

An aerial satellite view of the Fermilab Testbeam Facility. The image shows a large industrial complex with several large buildings, including a prominent red-roofed structure. The facility is surrounded by roads and parking lots. Labels for roads like 'Rd A', 'Rd B', and 'Rd C' are visible. The text 'Report of the Fermilab Testbeam Facility Committee' is overlaid in large white font. Below it, 'FNAL PAC Meeting June 24, 2015' is written in a smaller white font. At the bottom, 'Mayly Sanchez (Iowa State), for the FTBF Committee' is written in white. In the bottom right corner, there are navigation icons for a map application, including a compass, a grid, a location pin, and a zoom-in button.

# Report of the Fermilab Testbeam Facility Committee

FNAL PAC Meeting  
June 24, 2015

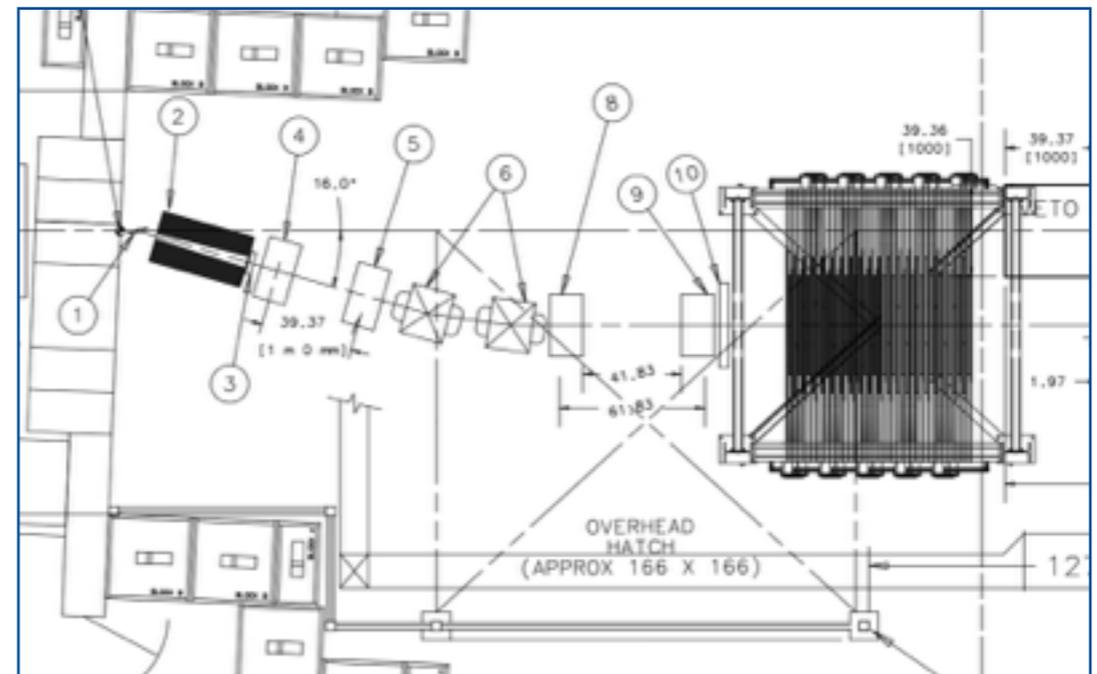
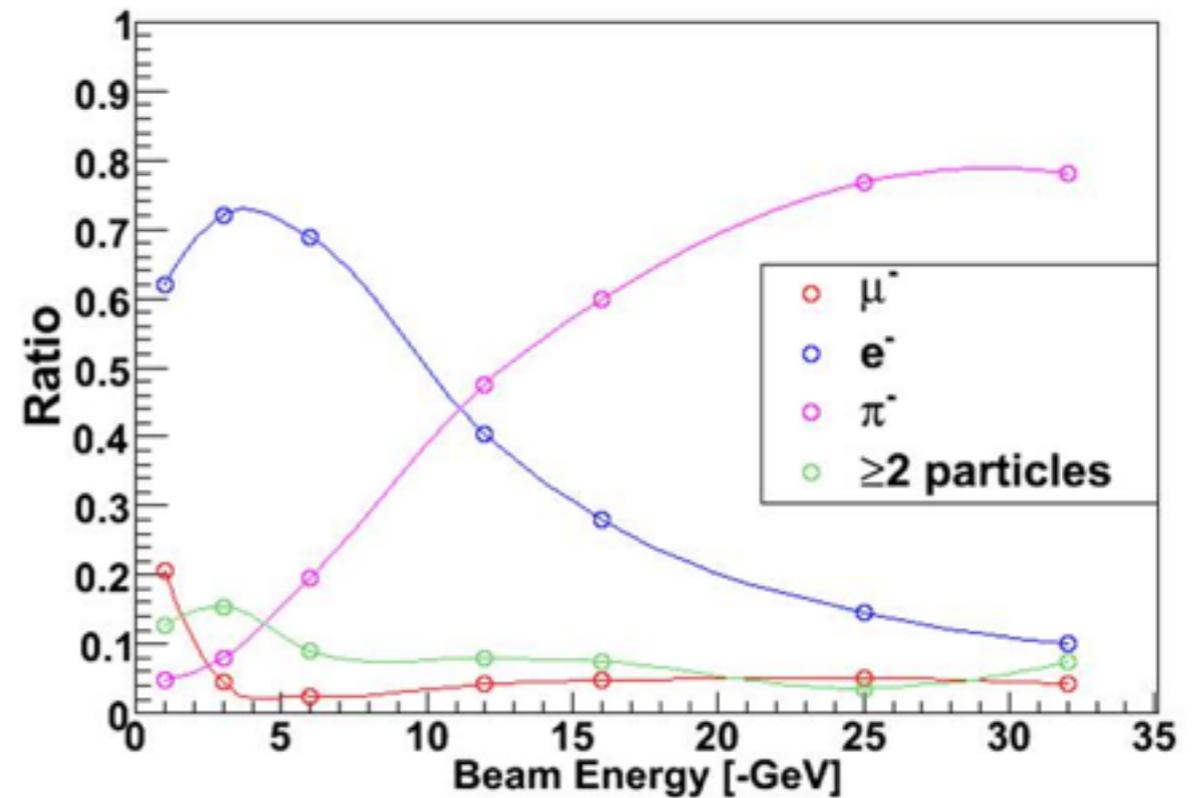
Mayly Sanchez (Iowa State), for the FTBF Committee

# What is the FTBF?

- FTBF provides beams for detector tests with equal and open access
- Beams based on 120 GeV protons with moderate intensity (1-300 kHz) with a diverse array of secondaries down to 1 GeV
- Much infrastructure to support the experimenters, including scintillators, pixel telescopes, wire chambers, TOF, DAQ, etc
- Located in the Meson Detector building at Fermilab
- Three areas: MTEST (main area), MCENTER (longer-term experiments), high-rate area for tracking experiments

