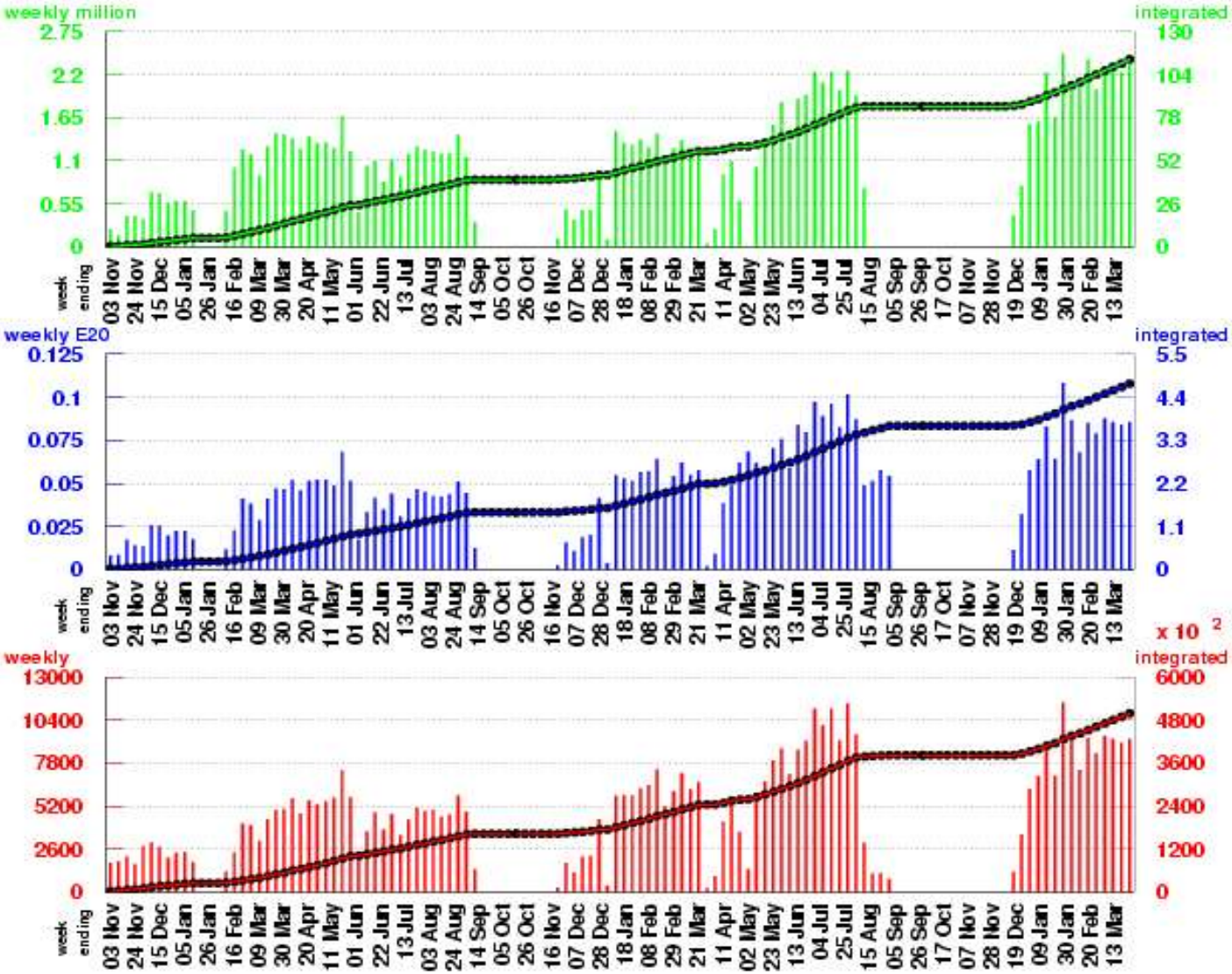
Fermilab AEM: MiniBooNE

P.Spentzouris
Fermilab

3/14/05

Progress Update



Number of Horn Pulses

To date: 113.04 million

Largest week: 2.46 million

Latest week: 2.33 million

(both horns)

