NuMI-MINOS Status Report – Laura Loiacono

FAR DETECTOR:

Uptime last week:

98.81% (wall time)

99.88% (pot weighted)

Issues from last week

Smooth running with no major disruptions

Plans (after we have collected 1e19 POT of FHC data):

Charge injection run during beam downtime (FHC→RHC)

Change coil current from forward to reverse (FHC→RHC)

NuMI-MINOS Status Report – Laura Loiacono

NEAR DETECTOR:

Uptime last week:

95.98% (pot weighted)

Issues from last week (handled before beam returned)

Swapped out 3 front end boards

Swapped out fan pack for electronics rack

Swapped out LeCroy 1445 controller for PMT HV

Plans (after we have collected 1e19 POT of FHC data)

Change coil current from forward to reverse (FHC→RHC)

NuMI-MINOS Status Report – Laura Loiacono

NuMI:

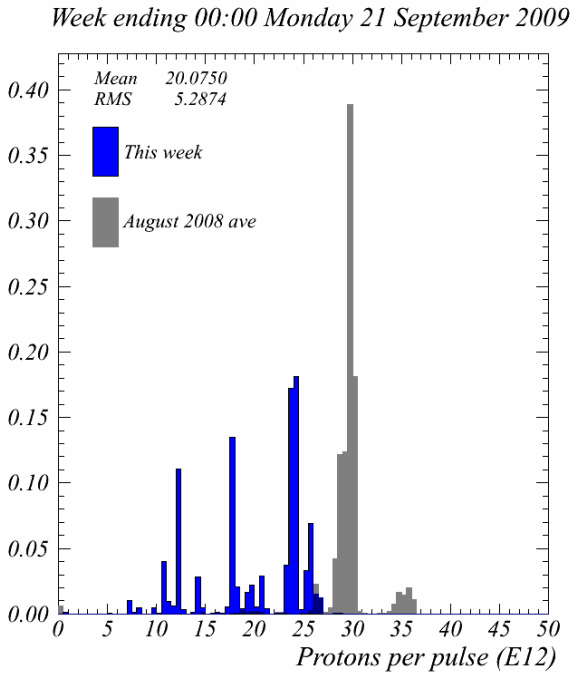
Completed Target/Horn Scans on Monday

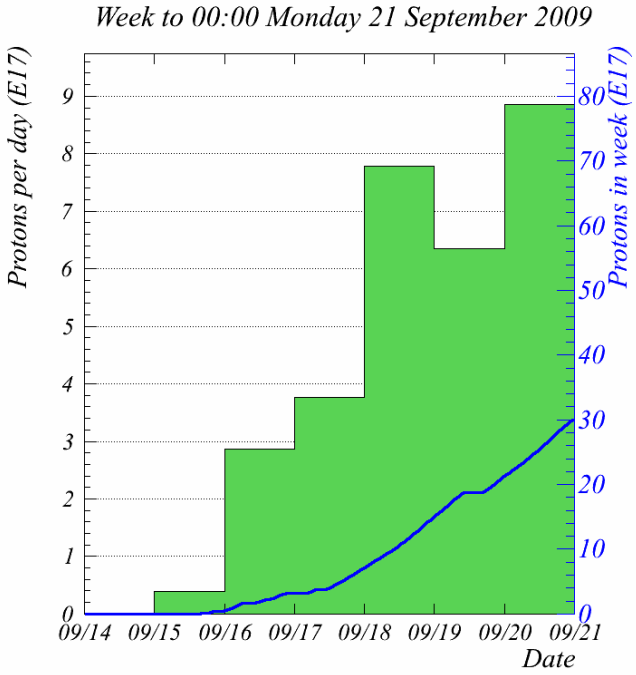
Resumed L010185 FHC running on Monday evening

Hardware problems

- Extraction kicker – Failed HV cable and charging resistor
- Horn PS – 2 trips

Ramping up to normal beam intensities





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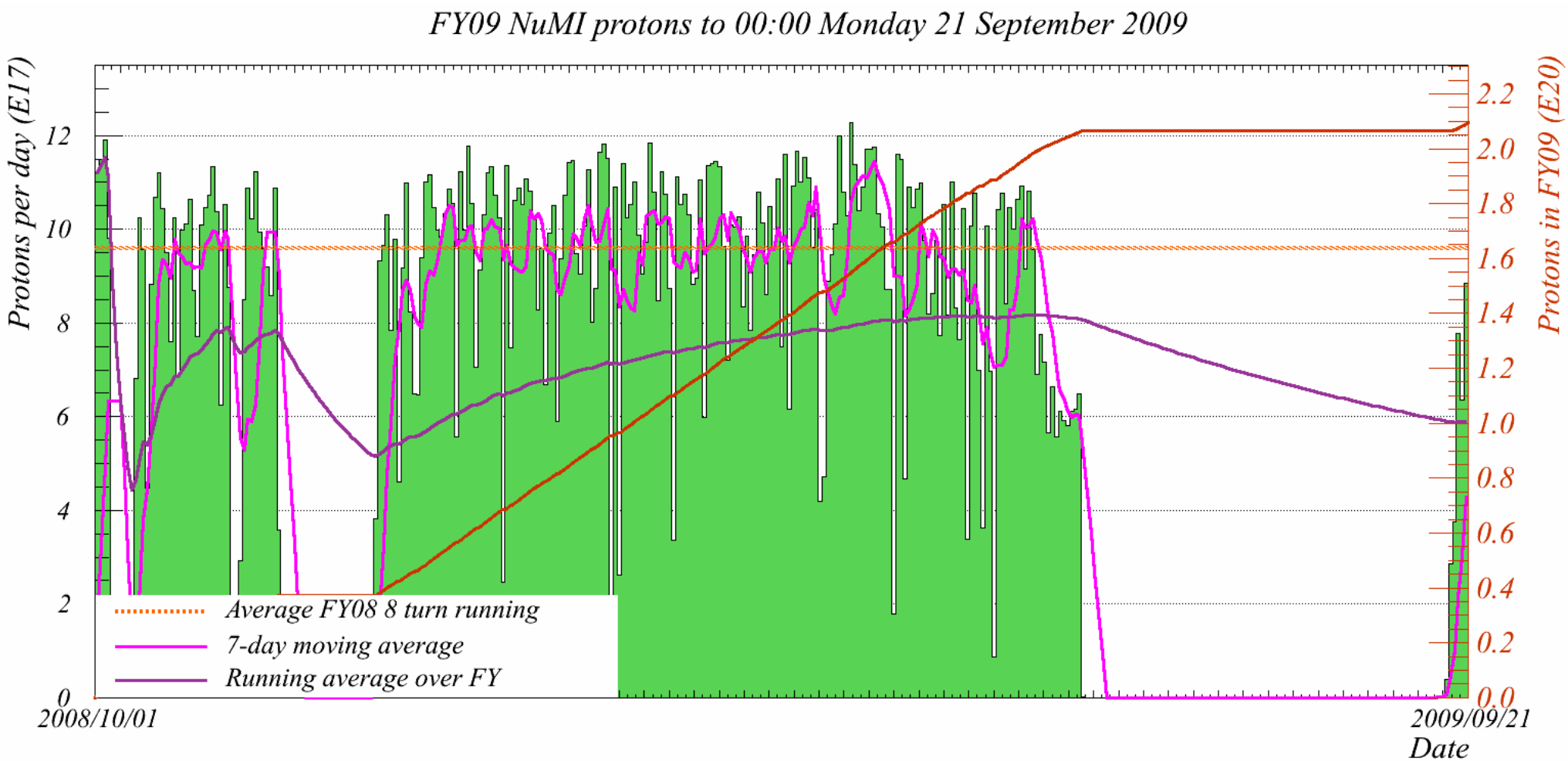
Protons on Target for FY09



