



μ BooNE

The image shows a visualization of a particle event in the MicroBooNE detector. It features several tracks of different colors (green, blue, red) against a dark blue background. A white arrow points from the μ BooNE logo to a track on the left. A scale bar at the bottom left indicates 55 cm. The event details 'Run 3469 Event 53223, October 21st, 2015' are shown at the bottom right.

Recent results from MicroBooNE

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for the MicroBooNE collaboration

University of Oxford

Lake Louise Winter Institute 11 February 2016

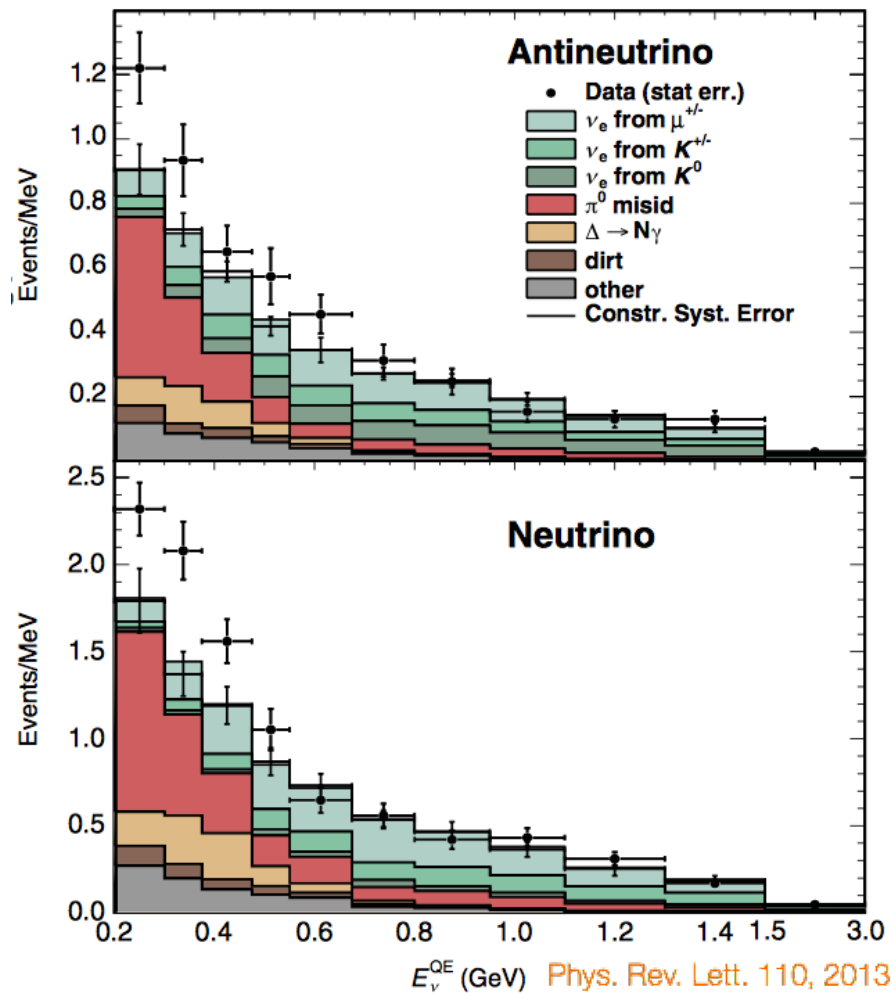
55 cm

Run 3469 Event 53223, October 21st, 2015

MicroBooNE: The context

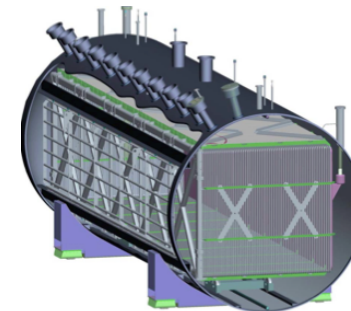
