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FY15 Scientific Summary

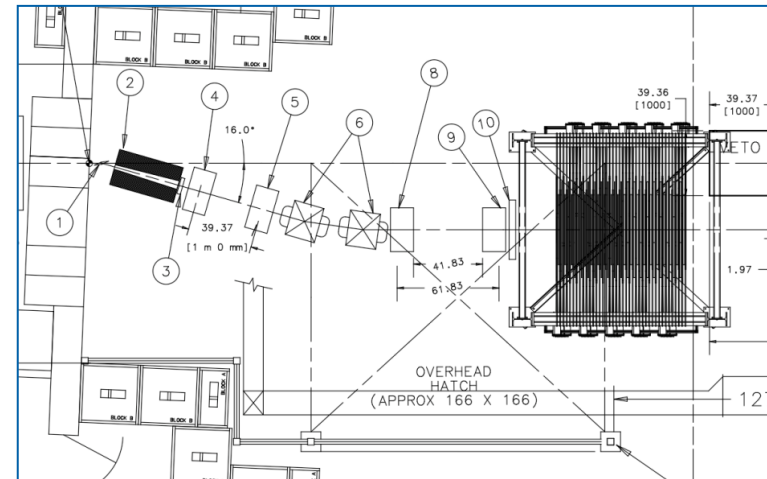
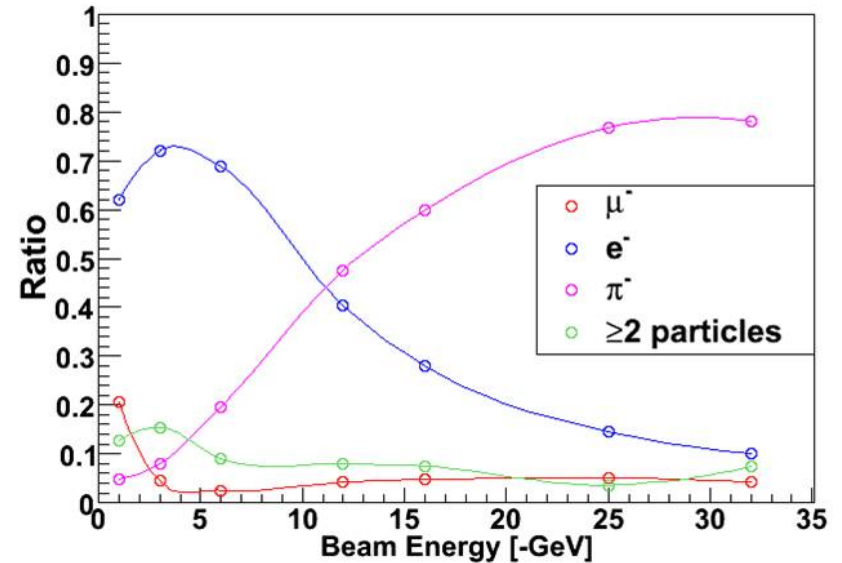
Mandy Rominsky
FTBF Annual Review
09 November 2015

Test Beam Facility – From Erik Ramberg’s FY14 talk

- A critical resource for Detector R&D efforts taking place across the entire HEP community (both in US and beyond)
- Allows researchers access to unique particle beams for testing their prototype detectors. (The most versatile test beam in the world?)
- Facility infrastructure (e.g. beam instrumentation, gas and high-voltage delivery systems, and an adaptable data acquisition system) allows researchers to conduct their required detector testing in an efficient and straight-forward manner
- Facility experts provide guidance to users on configuring particle beams, interfacing to infrastructure systems, and navigating lab safety requirements

Beams

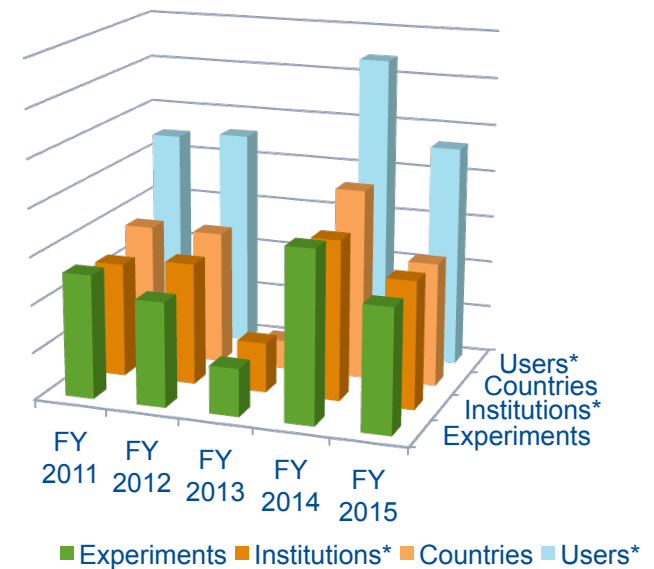
- 120 GeV proton beam with 7mm spatial spread, 100 μ rad divergence, and tunable rate (100 Hz to 100,000 Hz).
- Tunable secondary beams (1-66 GeV). Beam composition and spread are a function of beam energy
- Secondary target and tertiary beam spectrometer for low energy (below 1 GeV) particle beams (MINERVA in MTest shown)