Number of Protons on Target

To date: 4.7415 E20

Largest week: 0.1084 E20

Latest week: 0.0854 E20

Number of Neutrino Events

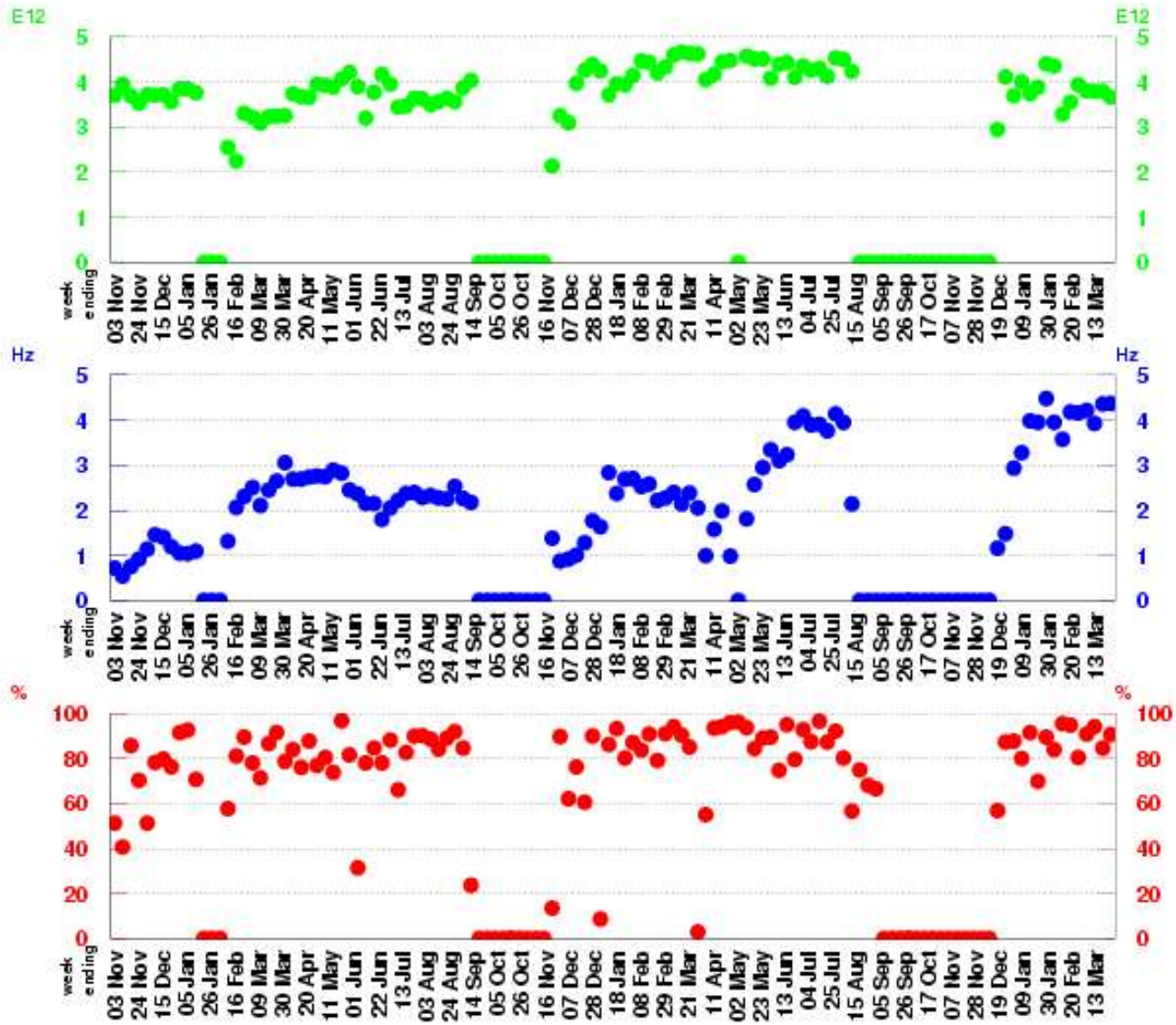
To date: 497431

Largest week: 11447

Latest week: 9235

4.742E20

Proton Delivery



POT per Horn Pulse

Largest week: 4.66 E12

Latest week: 3.66 E12

Horn Rate

(for time periods with beam)

Largest week: 4.48 Hz

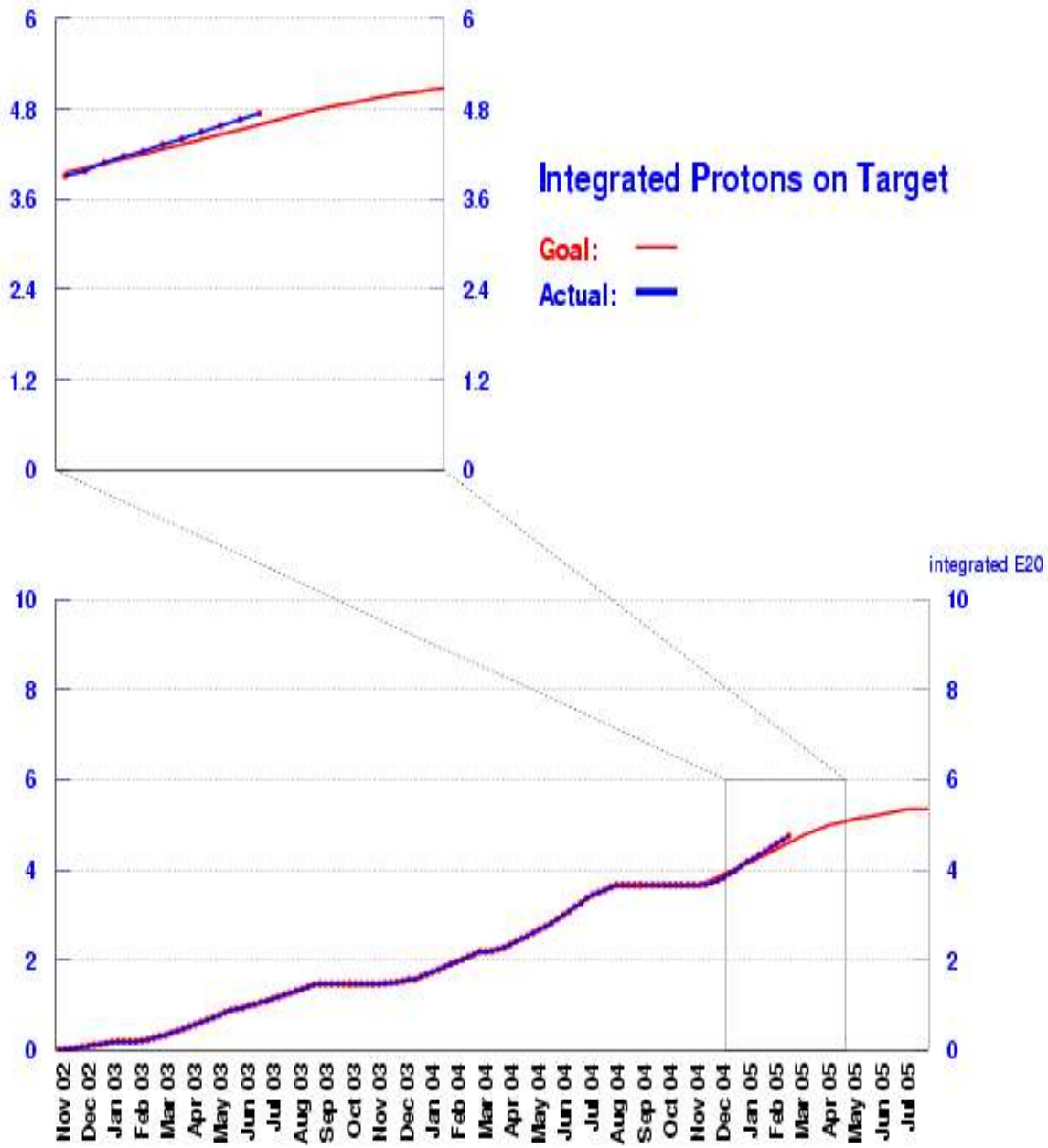
Latest week: 4.37 Hz

Beam Uptime Fraction

(fraction of time with beam)