DOE Goal: 2.2e20

We have: 2.1e20

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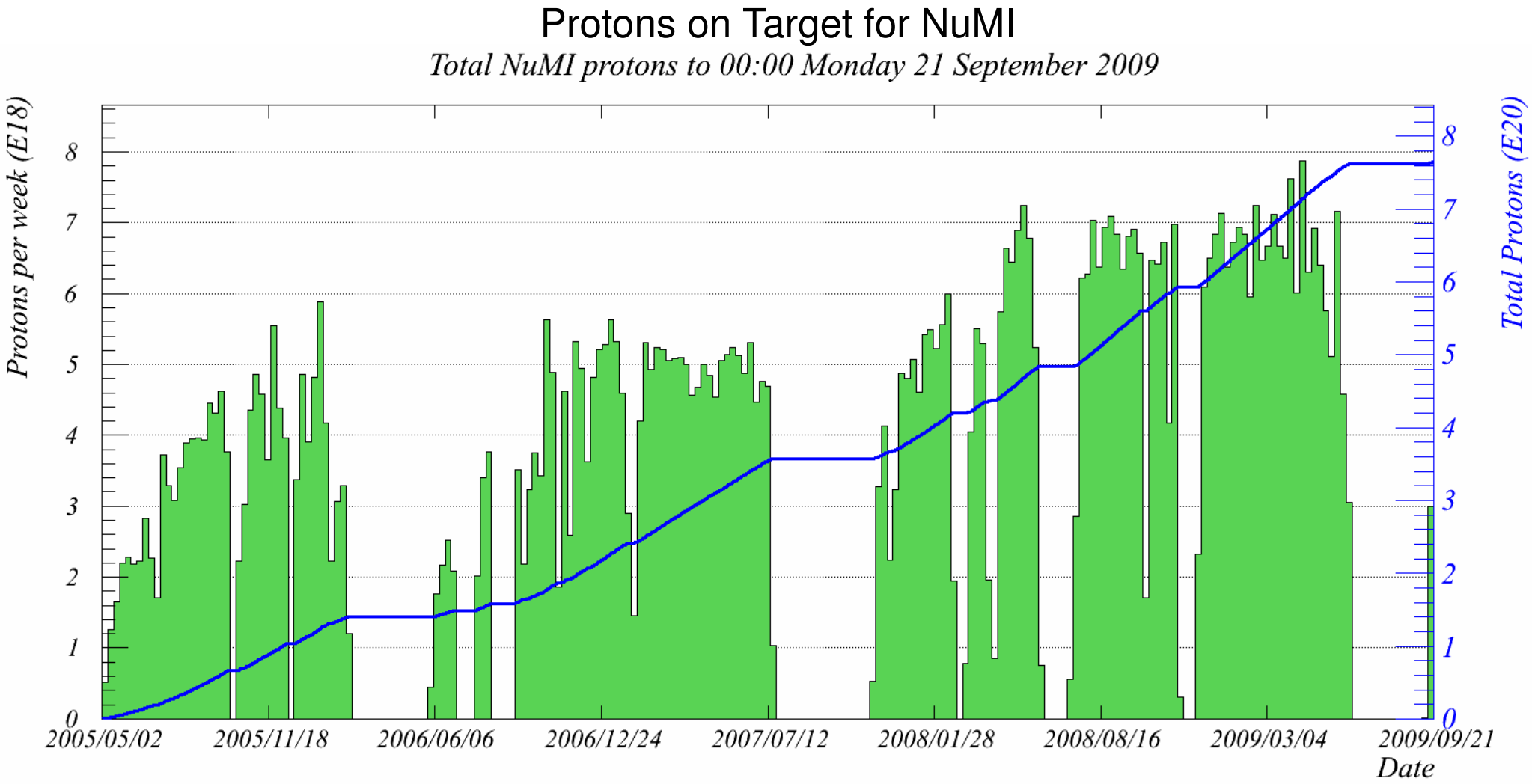
All Exp Mtg
September 21, 2009

