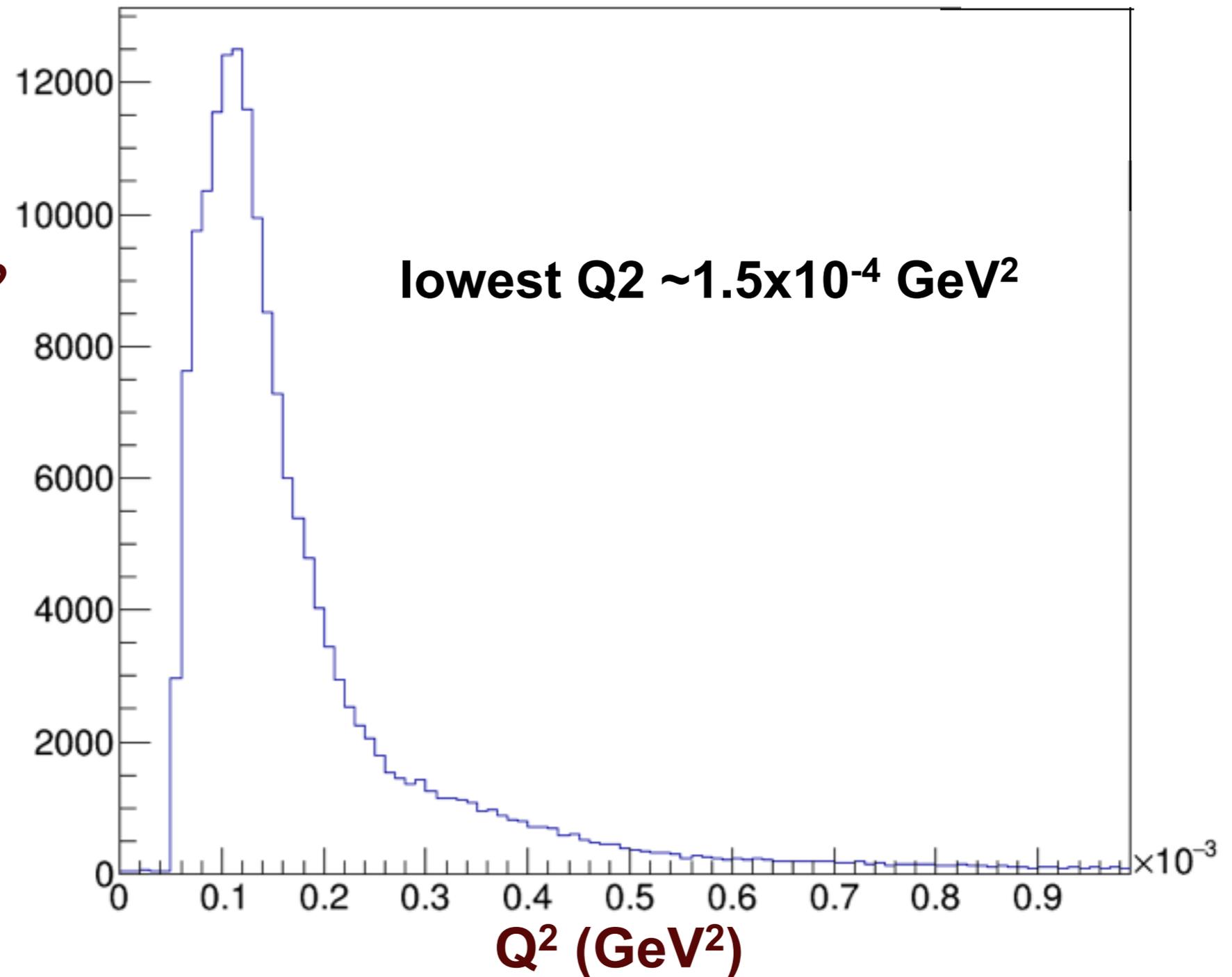


**Møller  $\Delta\phi$  (deg)**

Preliminary matching of GEM hits with HyCal clusters (PbWO<sub>4</sub> only)  
Total energy of two clusters > 700 MeV

