MiniBooNE Update

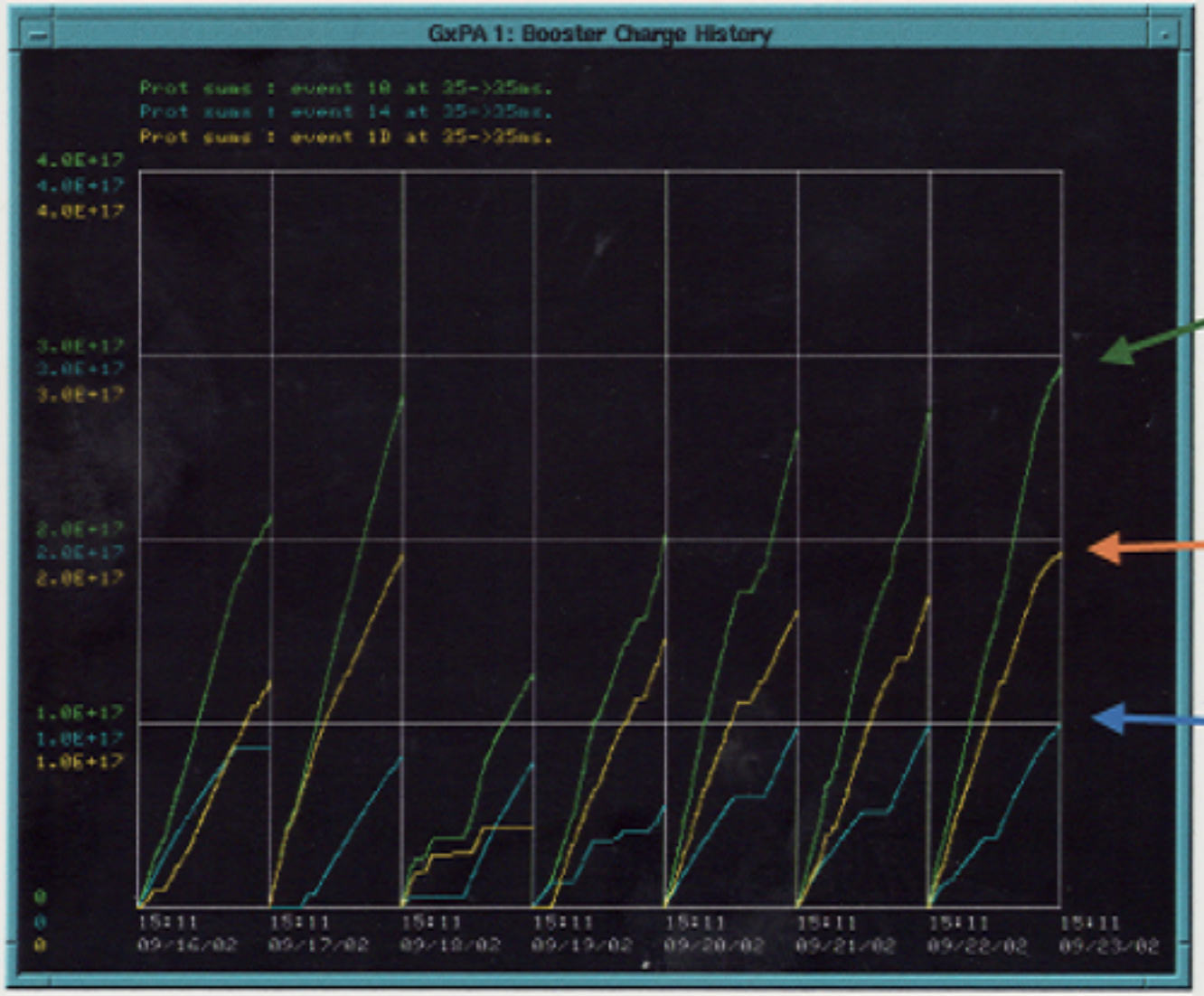
Andrew Green
Indiana University

All Experimenters Meeting
9/23/02

Highlights

- Consistently take about 1.5-2.0 times as many protons as stacking.
- Lowered trip limits in our beam line for long term operation.
- Frequent Trips at 10 Booster turns (4E12 ppp). Attributed to Booster (longitudinal?) instabilities. Reduced to 9 turns (3.7E12 ppp) and investigating.
- Miscellaneous beamline problems found
  - Bad power supply readbacks causing trips (being investigated).
  - Bad airflow monitor for horn stripline (fixed).