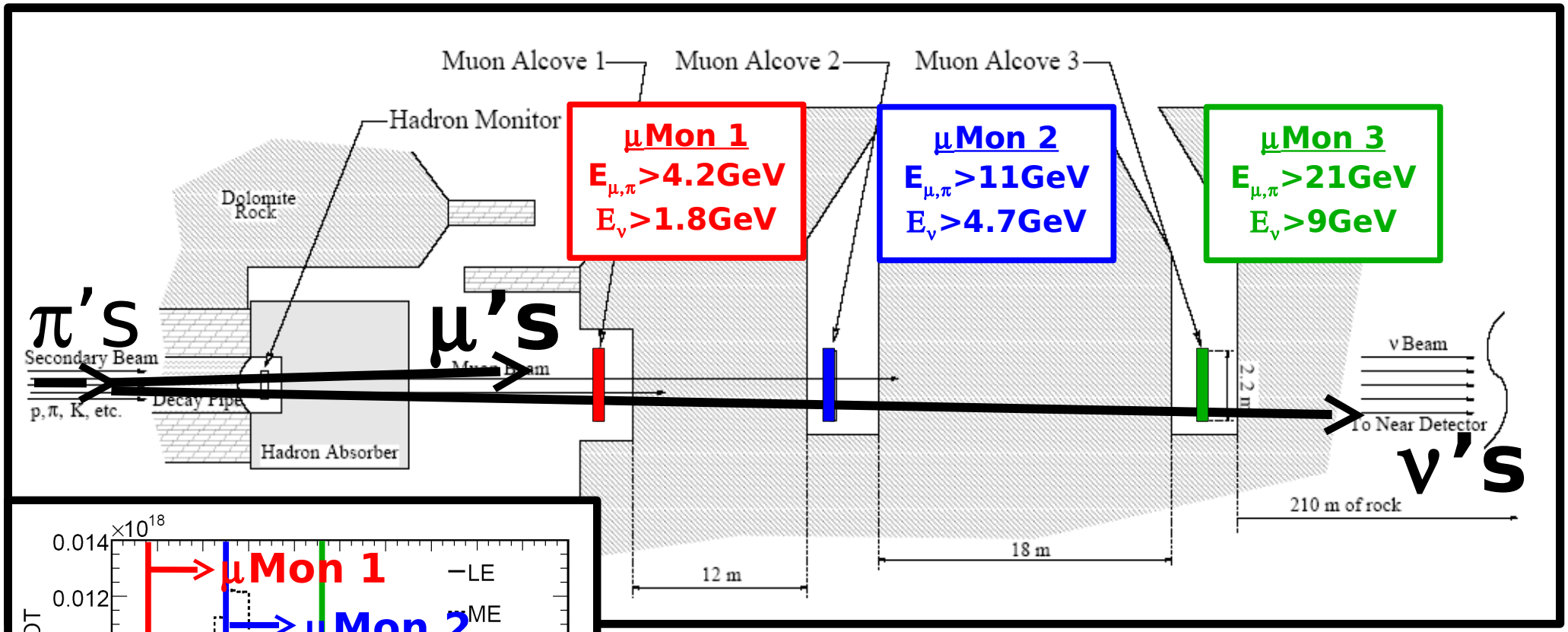


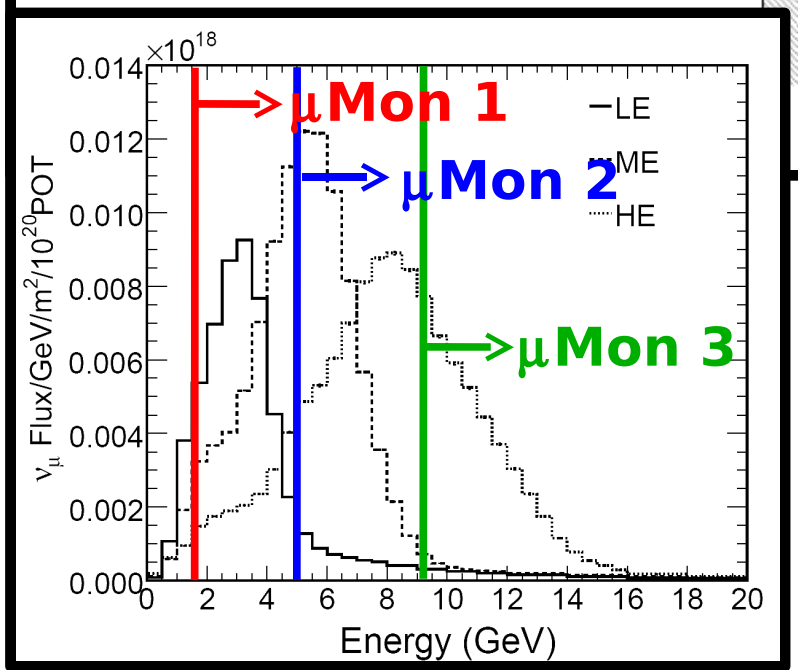
More than 7.6e20 integrated protons on target

Special low intensity horn current scans

- NuMI Muon Monitors.
- Neutrino Flux Measurement.
- Delta ray background.
- Raw data from the horn scans.