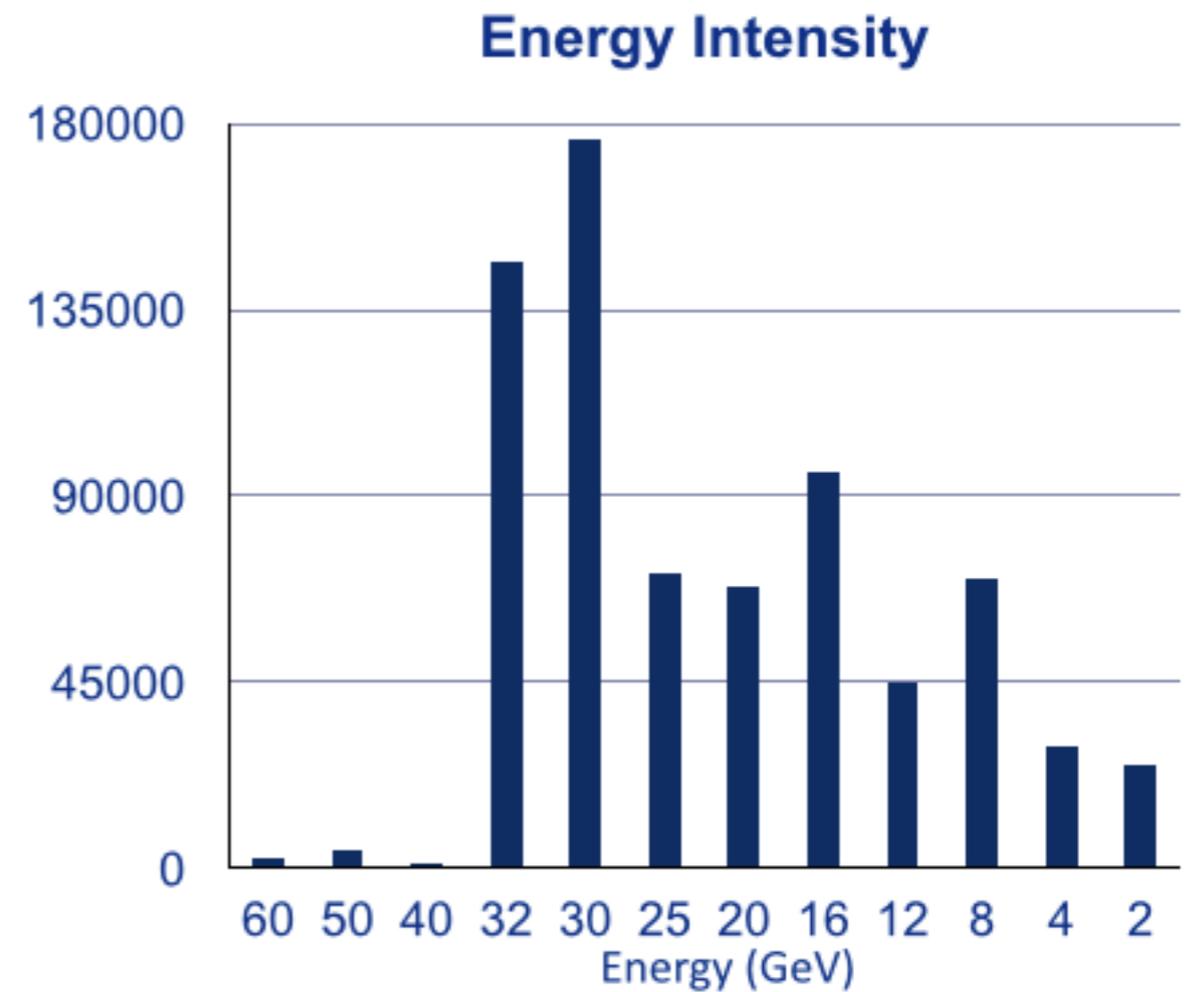
# Beams

- 120 GeV proton beam with 7mm spatial spread, 100  $\mu$ 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)

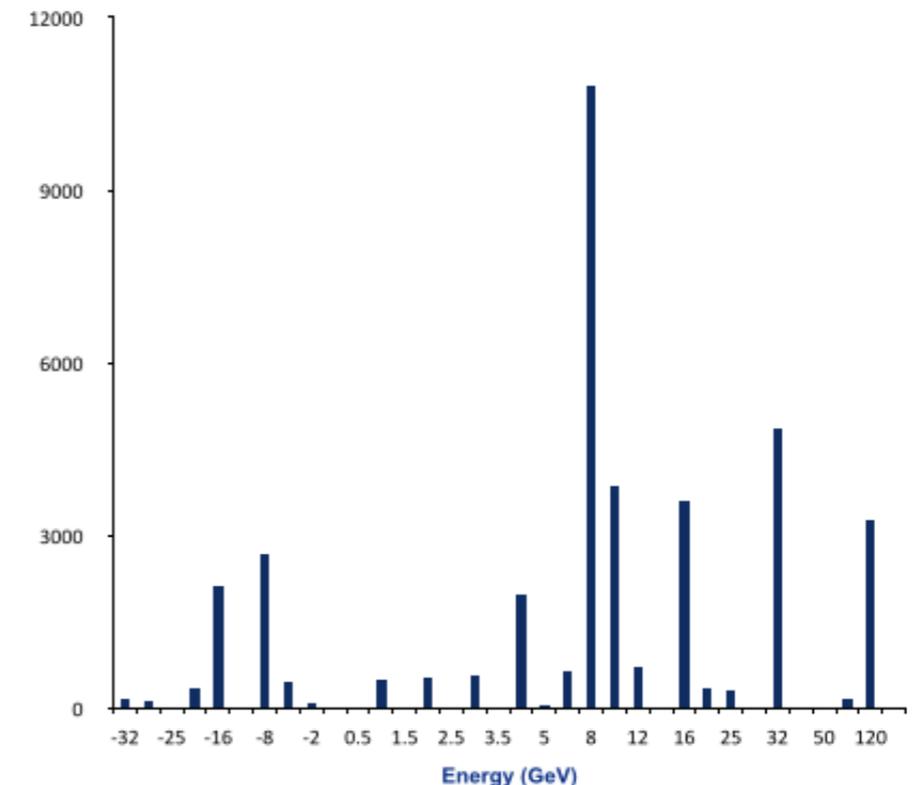


# FTBF beam usage snapshot

- 120 GeV proton beam
- High Energy Pion beams (40,50,60 GeV, all +)
- Low Energy Pion beams (1,1.5,2,2.5,3,3.5, 4,5,6,8,10,12,15,16,20,25,30,32 GeV, both signs)