The Last Week



Total

MiniBooNE

Stacking

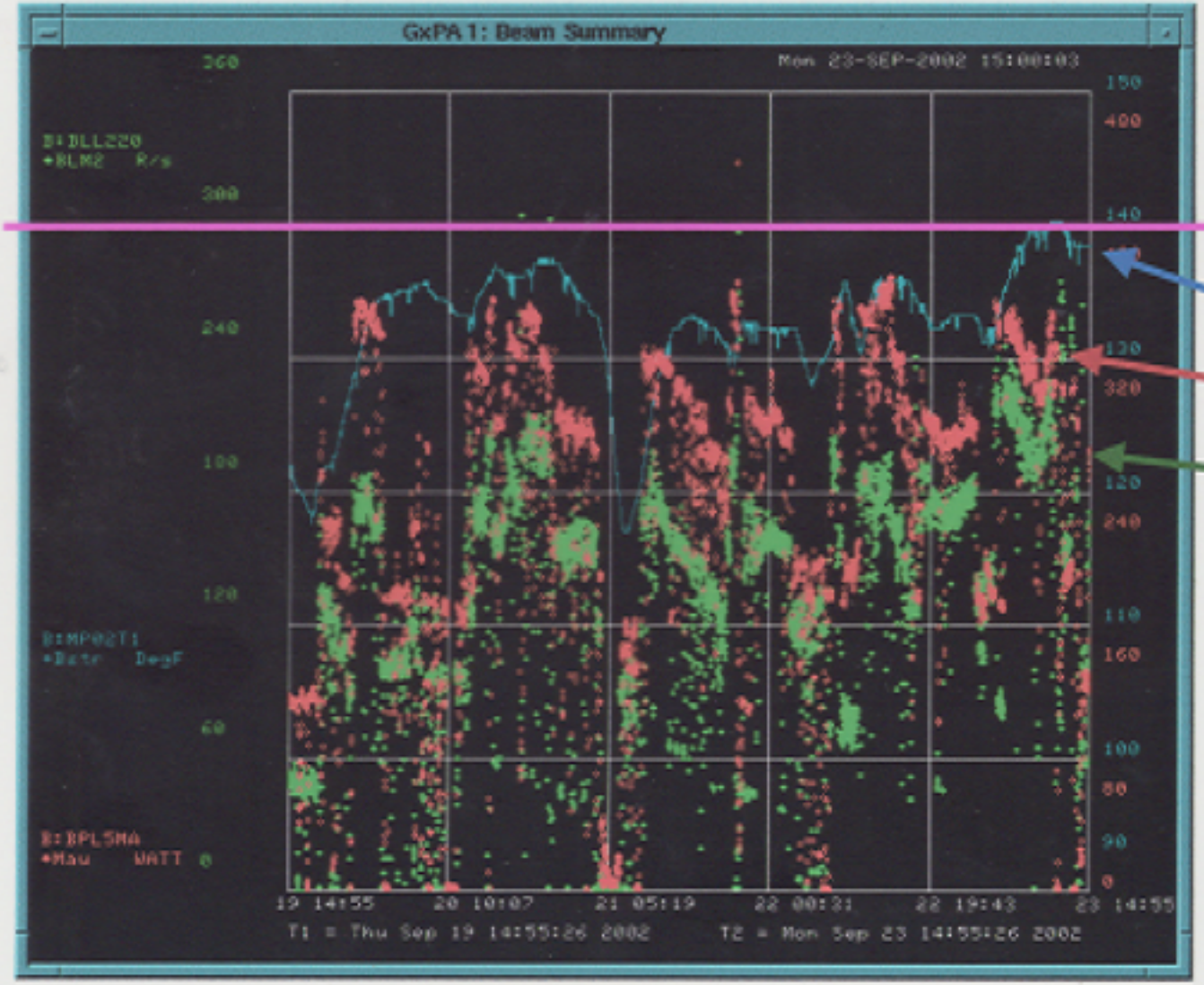
Timeline Problems

- Putting a certain number of MiniBooNE events (~1Hz + stacking) into long (220 second) accelerator timelines causes bizarre behavior in the Time Line Generator.
- Symptom is that the Main Injector Ramp comes too early on stacking cycles, which causes Booster to loose beam at phase-locking time and trip.
- Being investigated.

What Limits MiniBooNE Rate?

- Beam line budget extremely high. Not a practical limit in the foreseeable future.
- Booster output limited by:
  - Total beam power loss in Booster.
  - Running average of individual loss monitors in Booster tunnel.
  - Temperature of pulsed extraction septum (MP02).