NuMI Muon Monitors



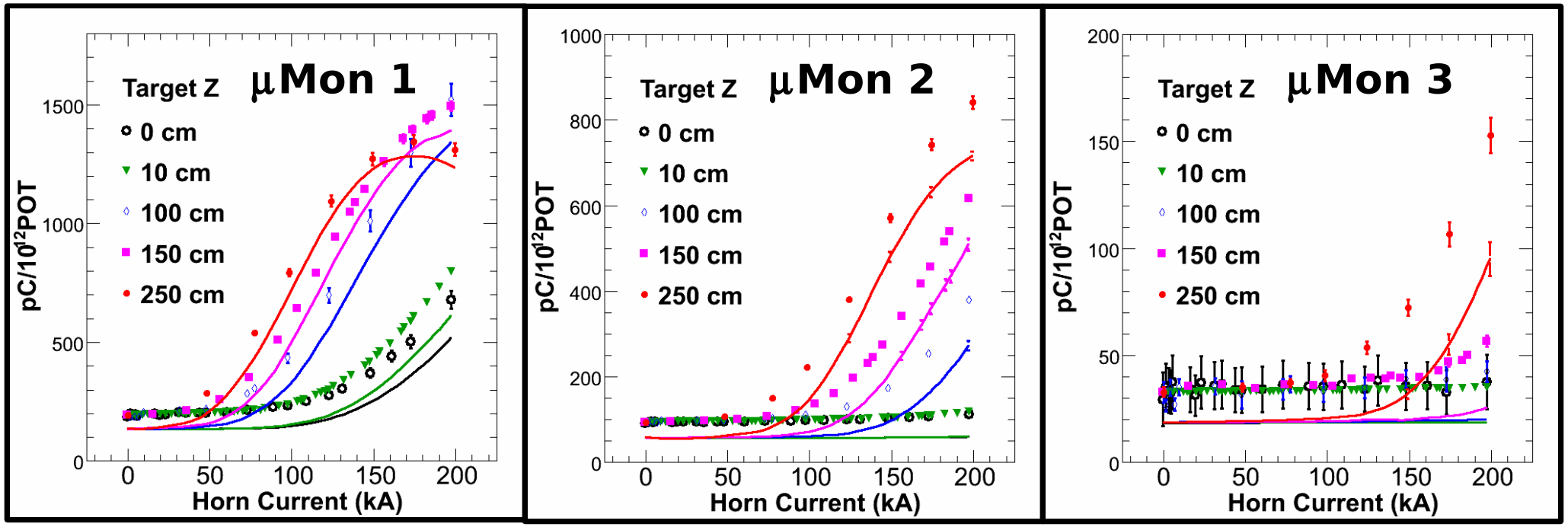


- 3 arrays of ionization chambers; Signal = ionized electrons.
- Sampling μ flux = Sampling hadrons off target = Sampling ν flux.
- Sample different energy regions of the flux.

Muon Flux from the Muon Monitors

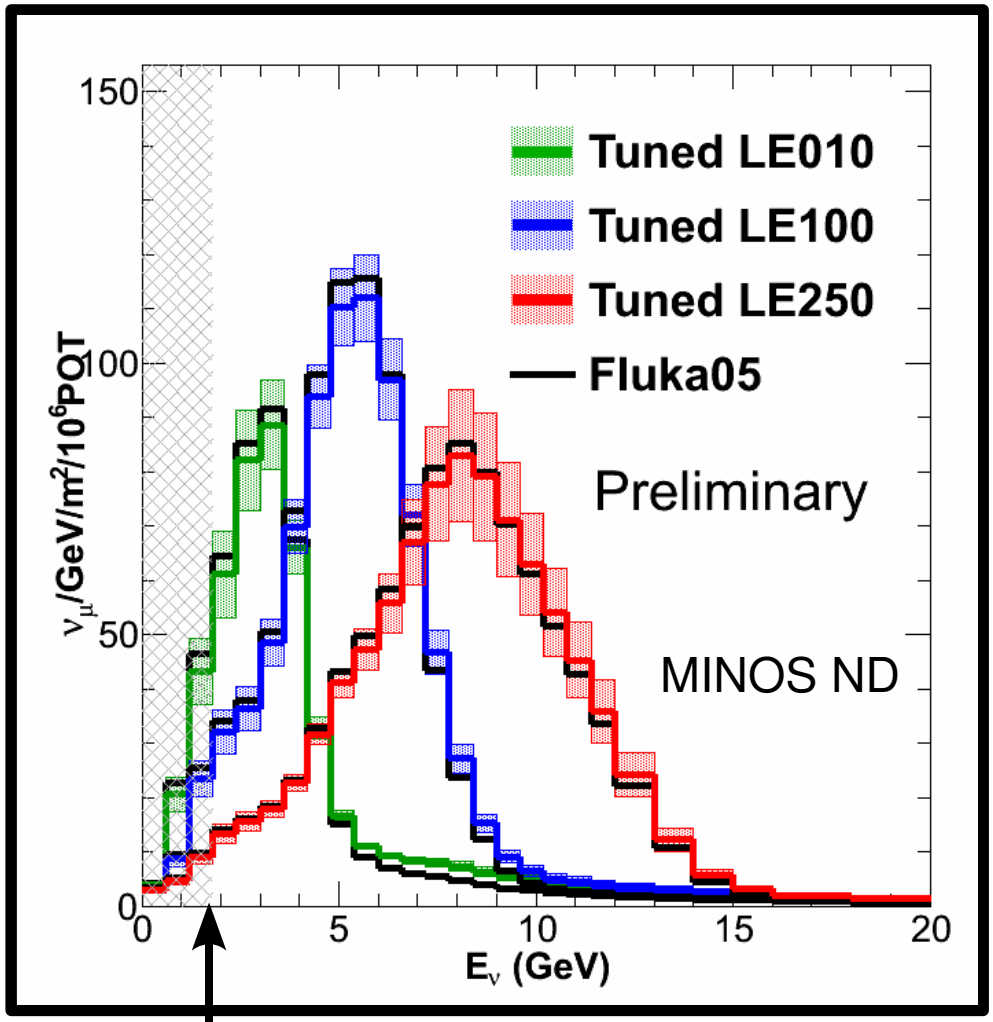
- Vary target z position and vary the horn current ⇒ changes the focused pion flux ⇒ changes the muon and neutrino flux.

● Data ▬ Monte-Carlo



- Tune MC to μ Monitor data and extract the neutrino flux.