Counts normalized to 1E11 on F:MW1SEM  
User Requests

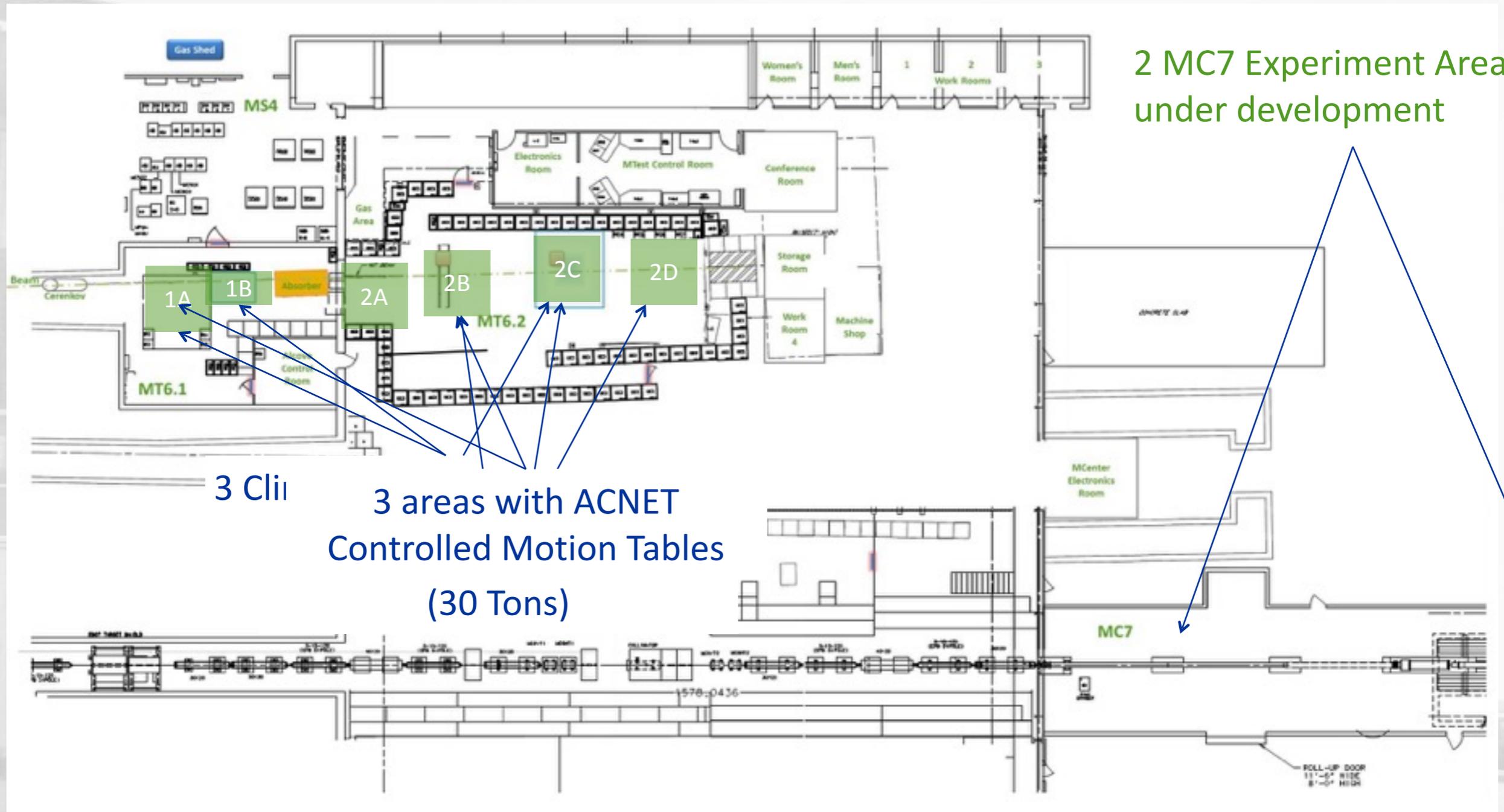


2014: From Feb 27<sup>th</sup> till Apr 18<sup>th</sup>

# MTEST

## Beam Areas

6 MT6 Experiment Areas



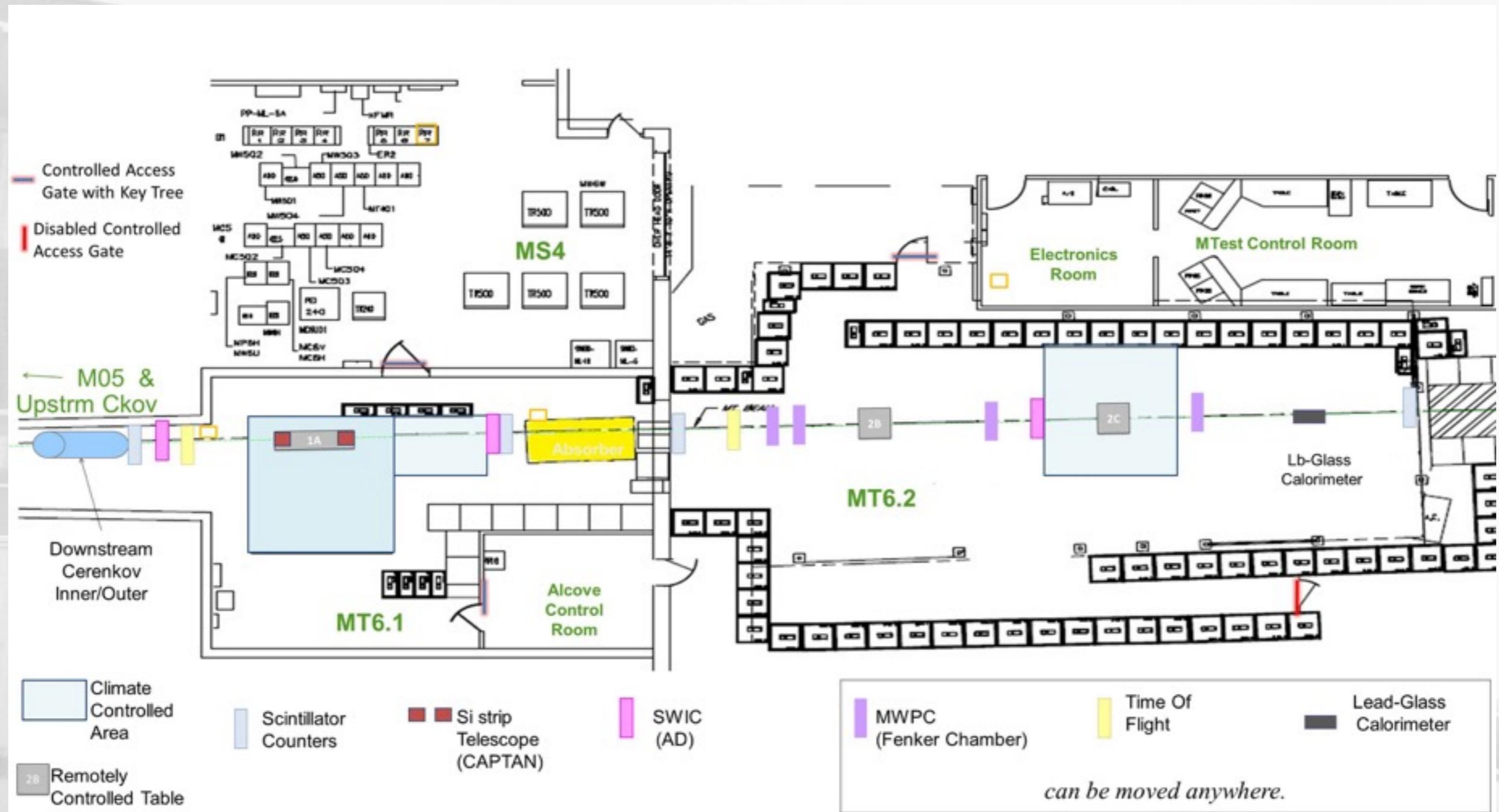
2 MC7 Experiment Areas under development