Largest week: 96.6 %

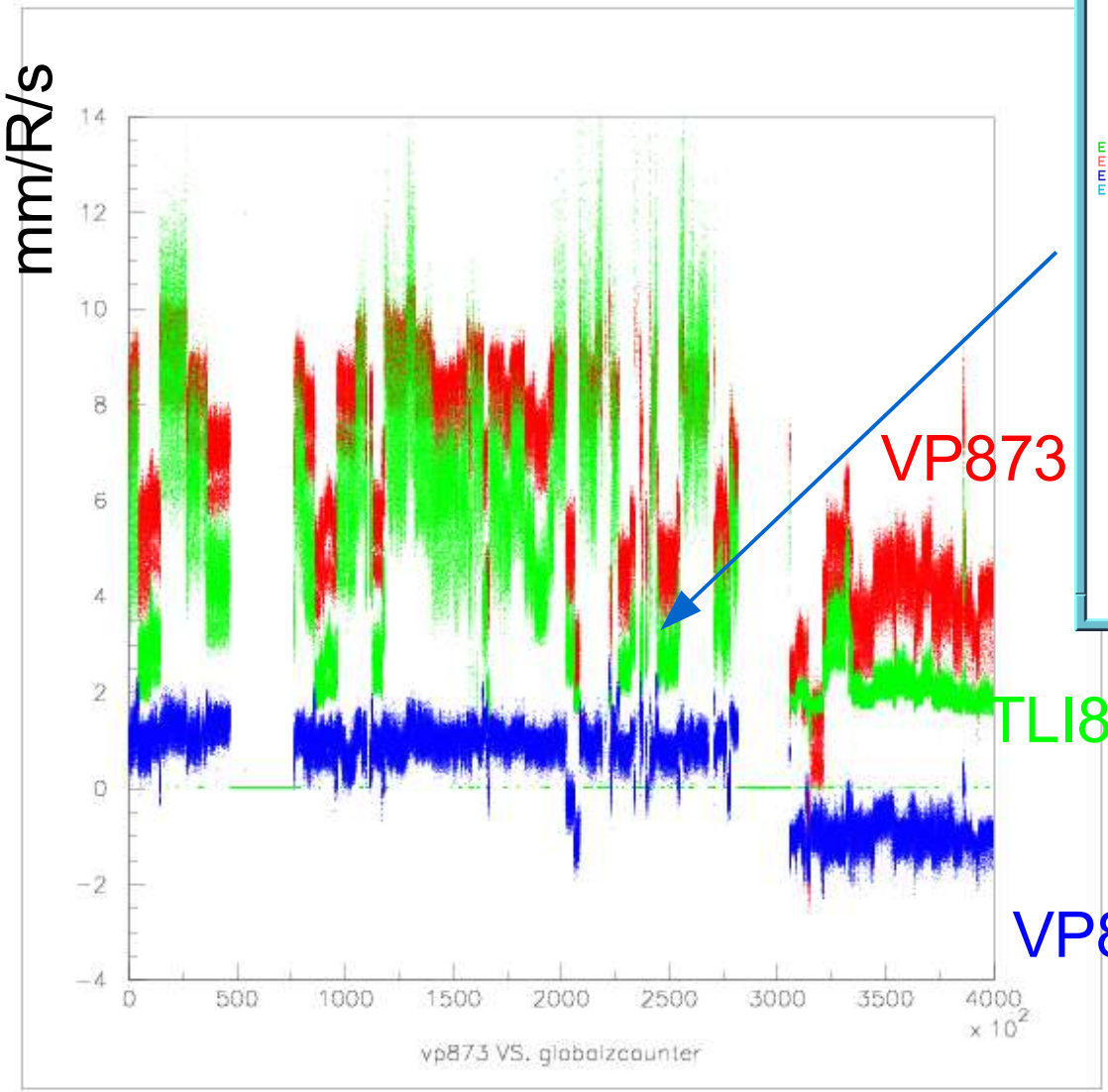
Latest week: 90.4 %

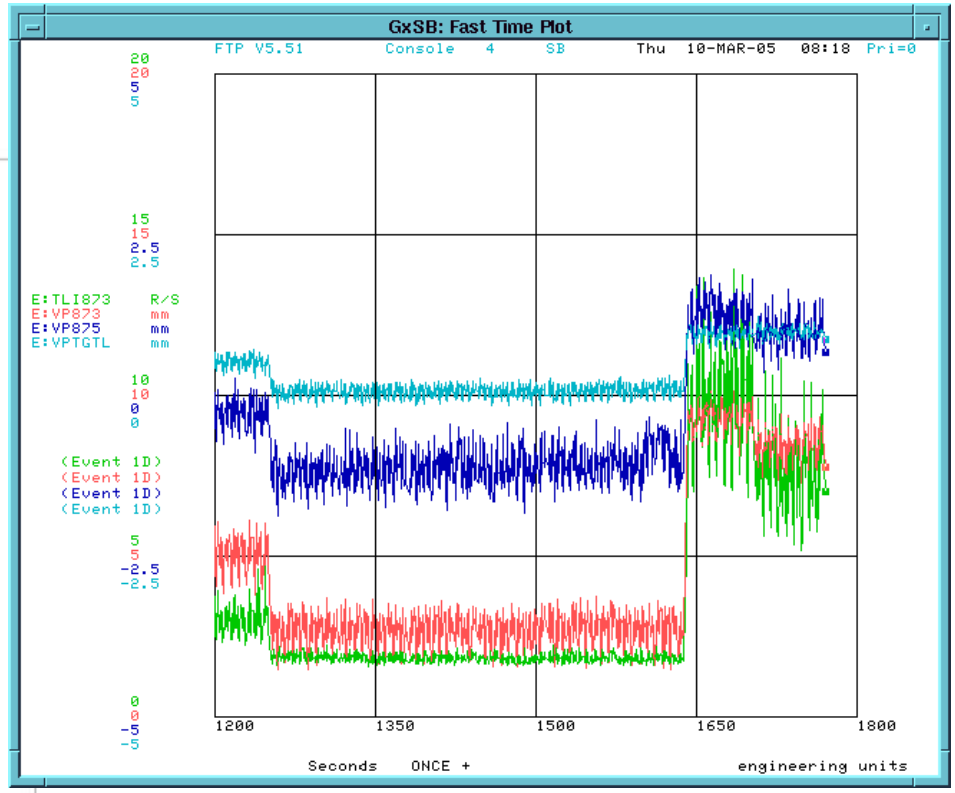

Integrated Protons on Target
Goal:
Actual:
integrated E20
0
1.2
2.4
3.6
4.8
6
0
2
4
6
8
10
Nov 02
Dec 02
Jan 03
Feb 03
Mar 03
Apr 03
May 03
Jun 03
Jul 03
Aug 03
Sep 03
Oct 03
Nov 03
Dec 03
Jan 04
Feb 04
Mar 04
Apr 04
May 04
Jun 04
Jul 04
Aug 04
Sep 04
Oct 04
Nov 04
Dec 04
Jan 05
Feb 05
Mar 05
Apr 05
May 05
Jun 05
Jul 05

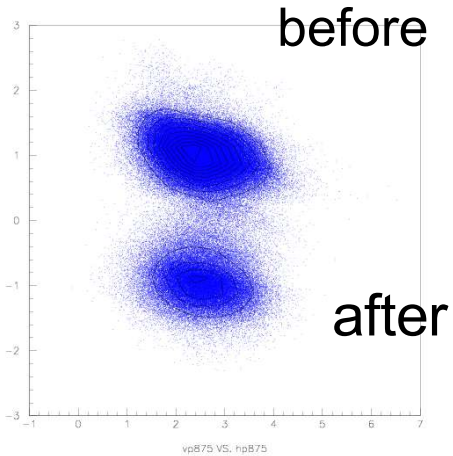
Beamline work

Losses @ 8GeV line have been a concern:

- Operational: beamline trips, sensitivity to MI closure (if not done following certain procedure)
- Could have been the limiting factor for high-intensity batch (<4.5E12) high-rep rate (~5Hz) running
- Beamline radiation
- Proposed solution to re-align triplet would cause unwanted downtime, so
  - change targeting angle to clear restricted apertures







Change: 0.4 mrad targeting angle

0.5 mm @ VPTGTL, 2 mm @ VP875

Other news

- Michel Sorel, first M'BooNE student to defend thesis (this week)
  - Sterile Neutrino search from charged-current quasi-elastic (CCQE) *possible* disappearance

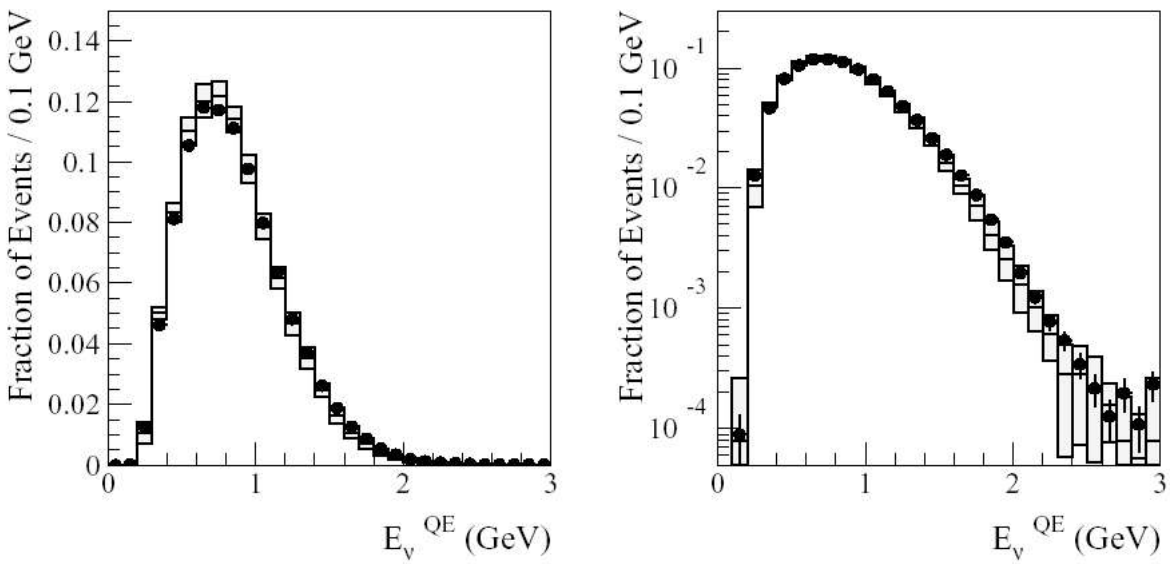
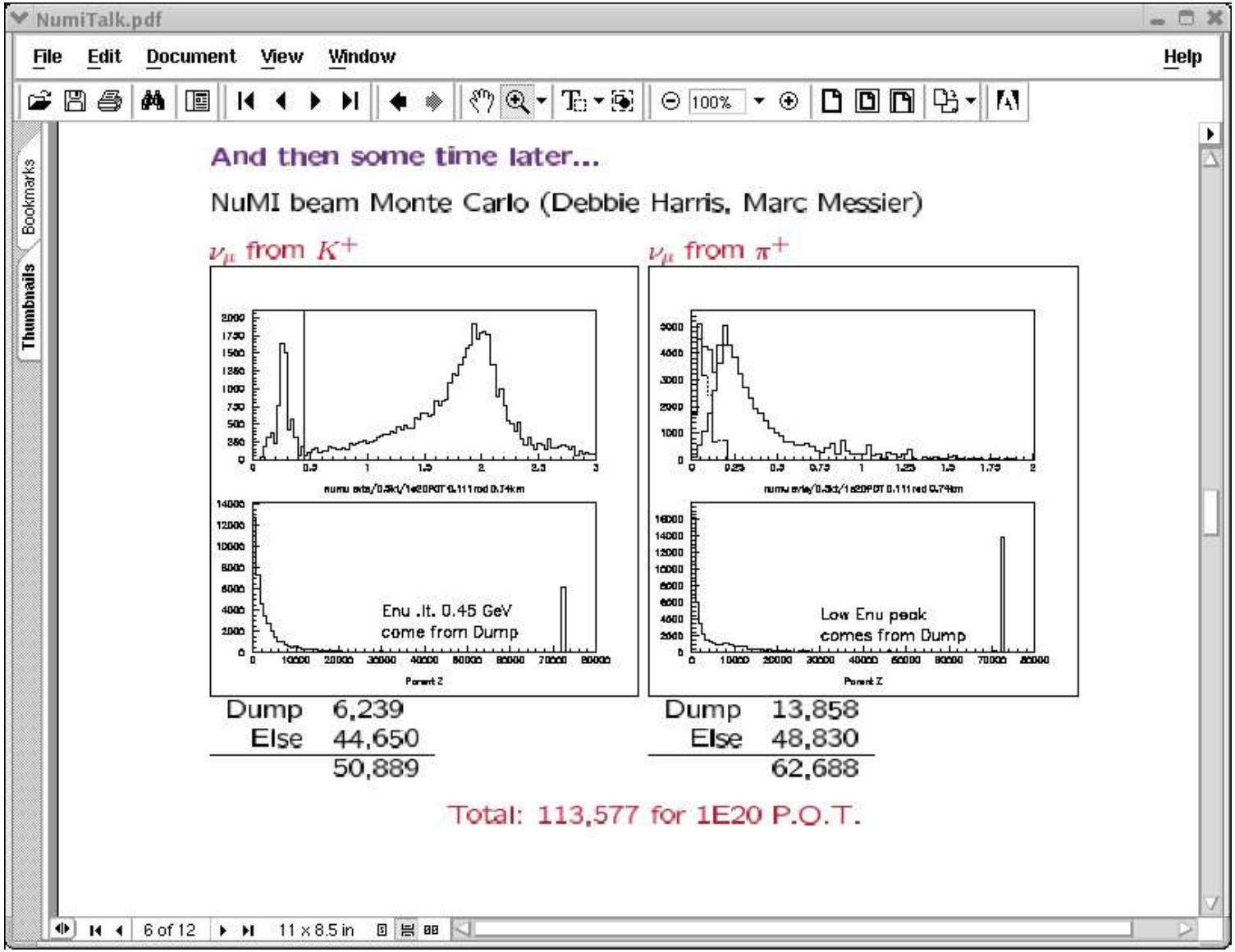


Figure 8.3: *Fraction of CCQE candidate events as a function of reconstructed neutrino energy E_ν^{QE}, shown on a linear (left panel) and logarithmic (right panel) scale. The points show the observed distribution with statistical errors only. The light gray boxes show the predicted distribution assuming no neutrino oscillations, including current estimates of flux, cross-section, and detector response systematic uncertainties.*

NuMI trigger

NuMI beam dump events a nice calibration source for studying energy resolution



Work by Alexis Aguilar Arevalo, with help from NuMI collaborators (thanks!)