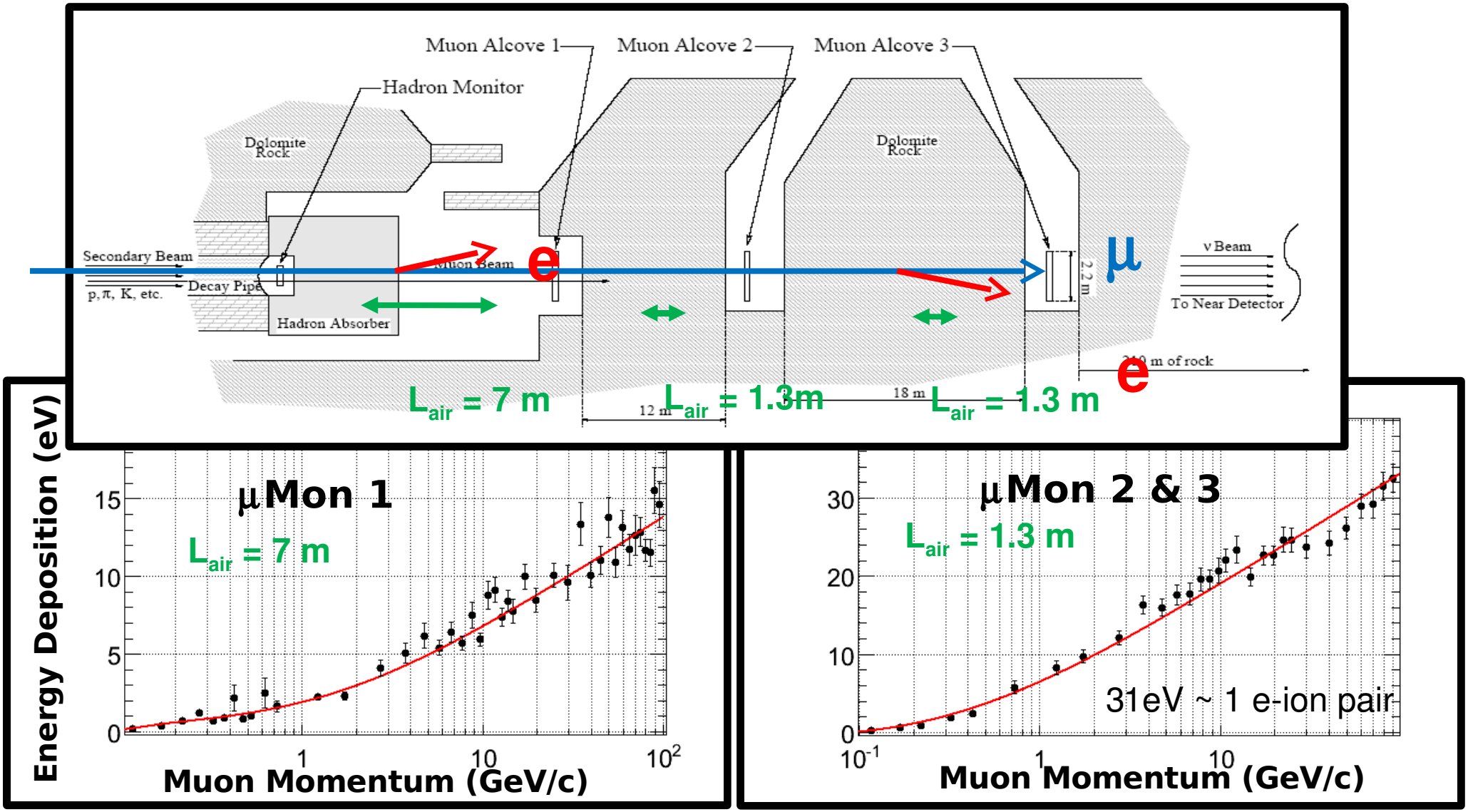
NuMI ν_μ Flux



μ Monitor energy threshold.

- Preliminary shape flux measurement.
- Large uncertainty from δ-ray backgrounds.

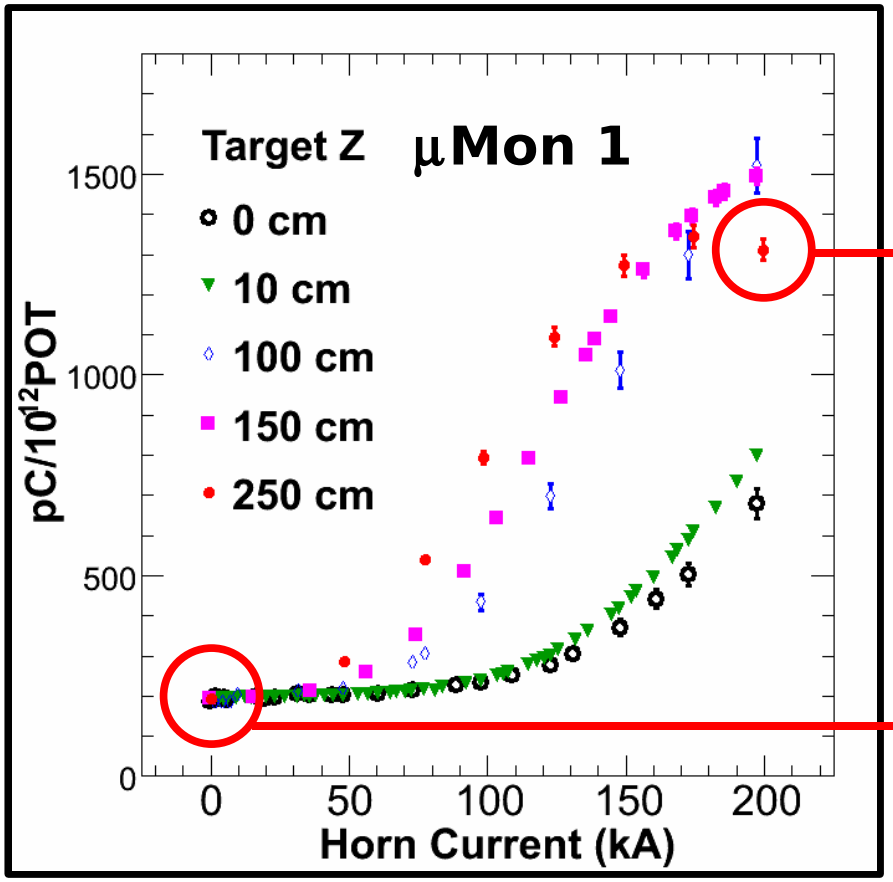
δ-Rays (Knock-On Electrons)



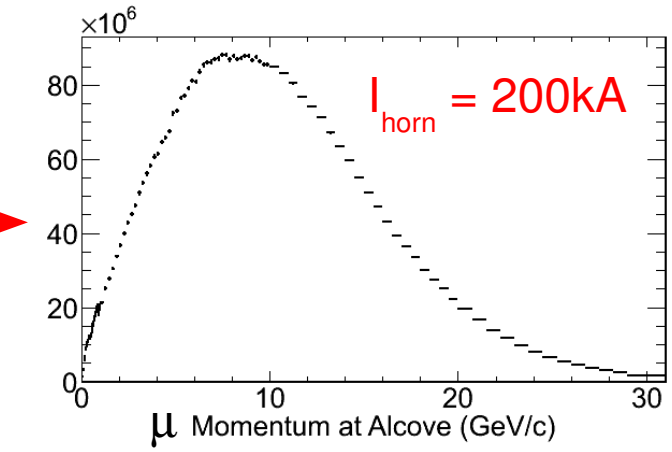
- Expect energy deposited by δ-rays to increase with muon momentum and decrease with the amount of air in front of the monitor.