Riding the Limits

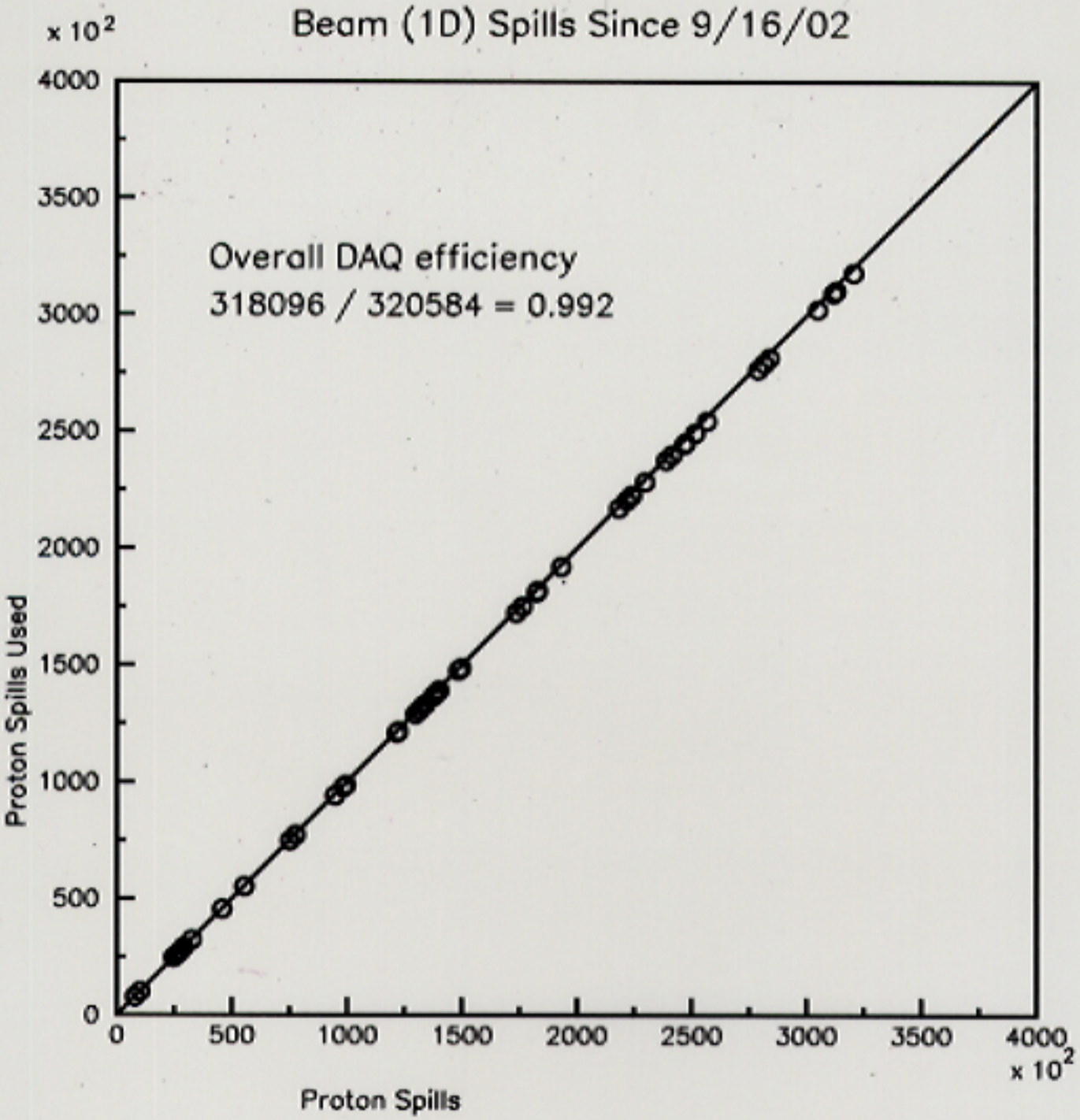


Increasing the Limits

- Extraction septum heating limits us to < 1Hz during stacking. Will be improved by new power supply (ready end of week), and ultimately new septum (Jan. shutdown).
- Booster losses will be improved by
  - Collimation system (needs shielding installed over next few months).
  - Ramped beam control system (being commissioned).