3 Cli

3 areas with ACNET  
Controlled Motion Tables  
(30 Tons)

# MTEST

## Instrumentation

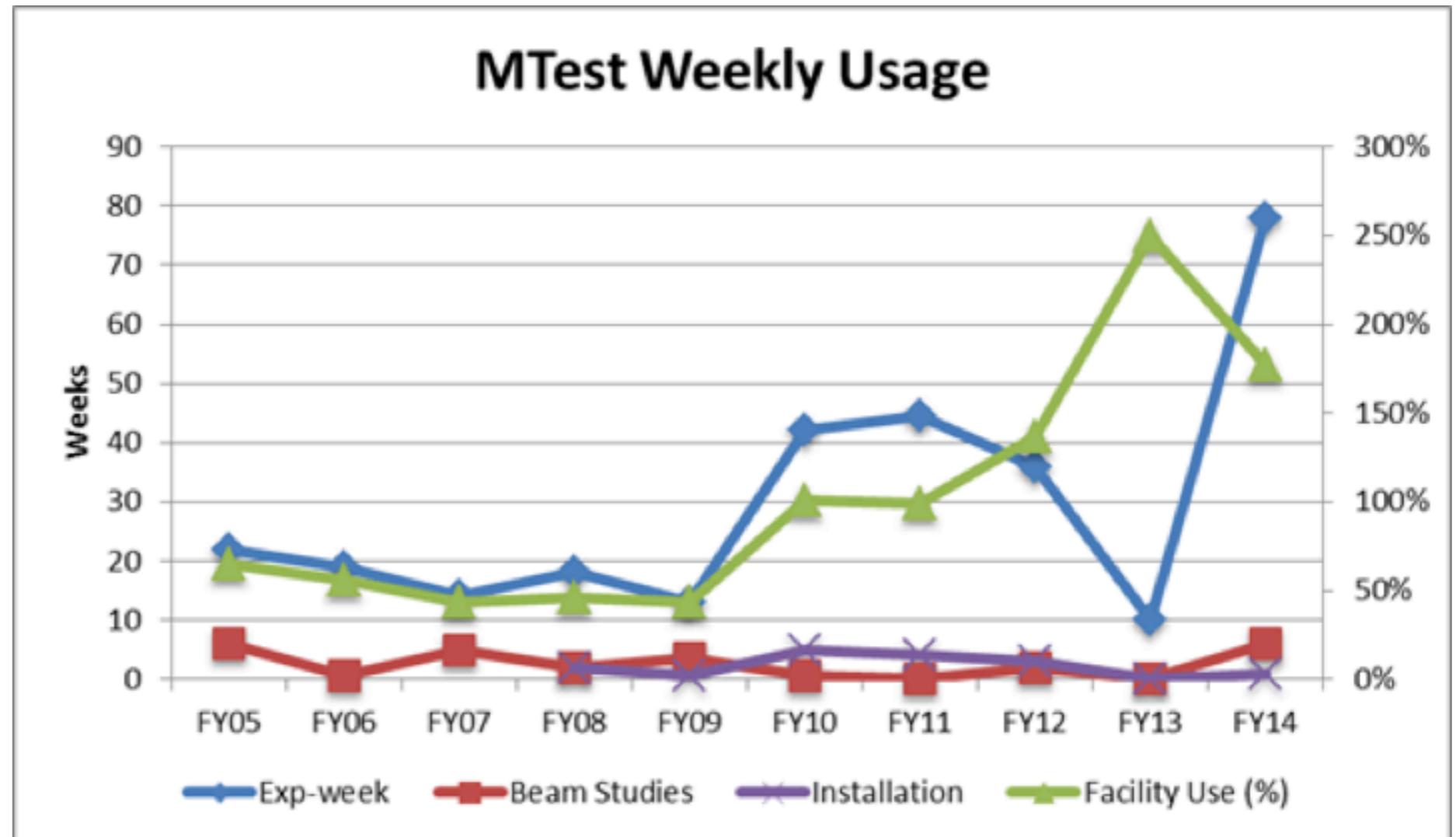


# How to get beam time

- Experimenter submits a few-page proposal to FNAL
  - Record time for approval less than a week
- Document goals of experiment and what is needed (flammable gas, DAQ, etc)
- Most comers are approved when there is available space
  - Internal lab procedures for ensuring safety
- Get on the schedule; ship equipment to FNAL, get trained at FNAL if not a user already
- Installation, inspection, request beam from MCR, and you're ready to go!

# Test Beam Facility is a huge success

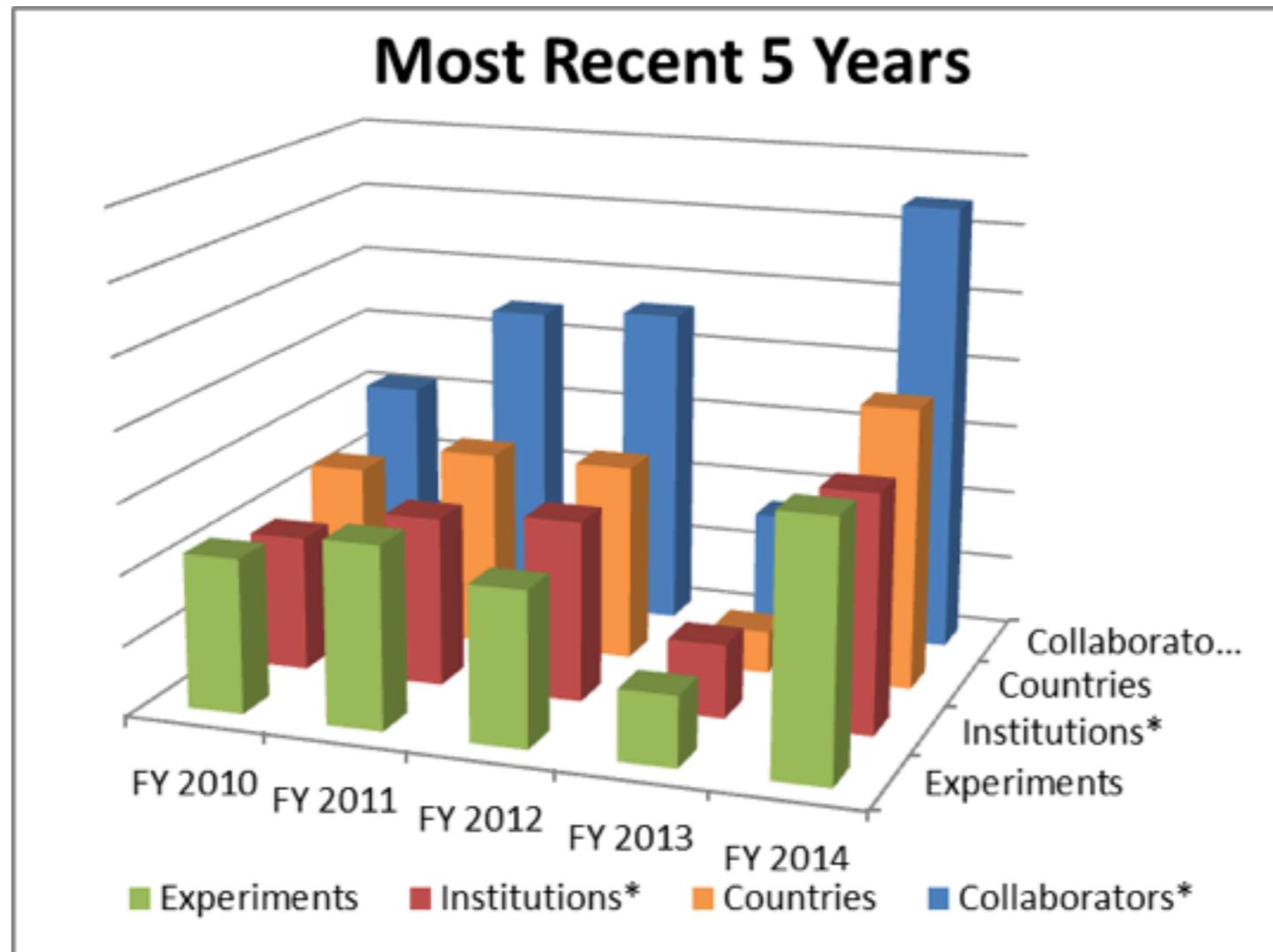
- Facility use skyrocketing in recent past. Form a committee to address following questions
- Q: What happens when we have more users than available slots?
- Q: How do we ensure that the facility is covering all users?
- A: Get help from the community via advisory committee