NumiTalk.pdf
File Edit Document View Window Help
94%
Bookmarks
Thumbnails

NuMi Beam test and NuMi trigger in past weeks (approximate)

Date	Run Interval	Trigger Condition	NuMI ON/OFF
Feb 19-20	10796-10775	$74 error	ON$^{\times}$
Feb 20	10775-10792	Dealy 23 μs off	ON$^{\times}$
Feb 20	10792-10806	Delay close to OK	ON
Feb 21	10807-10812	Delay off 23 μs	ON$^{\times}$
Feb 21	10814-10818	"	ON$^{\times}$
Feb 22-25	10818-10840	Delay close to OK	OFF
Feb 25-28	10841-10872	Delay OK	ON (3.88 POT)
Feb 28-Mar 3	10872-10910	"	OFF
Mar 3-7	10911-10945	"	ON (5.8E15 POT)
Mar 7	10945-10948	"	OFF
Mar 7	10949-10951	"	ON (2,2E 5 POT)
Mar 7-8	10952-10960	"	OFF
Mar 8	10961-10963	Delay advanced 5 μs	ON (3.6E 5 POT)
Mar8-9	10964-10969	"	OFF
Mar 9	10970-10980	"	ON (2.7E 5 POT)
Mar 10	10982-10988	"	ON (3.4E 5 POT)

Latest runs with higher intensity.

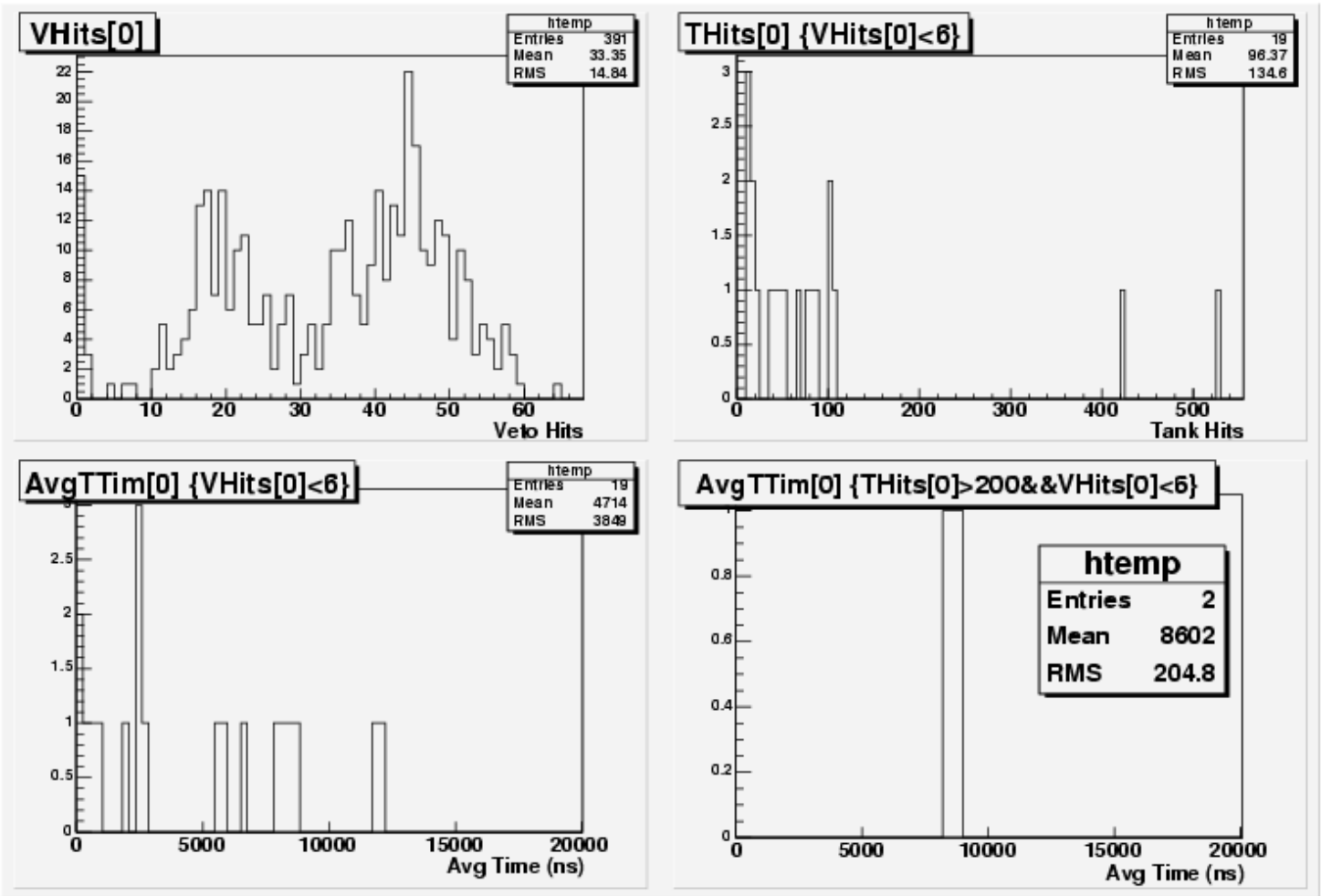
ON$^{\times}$=Not expected to have ν's.