# Q<sup>2</sup> distribution of single cluster events

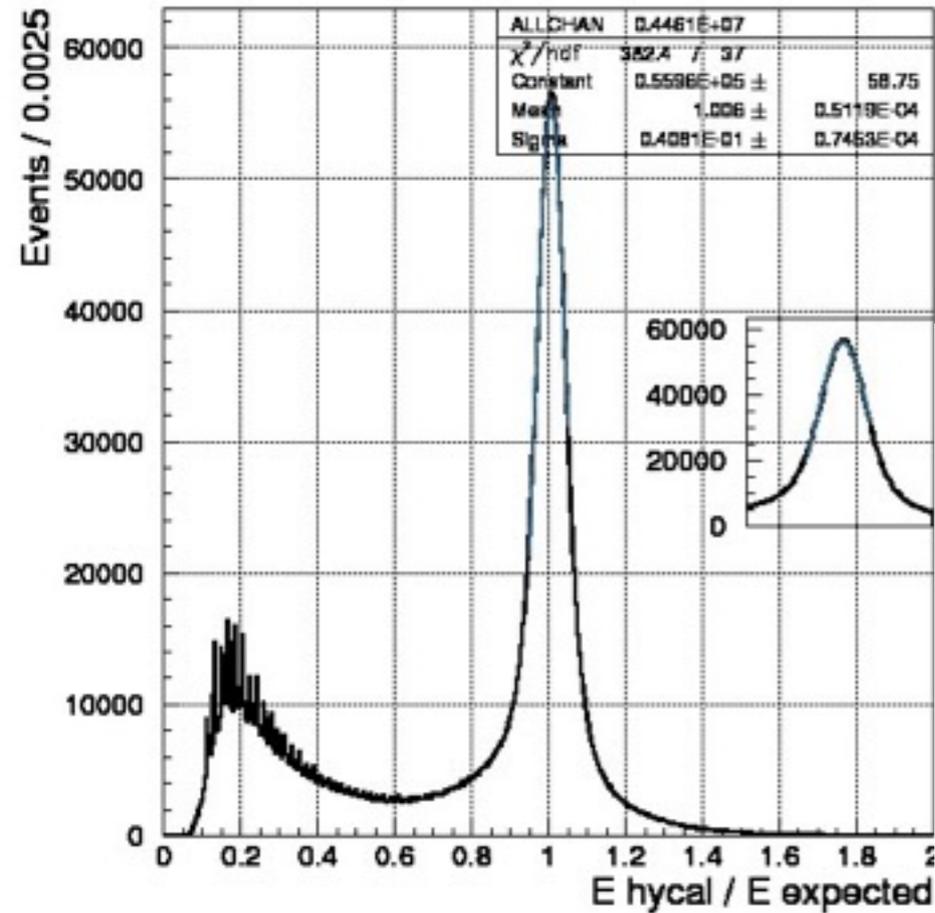
**Achieved the lowest Q<sup>2</sup> in  
e-p scattering experiments**



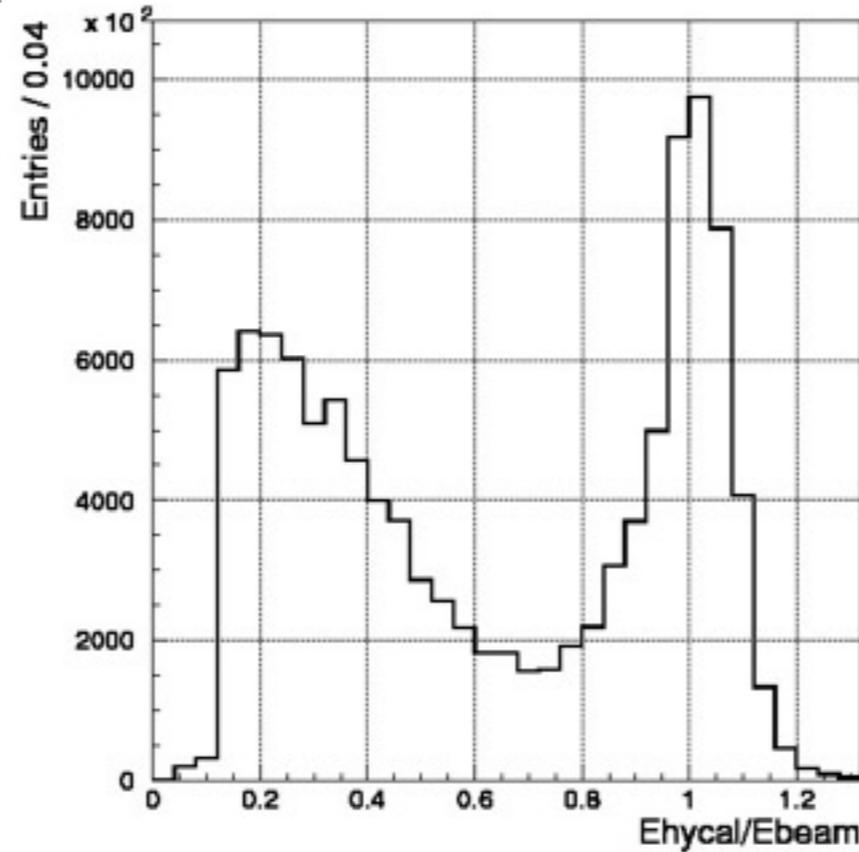
Preliminary matching of GEM hits with HyCal clusters (PbWO<sub>4</sub> only)  
Total energy of cluster > 700 MeV