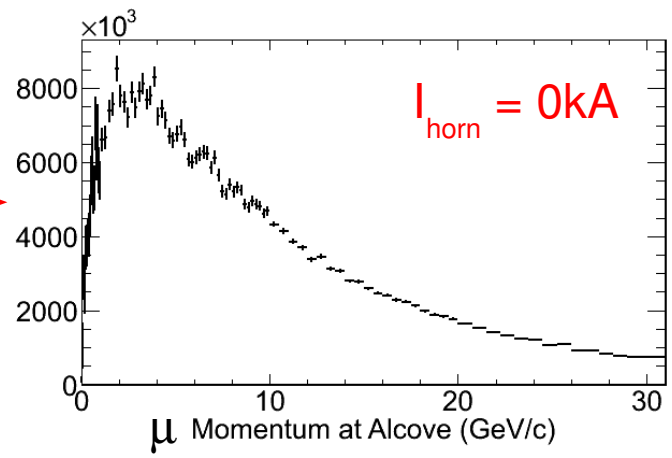
Muon Momentum

Data



MC



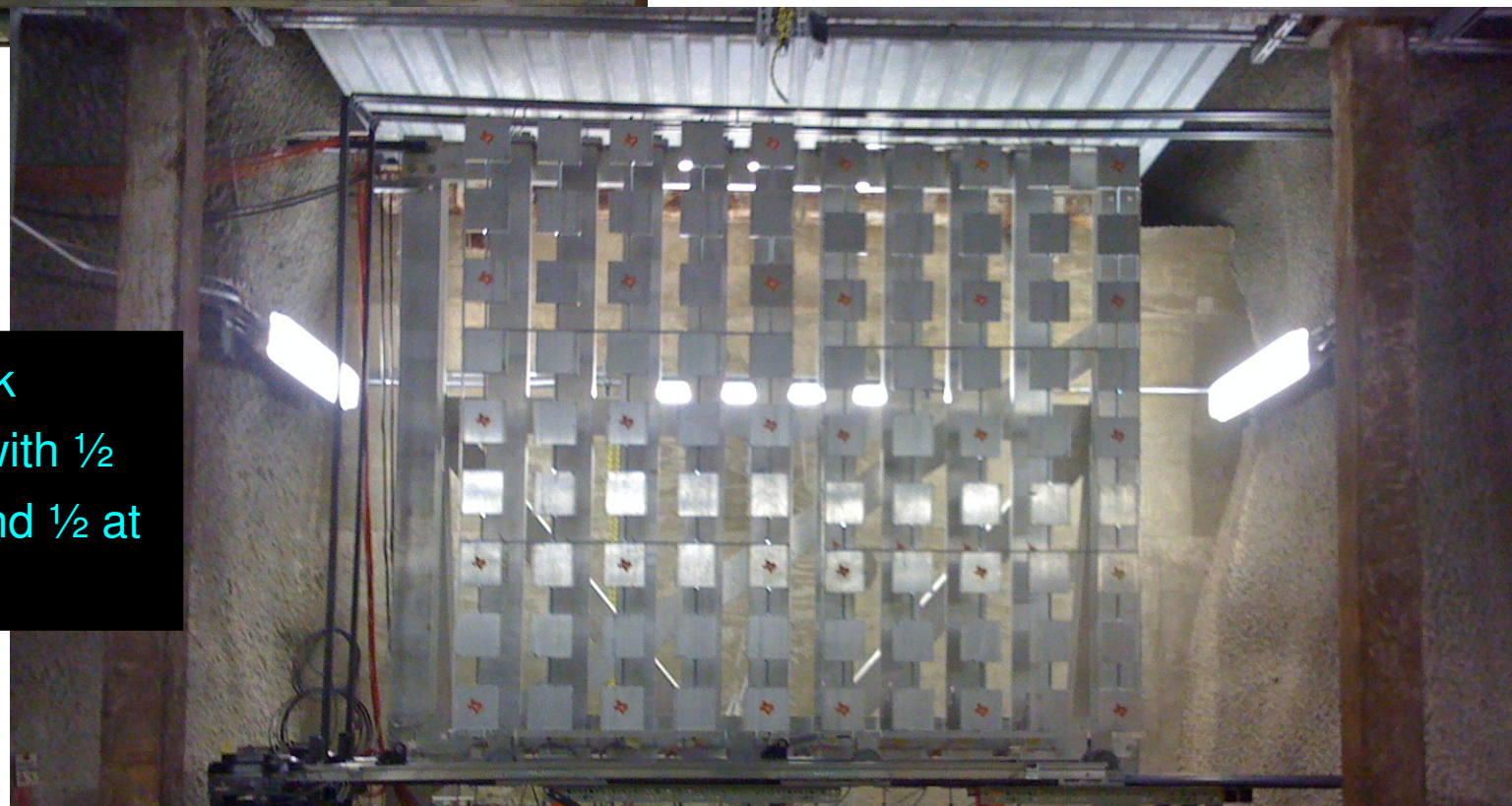


The Experiment

- Place “absorbers”, plates of aluminum, in front of the muon monitors to increase the number of delta rays intercepting the monitors.
- Measure the change in delta ray production with the muon monitors and use this in conjunction with Monte Carlo to constrain the delta ray background in the monitors during normal running.

- Aluminum blocks. 15 x 15 x 2.5 cm.
- 2 absorbers/curtains (sets of 45 blocks); located 24cm and 42cm in front of the monitor.