7 of 12 11 x 8.5 in

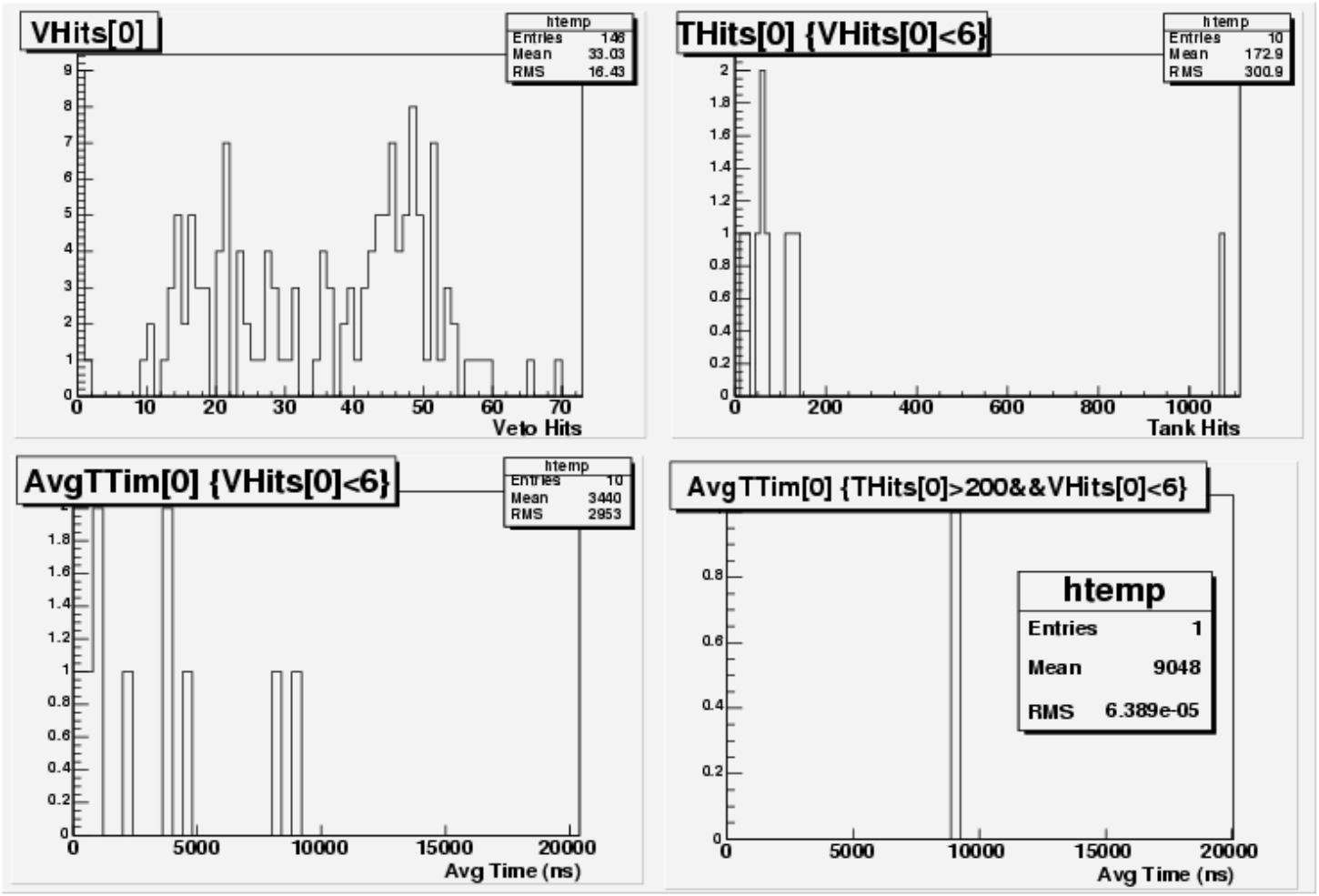
Candidate events *(very, very preliminary)*

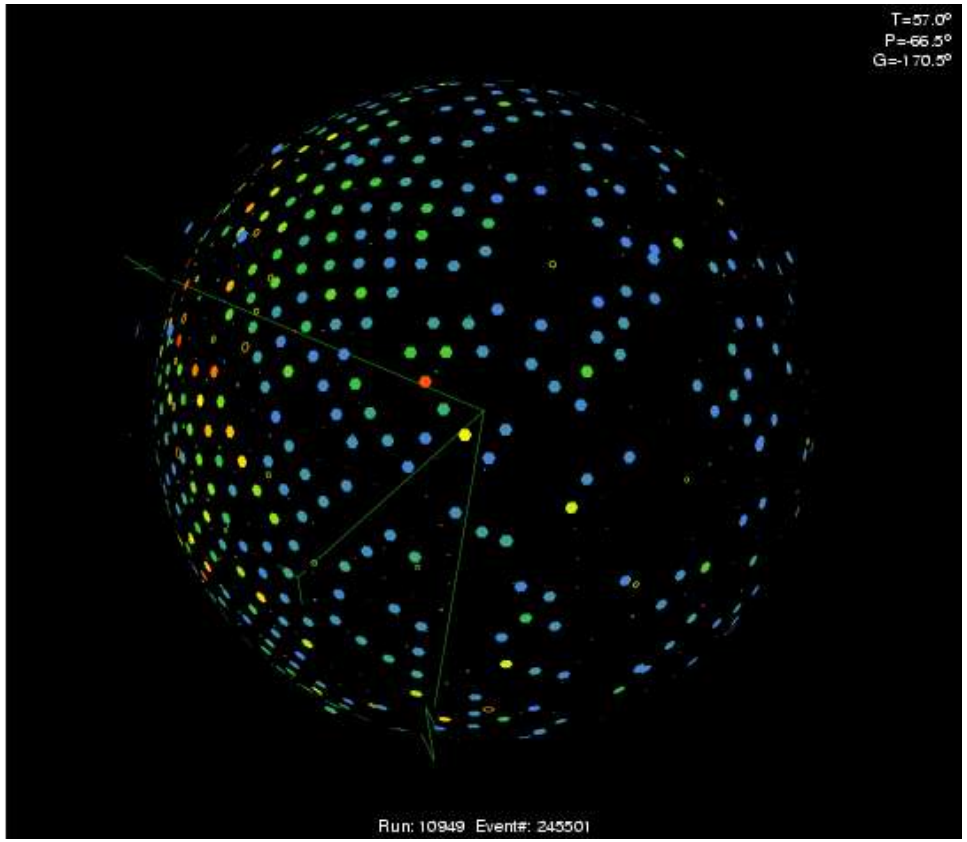
Selection: veto, tank hit, in beam window.