Users in FY15

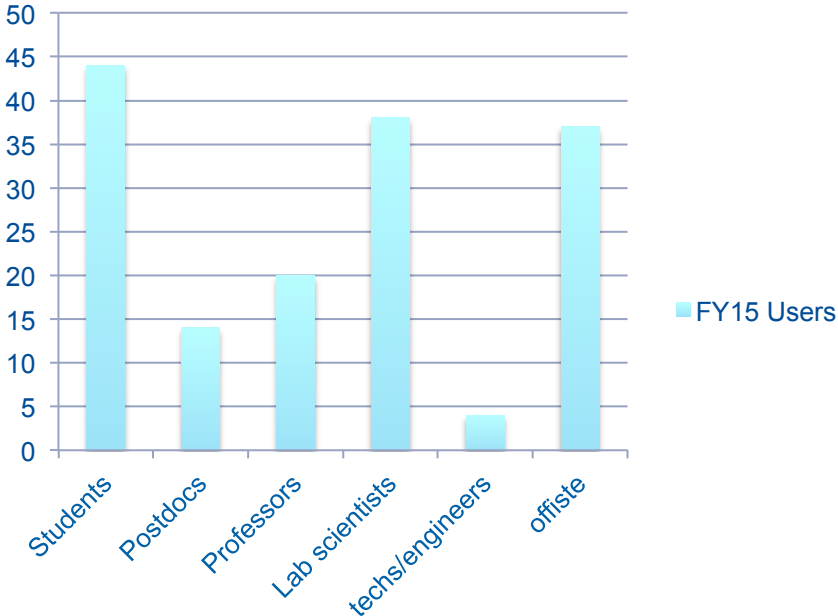
- T1064 STAR Forward Calorimeter System
- T1065 Secondary Emitters Study for Shower Maximum
- T992 Radiation-hard Sensors for the SLHC
- T979 Fast Timing Counters for PSEC
- T977 MINERvA (A1)
- **T1059 Optical Time-Projection Chamber**
- T1058 Secondary Emission Calorimeter
- T1043 Mu2e CRV Scintillation Counters
- T1042 Muon g-2 straw tracker
- T1041 CMS Forward Calorimetry
- **T1034 LArIAT: Liquid Argon TPC In A Test beam**
- T1018 Spacordion Tungsten Fiber Calorimeter
- T1015 DRO Calorimetry ently for FY15
- T994 JASMIN