# Calibration of HyCal is underway

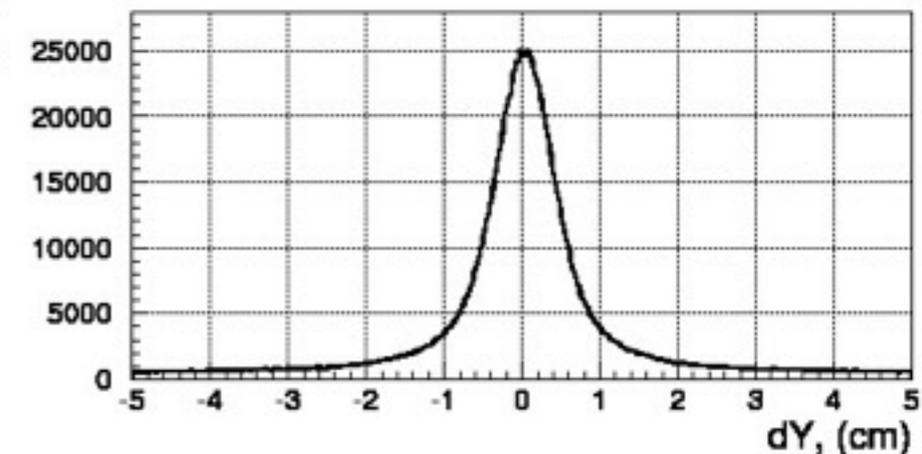
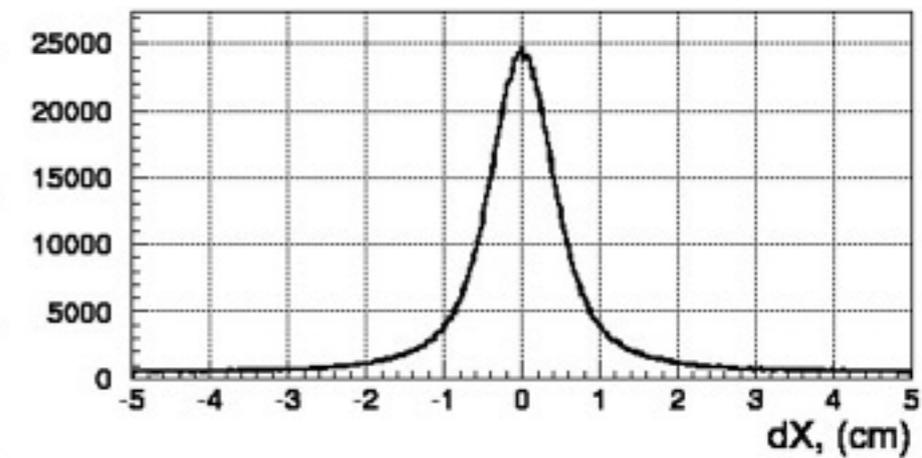
## Møller Energy



## one cluster energy



## position



# Plans for the next week

## **Collect 2.2 GeV data to extend the range of $Q^2$**

The full  $Q^2$  range is essential for robust extraction of proton charge radius (i.e. 2.2 GeV data just as important as the 1.1 GeV data)

**Need total of 96 hrs (4 days) of running to get the full statistics (including the empty target running).**

**An extended weekend (Friday - Tuesday) would help us reach full statistics.**