This is a M'BooNE “neutrino” selection. High energy NuMI muons will go through the detector (failing veto cut)

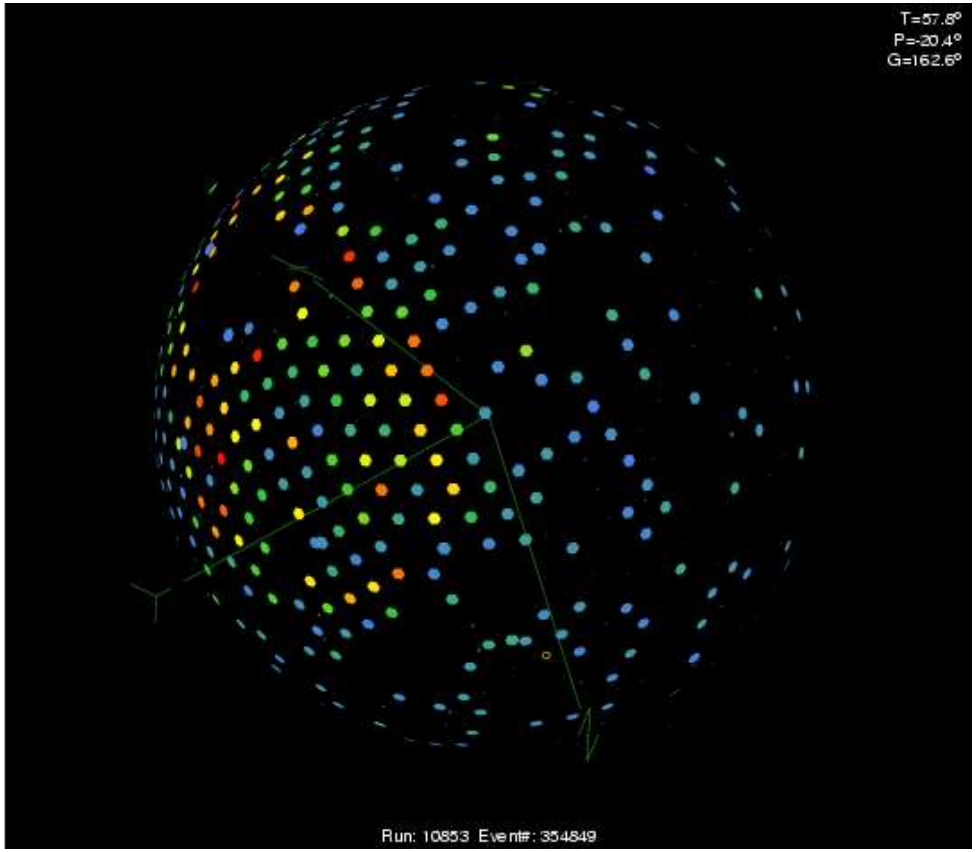


Candidate set II



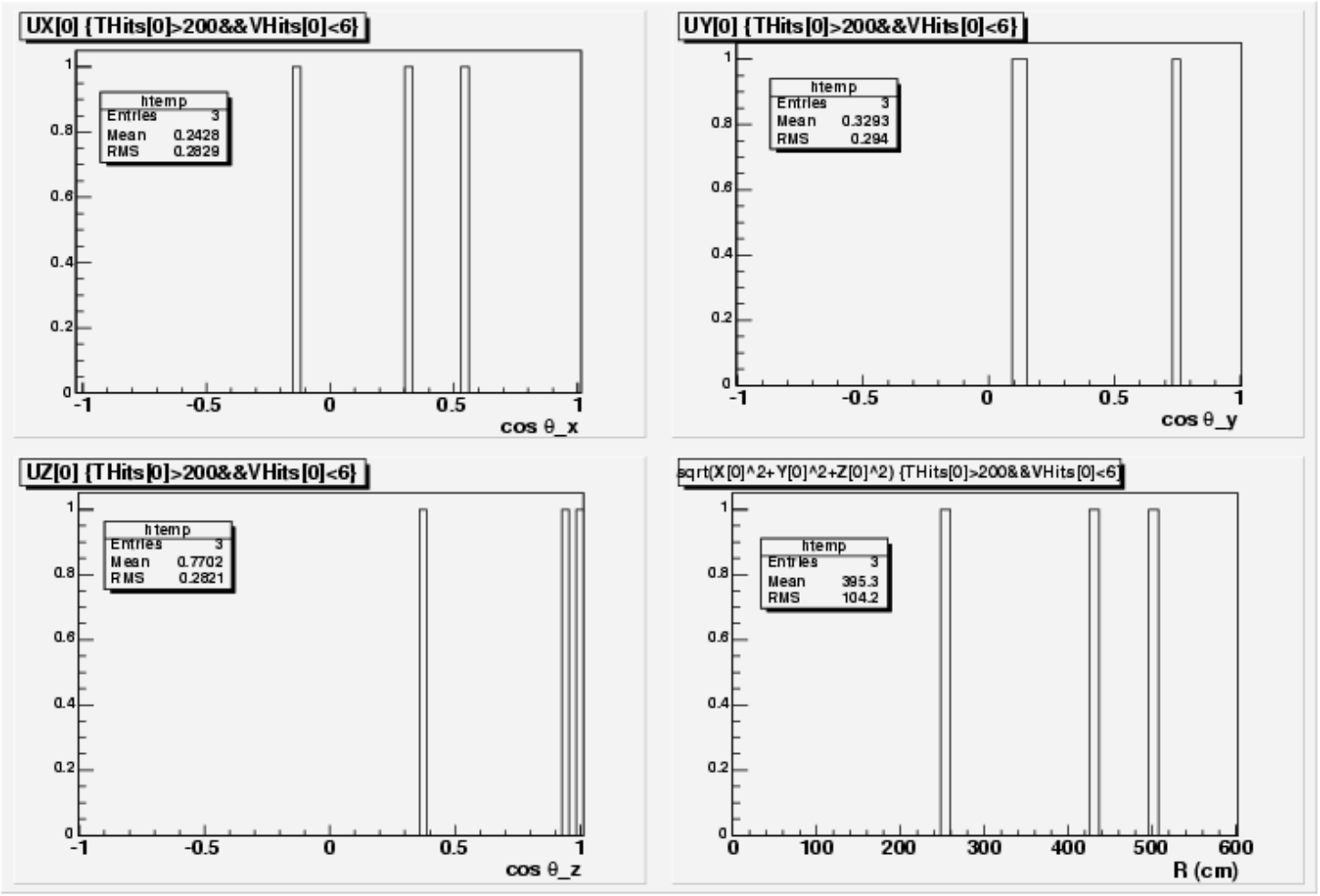


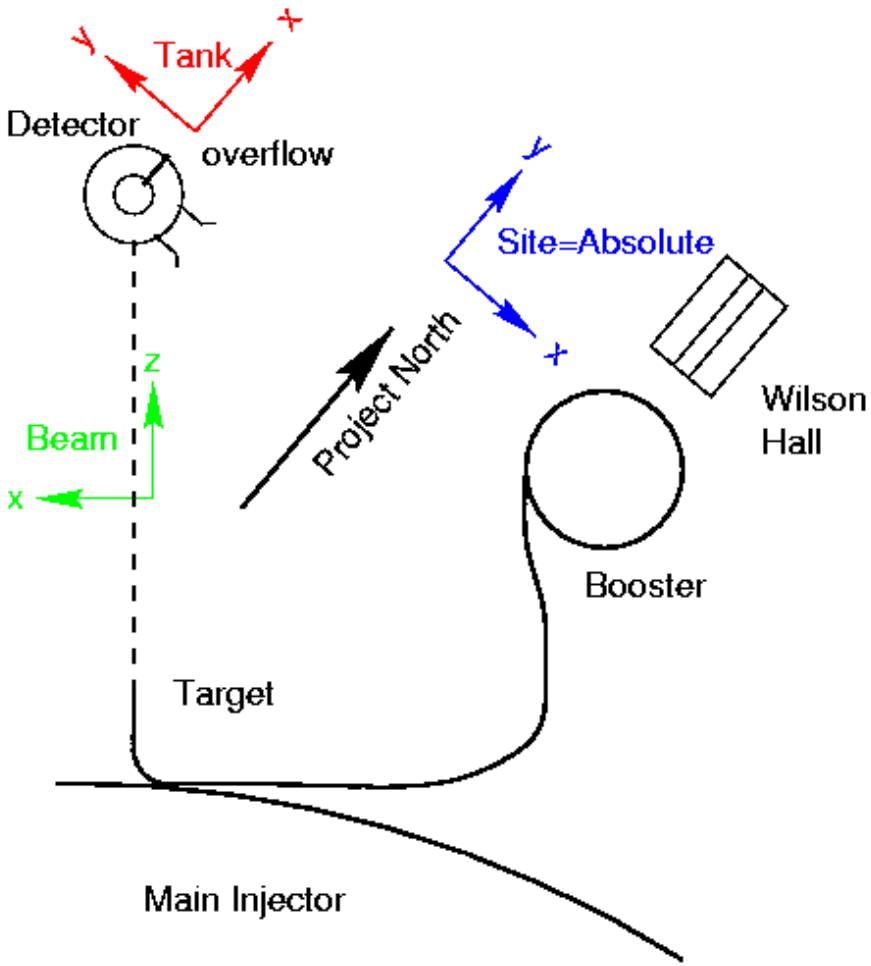
And some pictures...



Reconstruction

Directional cosines: x, y, z (going up, that's good), and radious



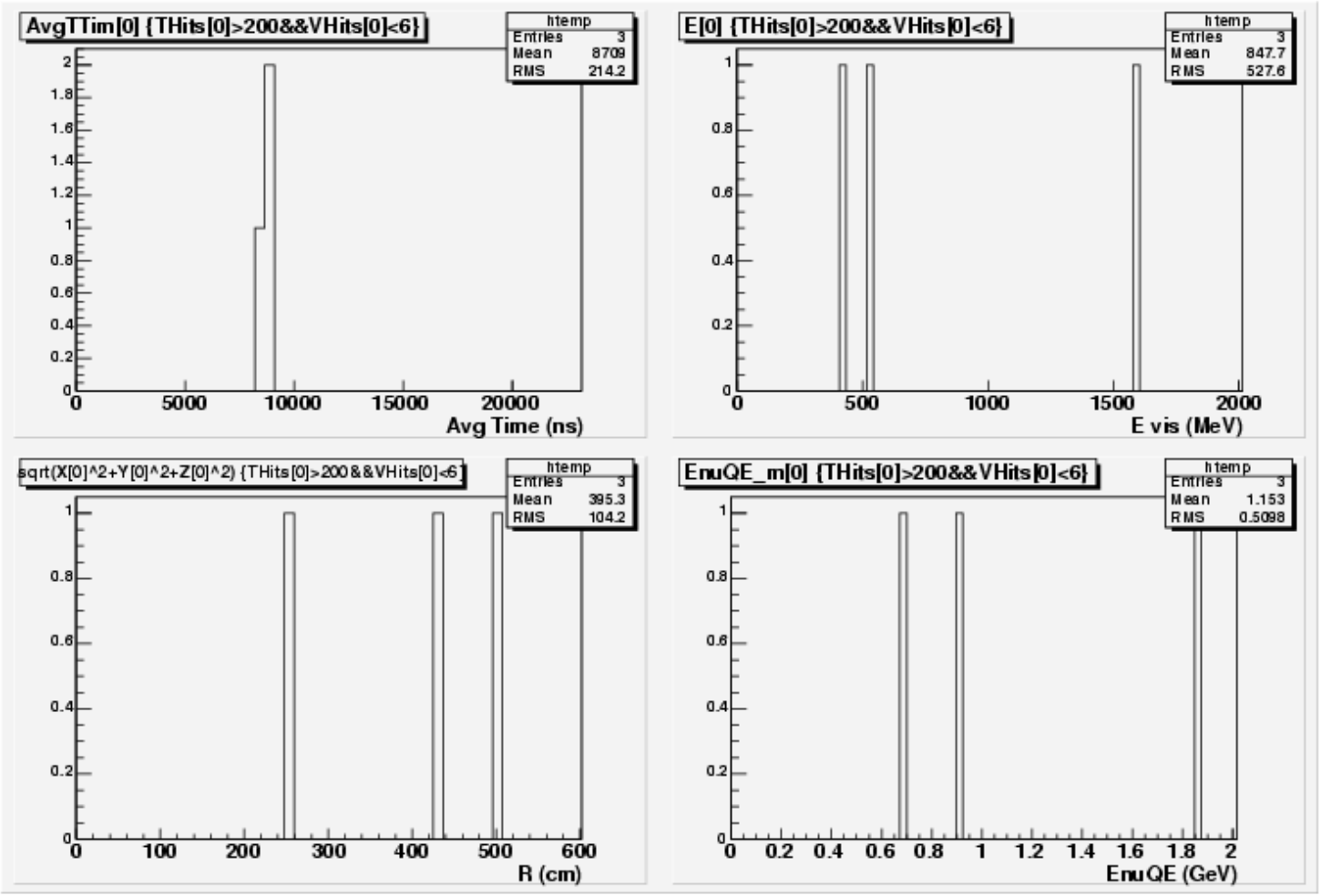


(Not-to-scale version of Beam TDR Fig. 1.2)

In case you were wondering (that will teach you...). In the previous plot we are using

tank coordinates (z down->up)

More reconstructed quantities



Summary

- We have ~4.75E20 pot & we are using them
  - First thesis defense this week
- We are getting ready to use more
  - Beamline work (for high intensity, high rep-rate, trip-free running)
- First steps in utilizing NuMI beam trigger
  - First off-axis!
  - Nice study sample (resolution, etc)