FY14 annual report

(>100% indicates more than one user)

# User Base vs time



dip in 2013 due to PIP2, influx in FY14 due to LHC shut-down

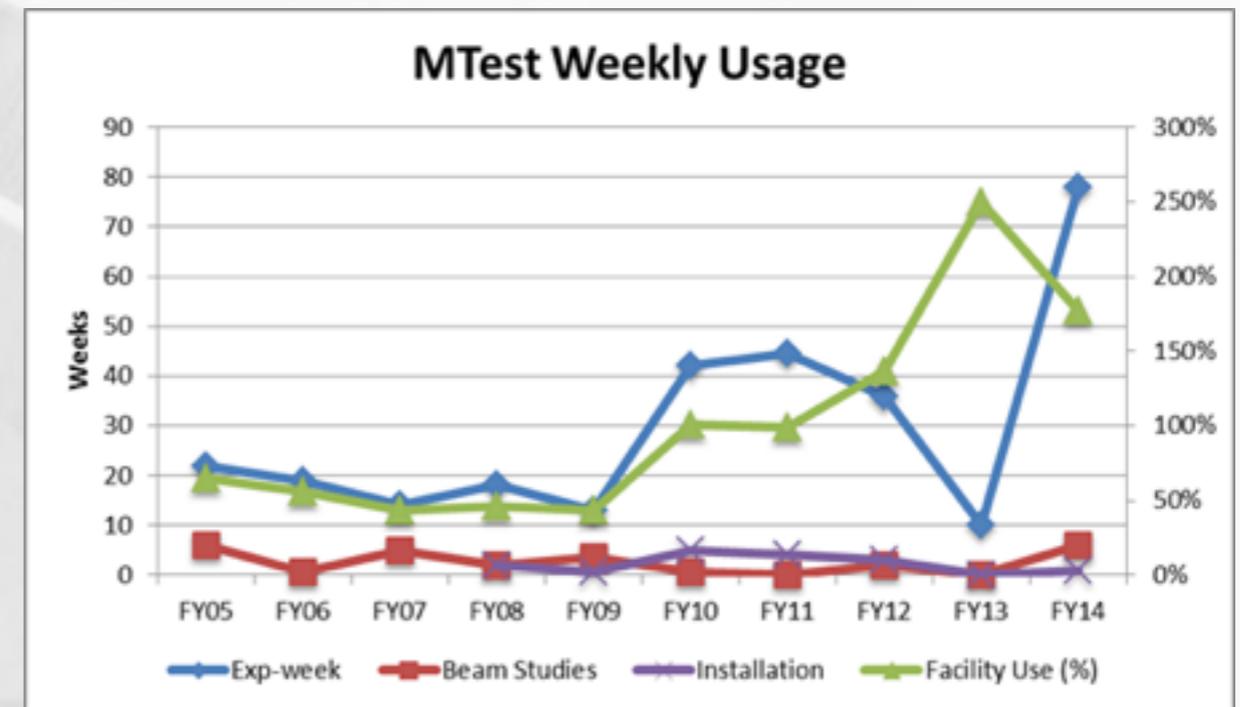
# MTEST vs MCENTER

- Two beamlines with different focus
  - MTEST: short-term users for apparatus development; timescale of weeks
  - MCENTER: long-term users for detector development; timescale of many months
- [LARIAT](#) (arXiv:1406.5560) as prototypical user of MCENTER
  - Argoneut detector in charged particle beamline to characterize response of LAr detectors
  - Dwell in beamline for many months
- MCENTER was commissioned in FY2014 with 100% usage thereafter