Physics

- MiniBooNE low-energy excess

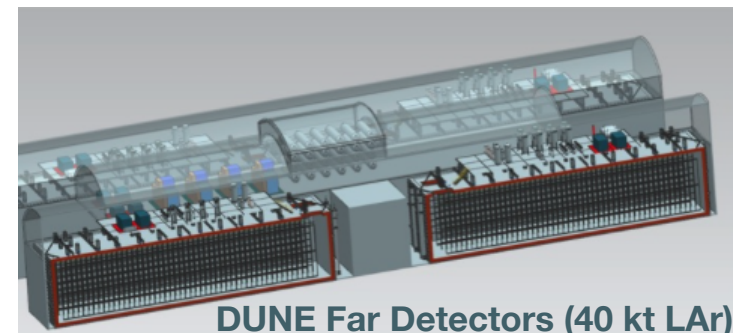


R&D

- LArTPCs for ν detection
- Road to *DUNE*



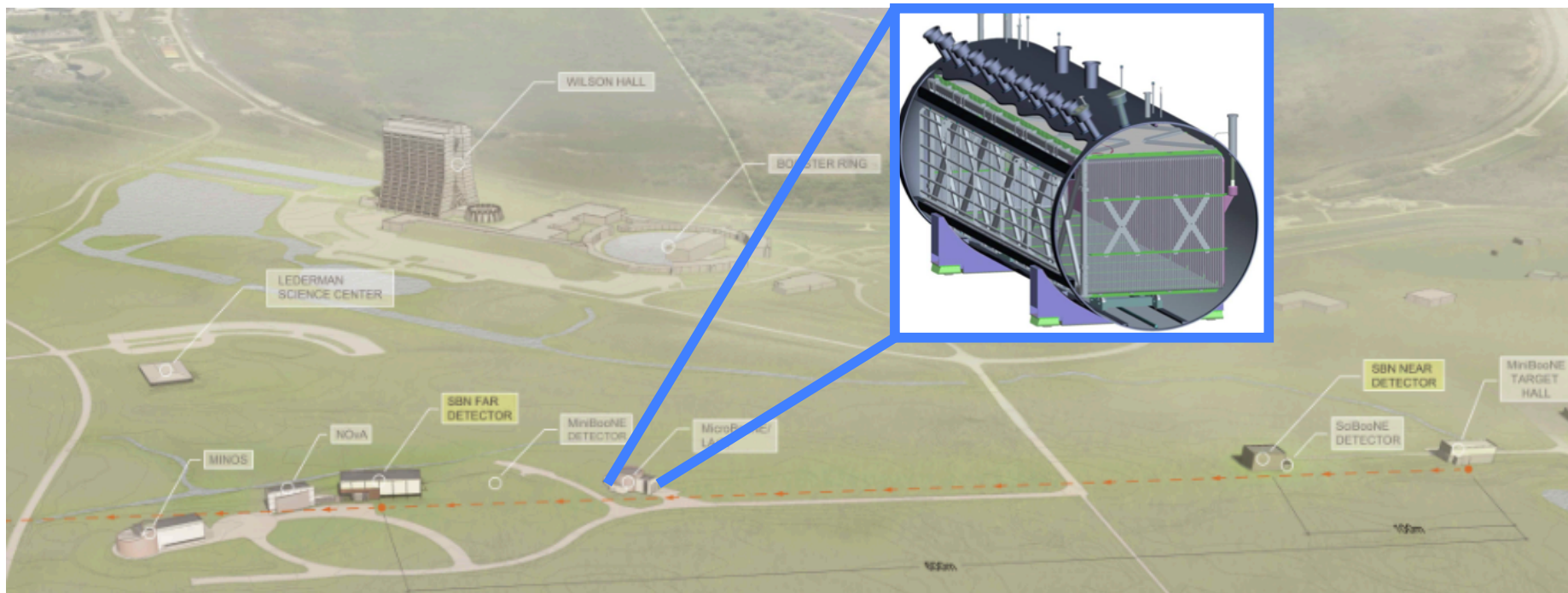
MicroBooNE Detector (170t LAr)



DUNE Far Detectors (40 kt LAr)

The MicroBooNE experiment

- ◆ New technology → Liquid Argon detectors
- ◆ 170 ton LArTPC
- ◆ 470m from BNB target (71m from MiniBooNE)



MicroBooNE Physics

- ◆ Address the MiniBooNE low-energy excess
 - ➔ Look for excess
 - ➔ Identify signal (γ or e^- ?)
- ◆ Oscillation physics study (appearance/disappearance)
- ◆ Neutrino cross-section measurements
- ◆ Astroparticle and Exotic physics

MicroBooNE status

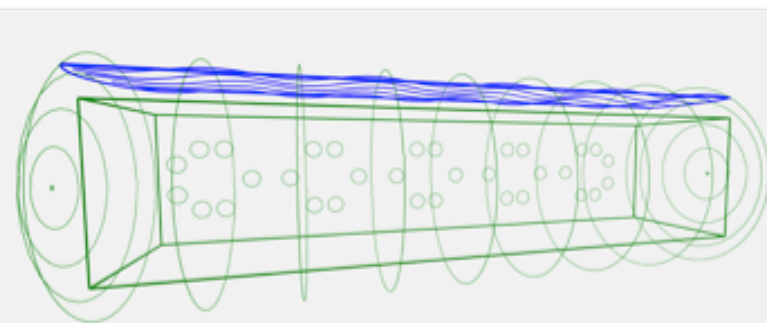
- ✓ Constructed
- ✓ Assembled
- ✓ Moved
- ✓ Installed