Most Recent 5 Years

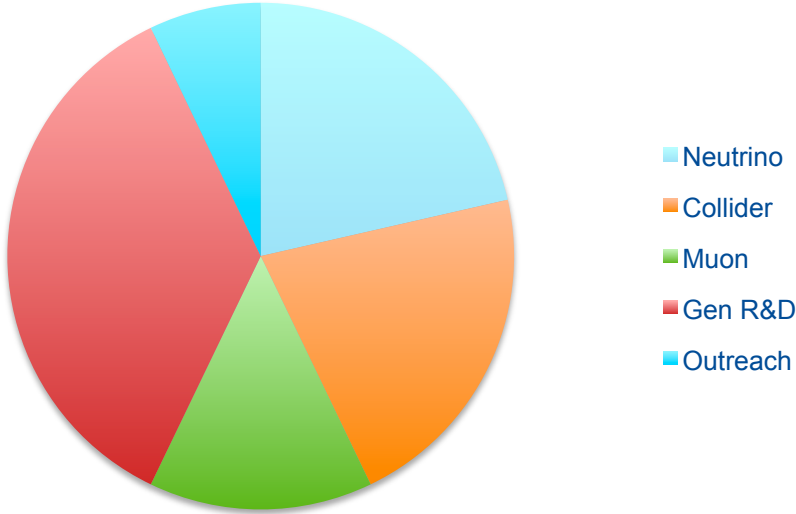


Breakdown of User statistics

FY15 Users



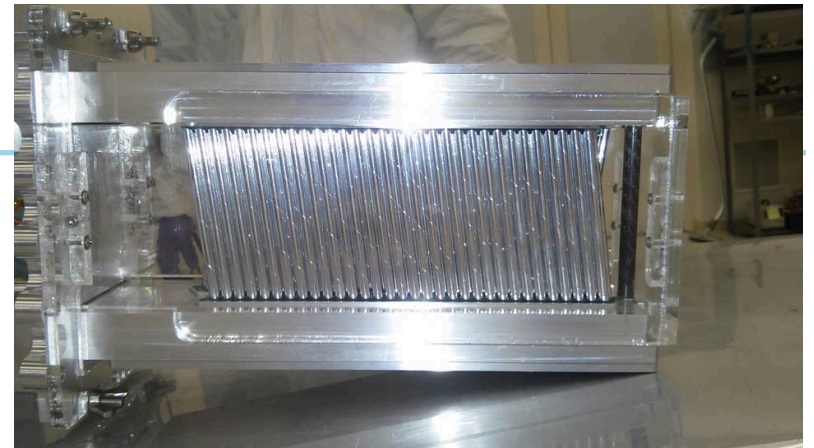
Breakdown by professional class.



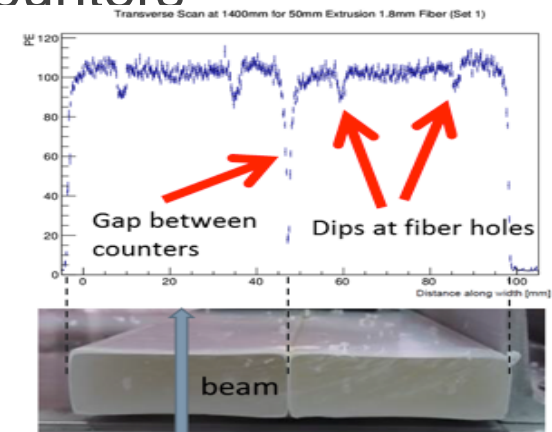
Breakdown by experimental area

Muon Physics

- Hosted 2 groups (g-2, Mu2E)
- g-2 tested their straw tracker
 - Tested the straws in vacuum
 - Tested the full chain of readout electronics
 - Tested different gas mixtures
- Mu2e tested their cosmic ray veto
 - Measured PE yields in their scintillation counters
 - Will return to continue these studies
 - Publishing in NIM when analysis is done
 - Took results to DPF



g-2 Straw Tracker



Mu2e detector and results

Neutrino Physics – MTest

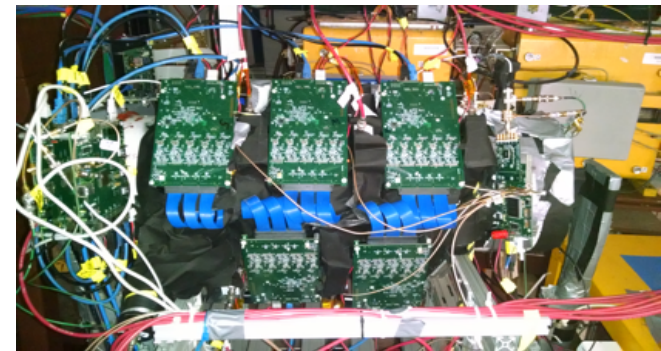
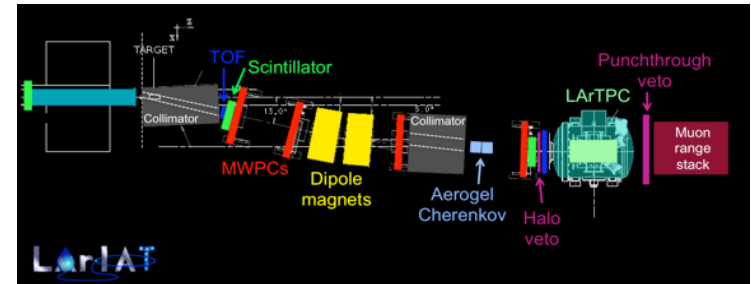
- MINERvA, LArIAT, T1059 all had runs in FY15
- MINERvA
 - Measured the energy response to pions in different parts of the detector (and provided feedback to the facility about beam energy spread).
 - Tested many versions of firmware
 - Test beam program very important to scientific goals of the full experiment