Fact Sheet

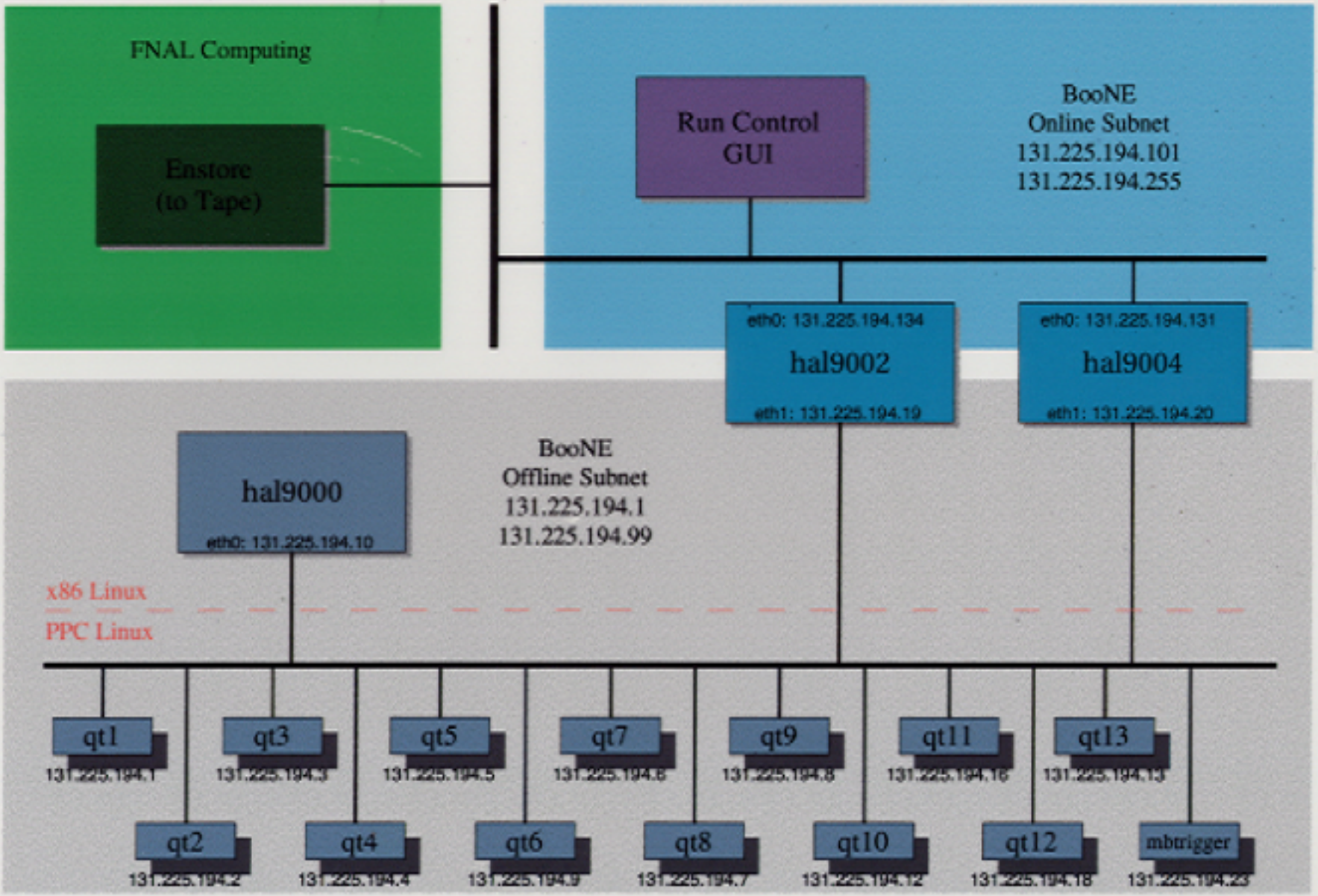
- Intensity at 3.5–4.2E12 protons/pulse.
- Rep rate at about 0.75 Hz, need 5 Hz.
- Currently at ~100 estimated ν_μ events/day (need ~1000).
- Trigger package: beam, supernova, michel, strobe, N–hit, Veto hits.
- Currently 10 Meg/minute data rate.
- DAQ can handle higher data and rep–rates than we are currently seeing.


Beam (1D) Spills Since 9/16/02
x 10²
4000
3500
3000
2500
2000
1500
1000
500
0
Overall DAQ efficiency
318096 / 320584 = 0.992
Proton Spills Used
0
500
1000
1500
2000
2500
3000
3500
4000
x 10²
Proton Spills

Data Acquisition System

- Charge (Q) and time (T) are digitized every 100ns for every phototube channel...info only kept for 205μs
- The trigger decides to take a certain *time window* based on a few inputs, e.g. Beam spill (unbiased), calibration laser, tank activity.
- Q&T info for a given time window is read out on a central system which "assembles" the event.
- Data shipped to a nearline process and to tape (enstore).

DAQ


FNAL Computing
Enstore
(to Tape)
Run Control
GUI
BooNE
Online Subnet
131.225.194.101
131.225.194.255
eth0: 131.225.194.134
hal9002
eth1: 131.225.194.19
eth0: 131.225.194.131
hal9004
eth1: 131.225.194.20
hal9000
eth0: 131.225.194.10
BooNE
Offline Subnet
131.225.194.1
131.225.194.99
x86 Linux
PPC Linux
qt1
131.225.194.1
qt3
131.225.194.3
qt5
131.225.194.5
qt7
131.225.194.6
qt9
131.225.194.8
qt11
131.225.194.16
qt13
131.225.194.13
qt2
131.225.194.2
qt4
131.225.194.4
qt6
131.225.194.9
qt8
131.225.194.7
qt10
131.225.194.12
qt12
131.225.194.18
mbtrigger
131.225.194.23

Summary

- We are currently taking physics data with high efficiency (>99%).
- Look forward to more protons/hour.