# 2014 Weekly Usage

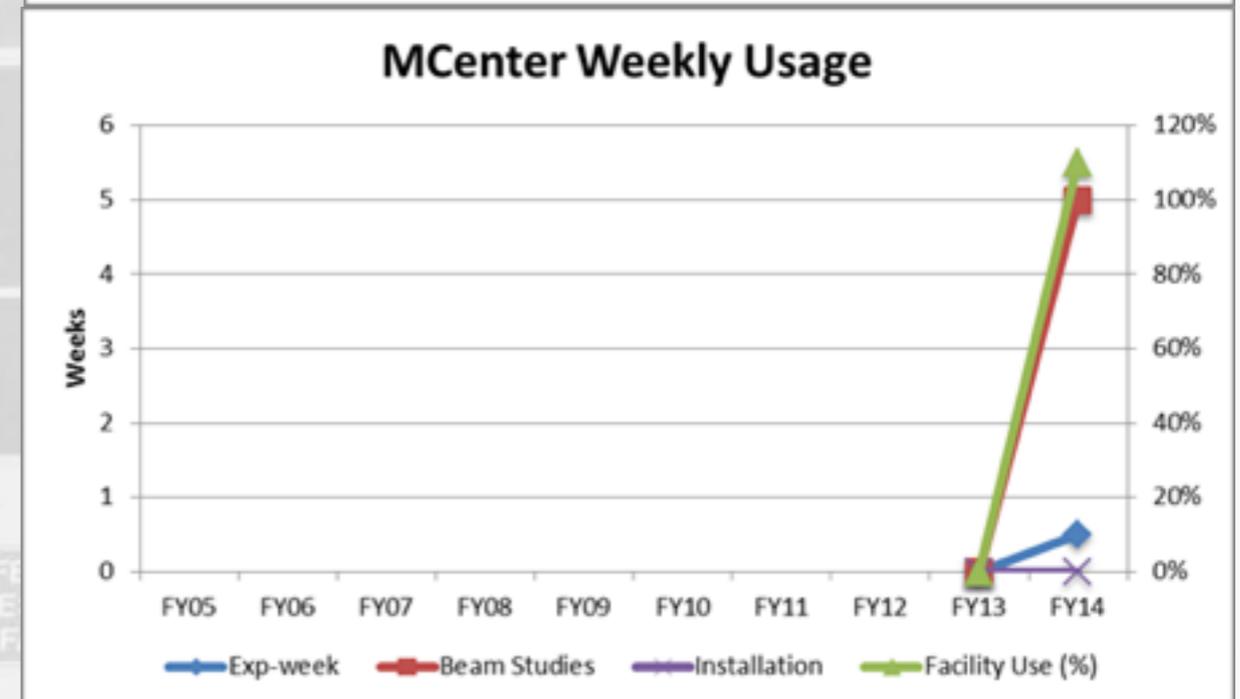
## MTest

- 48 available beam-weeks
- 78 experiment-weeks
- 6 weeks of beam studies/commissioning
- 177% Usage



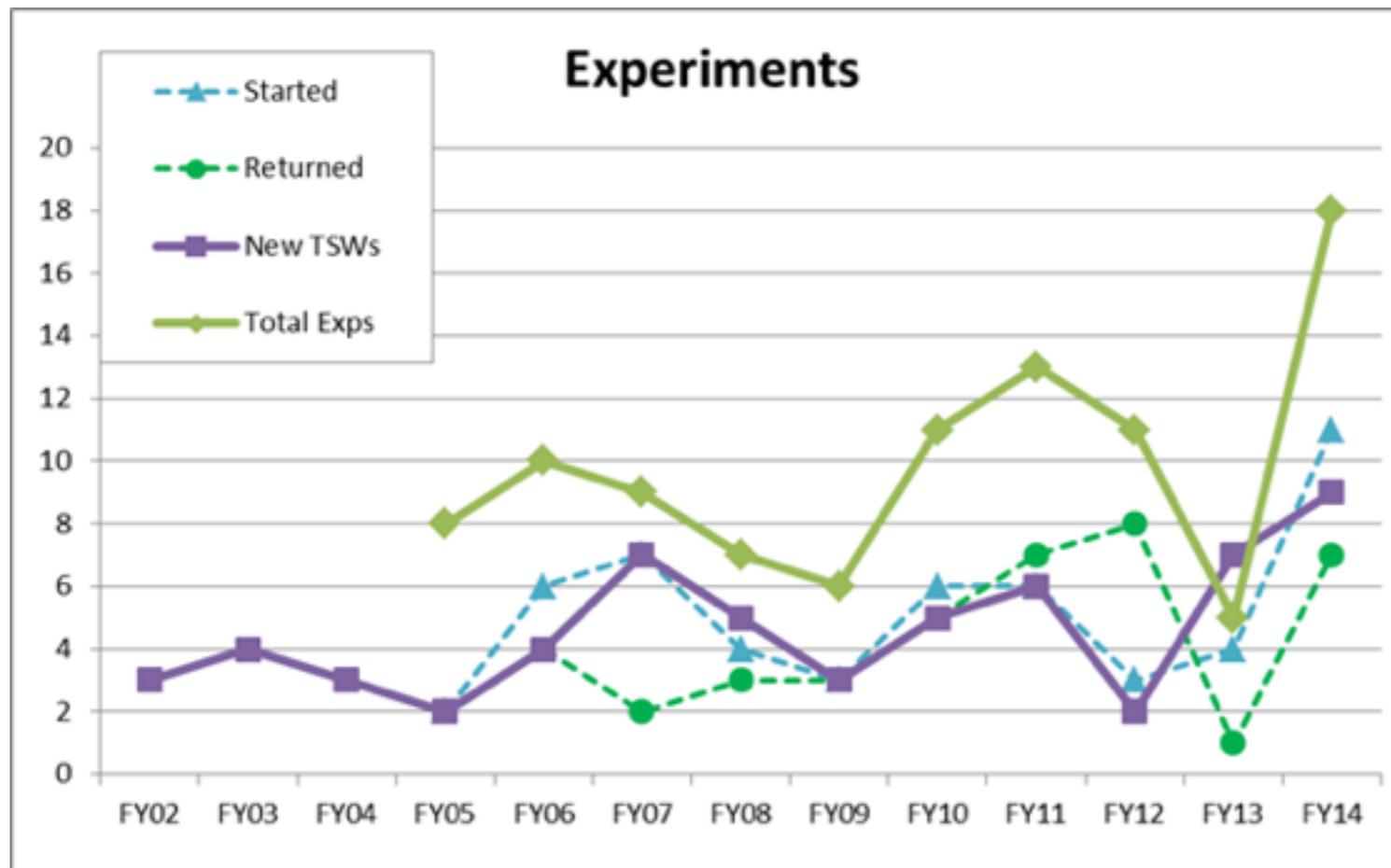
## MCenter

- 5 available beam-weeks
- 0.5 experiment-weeks
- 5 weeks of beam studies/commissioning
- 100% Usage



# FY2014 Experiments

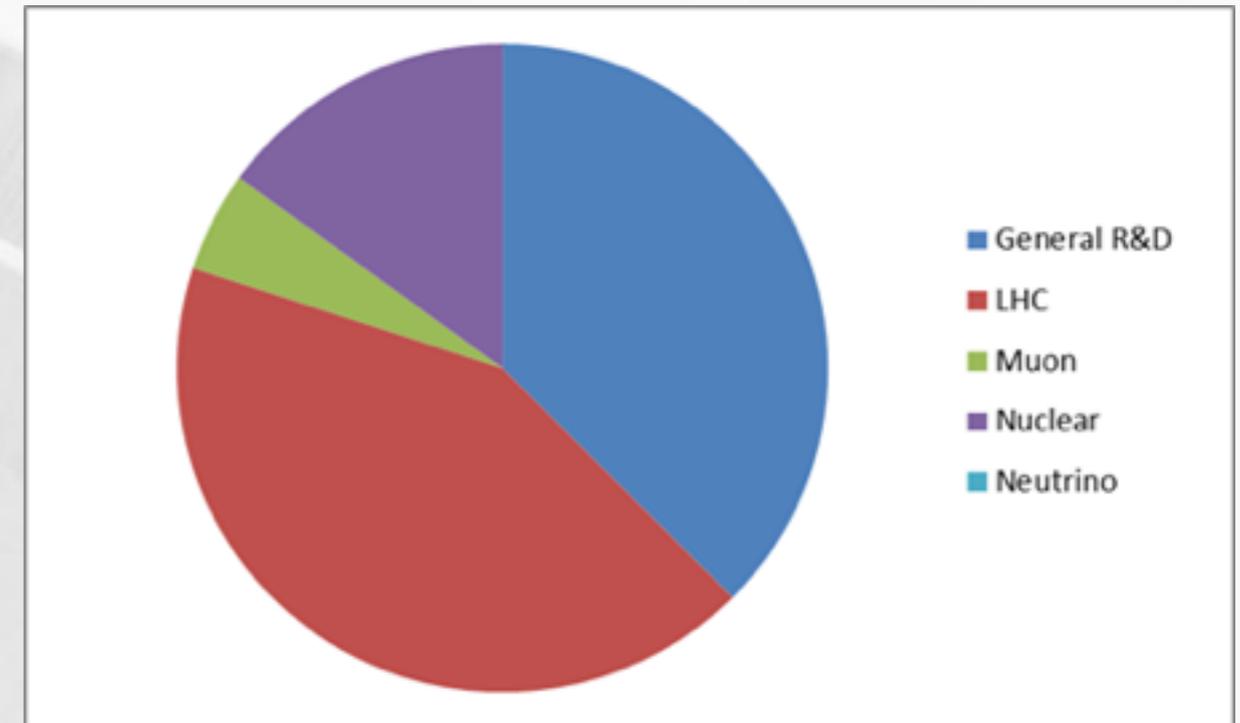
- Nine new proposals approved
- Twelve new experiments took data
- Seven returning experiments
- 321 collaborators from 84 institutions in 20 countries