The MINERvA Detector

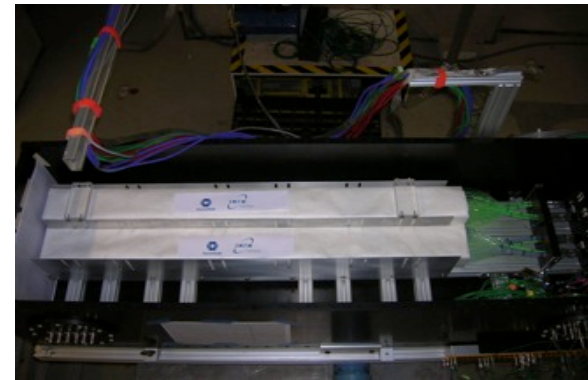
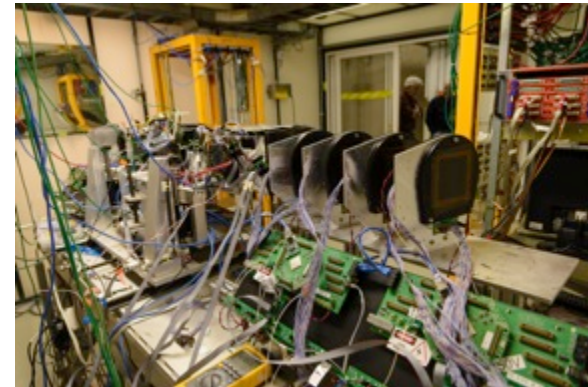
Neutrino Physics - MCenter

- First physics taken with MCenter beam line
- LArIAT
 - Liquid argon detector, installed cryogenics
 - Characterize performance of liquid argon
 - Took physics data this run
- T1059
 - Student built, tested and analyzed data for an optical TPC.
 - Ph.D. awarded based on this work



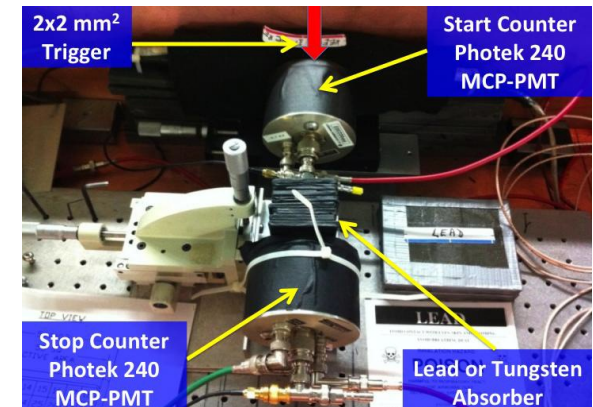
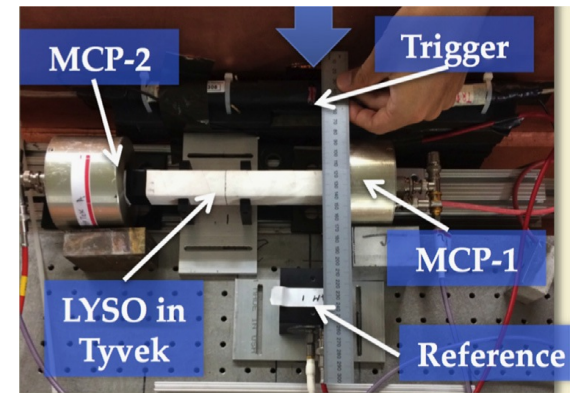
Collider Physics – A sampling

- Groups came in for LHC, ILC, RHIC
- T992
 - Testing radiation hard sensors for SLHC
 - Developed a silicon strip/pixel telescope that will stay at test beam once they are done
- T1015
 - Testing dual readout calorimetry with heavy glasses.
 - First studied hadronic calorimeters, but extending to em calorimeters
- T1018
 - Developing W powder SciFi technology for use in RHIC and EIC
 - Ongoing program continues to test different options



General R&D – A sampling

- Many groups came to test general R&D concepts
- T1058
 - Testing time properties for LYSO calorimeters
 - Full module gives 30 picosecond timing
- T1065
 - Testing time and position resolution of fast, radiation hard, low cost calorimeters
 - 13 ps timing resolution demonstrated
 - Coming back for continued studies.



Conclusions

- Very broad and exciting program in FY15
- Touched on a variety of physics topics – collider, neutrino, general R&D
 - Demonstrates the capability of the test beam to serve a broad range of users
- Only covered a few of the collider and general groups – see report for a full accounting of the different experiments.