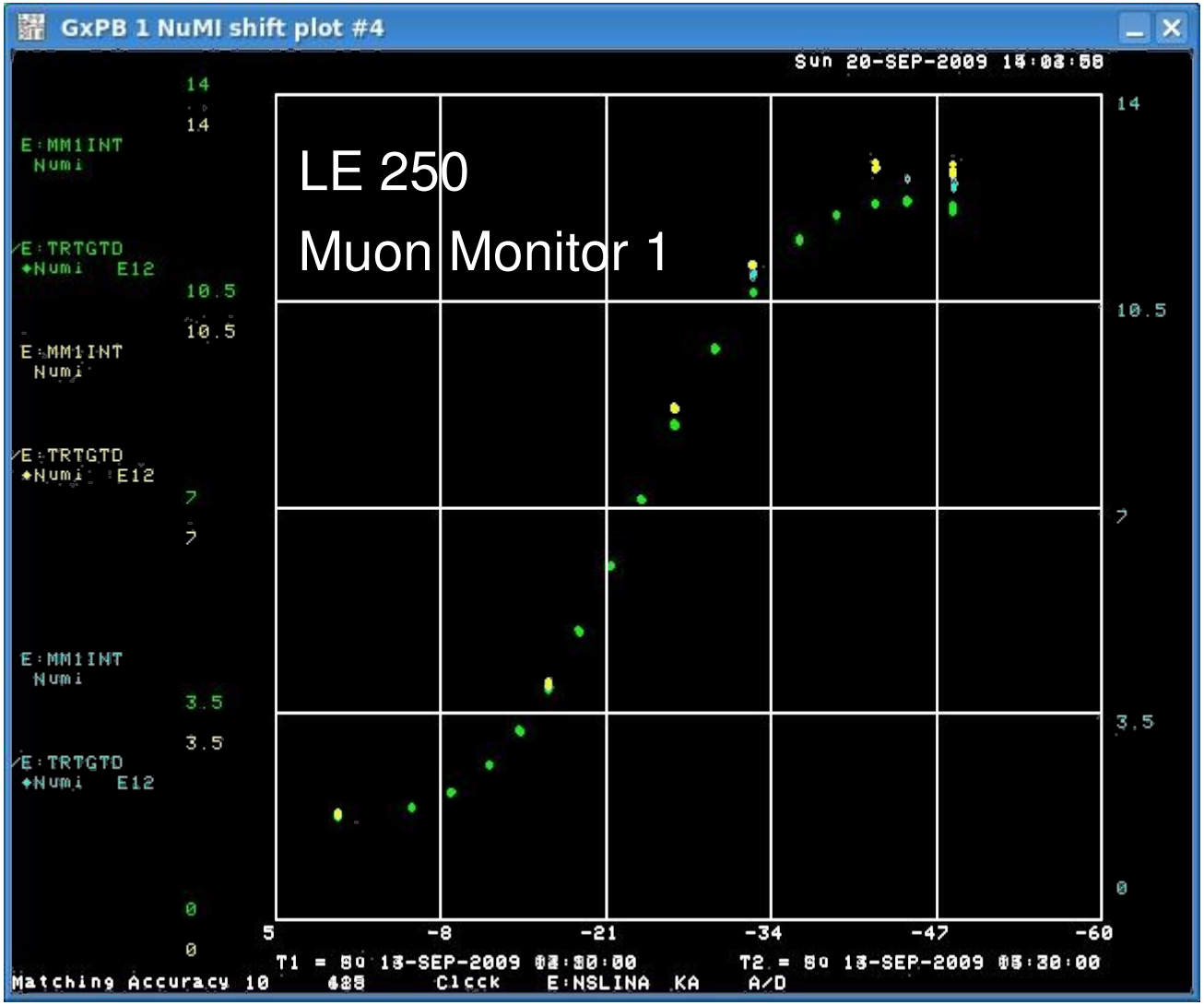
5cm thick absorber at 24cm.



2.5cm thick absorber with ½ at 24cm and ½ at 42cm.

The Data

- Data require processing and corrections.