Test	Description
T0958	FP420 Fast Timing Group
T0979	Fast Timing Counters for PSEC
T0979	Fast Timing Optical Time Projection Chamber
T0987	DAMIC
T0992	SLHC rad hard sensor tests
T0994	JASMIN
T1015	Dual Read out Calorimetry (crystal/glasses)
T1015	Adriano for ORKA
T1015	Adriano for High Energy (ILC)
T1018	Spacordian Tungsten Powder Calorimeter
T1031	ATLAS Tile Calorimeter Electronics Test
T1034	LArIAT Commissioning
T1036	High Rate Pixel Detector for CMS Upgrade
T1037	FLYSUB Consortium
T1041	High Rate RPCs
T1041	Crystal Fibers
T1041	CMS Dedicated Fast Timing
T1041	CMS Precision Timing
T1041	QIE10
T1041	Quartz Plates
T1041	Radiation-Hard Scintillating Fibers
T1041	Radiation-Hard Scintillators
T1041	Secondary Emission Calorimetry
T1041	CMS EE Shashlik array
T1042	Muon g-2 Straw Tracker
T1044	sPHENIX Calorimetry Tests
T1048	PHENIX Fast TOF
T1049	ATLAS large scale Thin Gap Chambers
T1054	sPHENIX PreShower Calorimeter
T1056	ATLAS DBM Module Qualification
T1058	Secondary Emission Calorimeter

# 2014 Experiment Types

- T1015 DRO Calorimetry
- T1037 FLYSUB-Consortium
- T958 FP420 (CMS+ATLAS) Fast Timing Group
- T979 Fast Timing w/Cherenkov Counters
- T989 DAMIC
- T1058 Secondary Emission Calorimeter
- T1031 Atlas Tile Calorimeter Electronics
- T1036 CMS High Rate Pixel Detector
- T1041CMS Forward Calorimetry
- T1049 ATLAS large scale TGC
- T1056 ATLAS DBM Module Qualification
- T992 Radiation-hard Sensors for the SLHC
- T1042 Muon g-2 straw tracker
- T1018 Spacordion Tungsten Fiber Calorimeter
- T1044 sPHENIX
- T1048 PHENIX fast TOF
- T1054 sPHENIX Pre-Shower Calorimeter
- T994 JASMIN