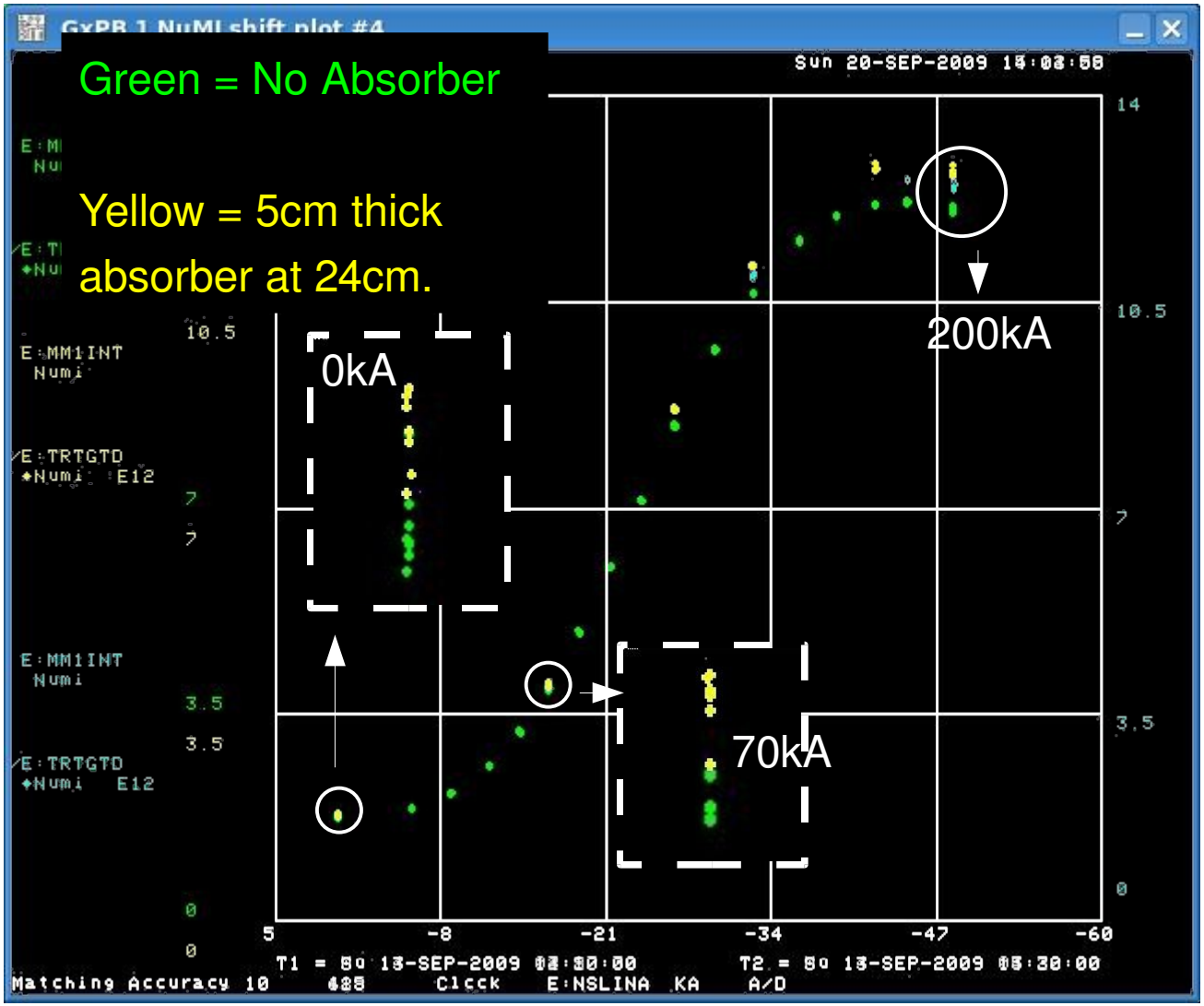
Green = No Absorber

Yellow = 5cm thick absorber at 24cm.

Blue = 2.5cm thick absorber with ½ at 24cm and ½ at 42cm.

The Data

- Data require processing and corrections.



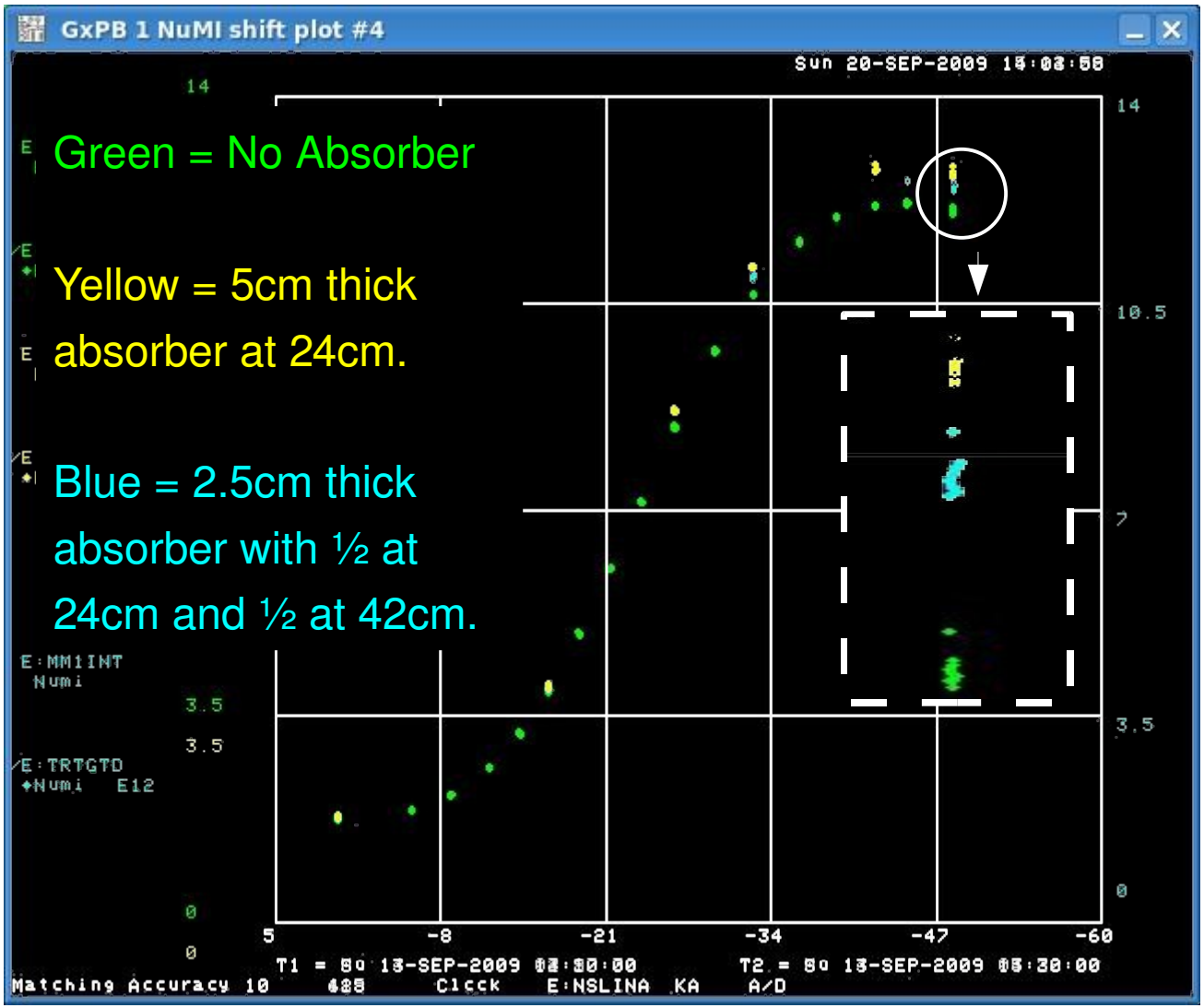
- Contribution from delta rays is larger at larger horn currents.

<u>% increase in signal due to absorber</u>

0kA	~ 2%
70kA	~ 3%
200kA	~ 5%

The Data

- Increasing the distance between the monitor and the absorber and decreasing the absorber thickness decreases δ-rays.



% increase in signal due to 5cm thick absorber at 24cm distance

200kA ~ 5%

% increase in signal due to 2.5cm thick absorber at 42cm distance

200kA ~ 3.7%

Many people were involved in making this project possible and bringing it to fruition.

Thank you for your hard work and assistance in making this project successful!