Two Large Neutrino experiments on schedule for FY15: MINERvA & LArIAT

FERMILAB  
TEST BEAM  
FACILITY

# PHENIX upgrade detectors come to FTBF in force!

T1044 - Calorimetry  
 T1048 – Fast Time of flight  
 T1054 - Preshower

Example of FTBF experiment:  
**PHENIX upgrades**

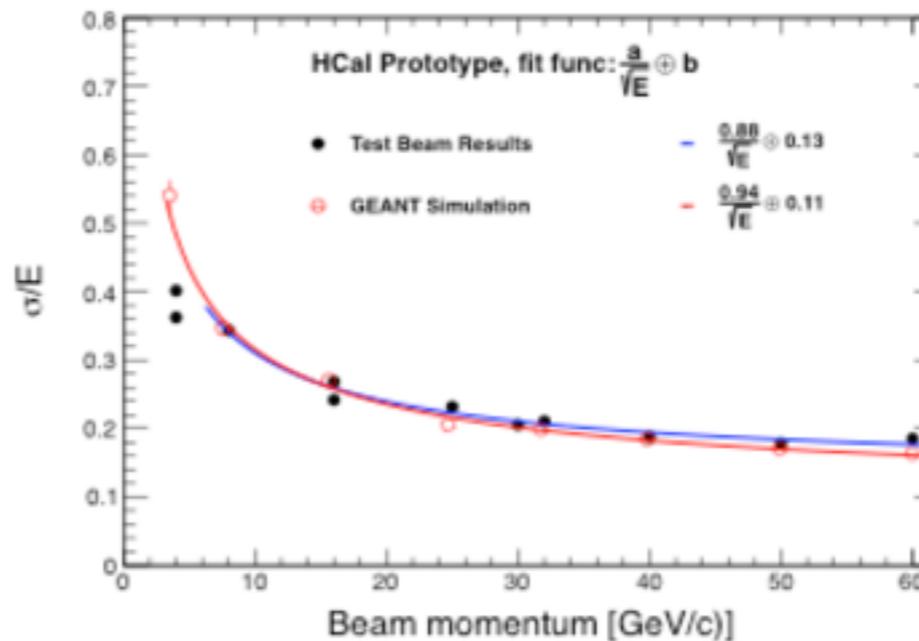
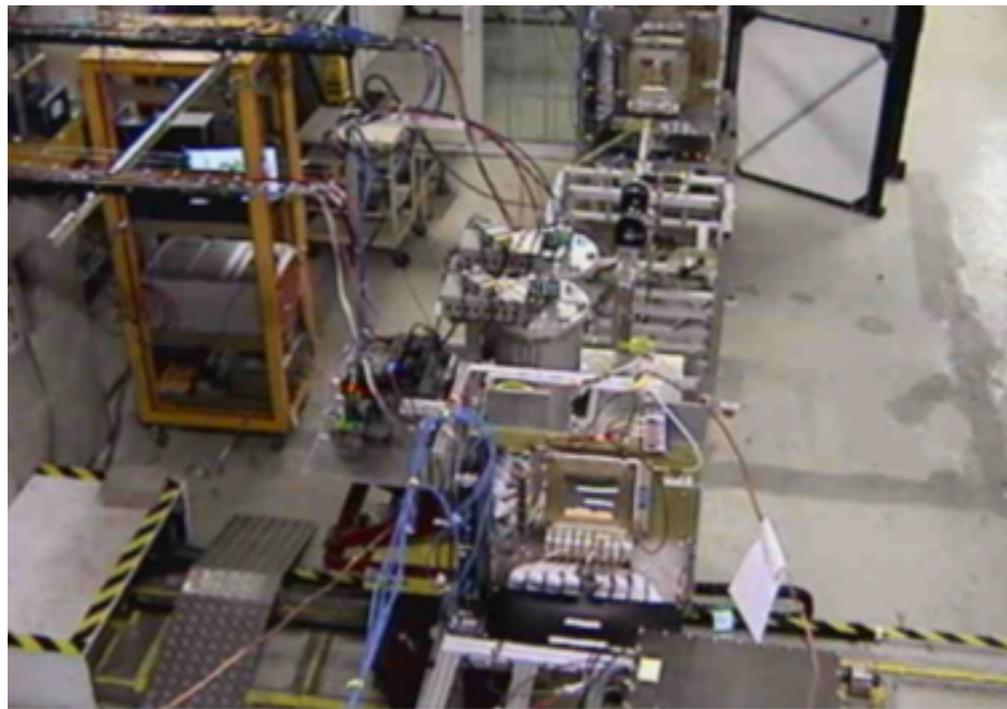
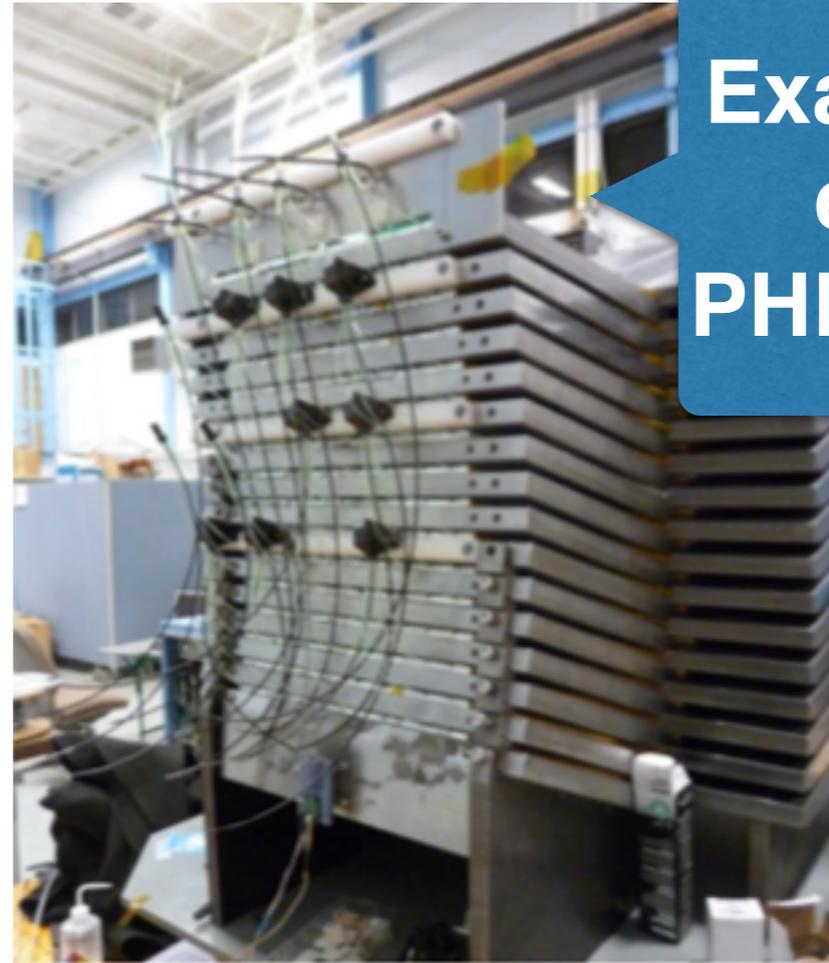


Figure 6: BNL and Tsukuba mRPC Prototypes in FTBF Beamline

# Committee Charge

The testbeam facilities at Fermilab are a valuable resource for the HEP community. In the past it has been customary to approve all test beam experiments that have scientific merit. However, the Fermilab testbeam facilities **have become oversubscribed**, making it necessary to **make programmatic choices**, which may determine which experiments run, the beam-time they get, and the order in which they run.

The committee is asked to give advice to the Fermilab Directorate on the programmatic choices needed to optimize both community use of the testbeam facility and its scientific impact. The committee chair is expected to **define**, in consultation with the Testbeam Coordinator, **what decisions are needed** and on what timescale.

The committee should meet as needed, and produce a brief **bi-annual report** documenting the advice. The report should be submitted to the Office of Program Planning. The Testbeam Coordinator will use the advice to guide week-by-week scheduling decisions.

Although the primary purpose of the committee is to give programmatic advice, the Directorate will welcome other comments about **utilization of the facility and the need for enhancements**.

# Committee Membership

- Peter Wittich (Cornell, chair)
- Mayly Sanchez (Iowa State)
- Jen Raaf (FNAL)
- Ron Lipton (FNAL)
- Guy Savard (ANL)
- Carsten Hast (SLAC)
- Henric Wilkens (CERN)
- JJ Schmidt (FNAL, ex officio)
- Mandy Rominsky (FNAL, ex officio)

Membership from the university community, from FNAL and from the ANL, CERN and SLAC test beam leadership.

Forum for test beam coordinators

# FTBF Advisory Committee meetings to date

- Two meetings to date
  - 4/23/2014, in-person; kickoff meeting: intro to facility as needed; functioning of the facility; issues and plans
  - 01/25/2015: mixed phone & in-person; 2014 progress & review; response to initial committee recommendations
- Brief reports produced in response to each meeting with summary of progress and recommendations

# Committee Thoughts

- Committee is very impressed with the FTBF
- Facility is constantly evolving: making the most of a small staff and minimal direct resources to improve what can be done
  - wire tracking chamber, Si tracking telescope, etc
- New lead (Mandy Rominsky) recently hired
  - Develop a future vision for the facility, including
  - Outreach to new users,
  - Complete the characterization of the existing beams, and
  - Optimization of its operation.
- Much progress in better understanding the user base and their needs on a statistical basis, and how the facility is used
  - New FTBF annual report very impressive; CERN and SLAC are considering a similar report

# Committee Recommendations

- Recommend increasing the independence of the FTBF
  - delegate more decision-making to the local staff for routine decisions about approval and operations
- Understand the usage model for MCENTER vs MTEST and how the usage will evolve
  - For example: are there underserved user needs?
- Ensure that the FTBF is acknowledged in conference talks and publications
- Coordinate test beam usage between SLAC, FNAL and CERN

**FTBF Annual Report – FY 2014**

# Annual report/ FTBF snapshot

Committee request: more  
information about user base

Outcome: new annual report

Includes:  
statistical overview  
reports from experiments

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# FTBF Committee: summary

- FTBF committee has been formed
- Meets semi-annually
- Good interaction with FTBF staff
- Working towards ensuring that this vital resource is best utilized for Fermilab and the community

# References

- Apr 2014 Meeting:
  - <https://indico.fnal.gov/conferenceDisplay.py?confId=8434>
- Jan 2015 Meeting:
  - <https://indico.fnal.gov/conferenceDisplay.py?confId=9250>
- FY2014 annual report:
  - <https://indico.fnal.gov/materialDisplay.py?materialId=3&confId=9250>

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