MicroBooNE

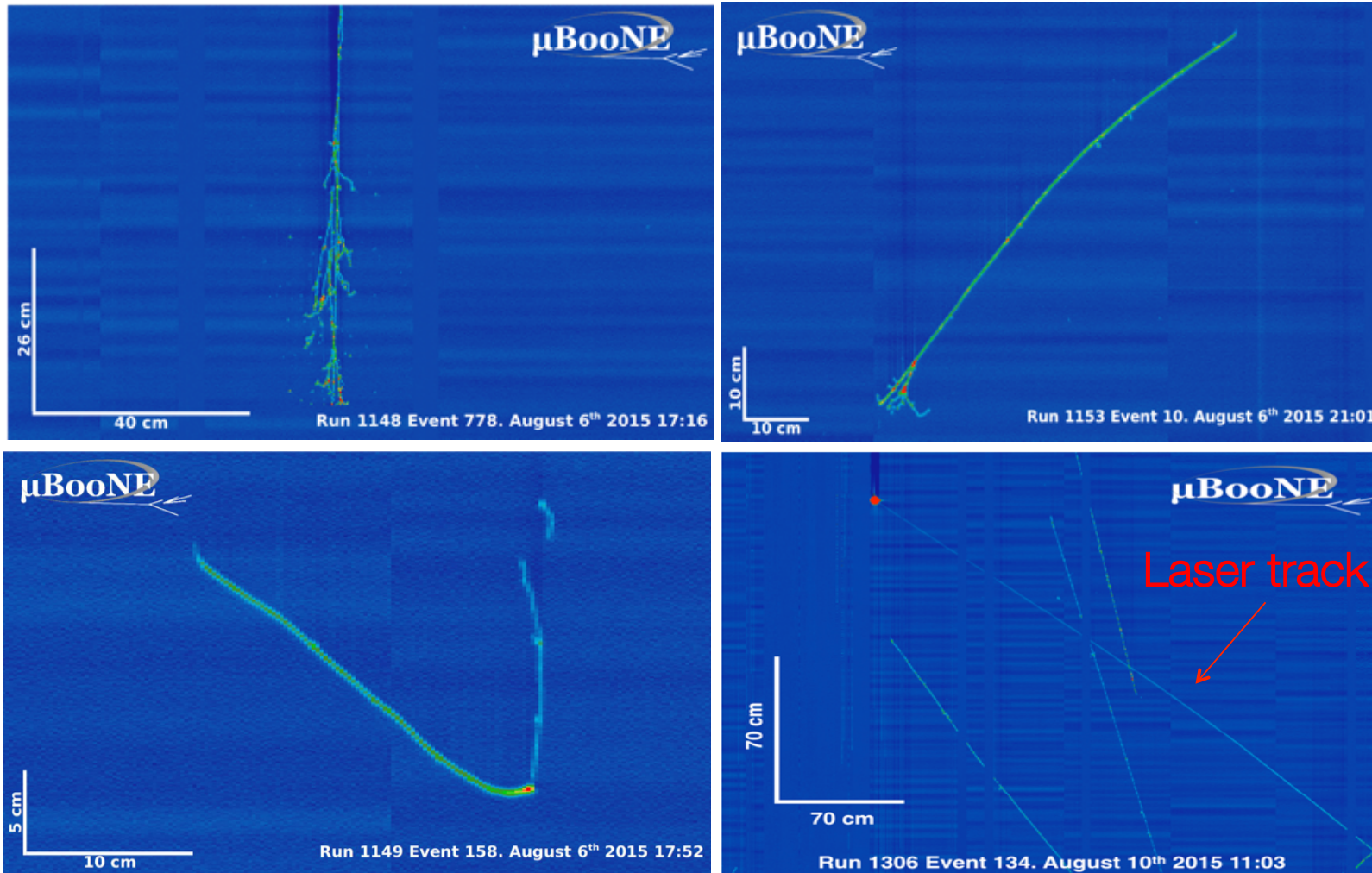


- ✓ Insulated
- ✓ Cabled
- ✓ Purged
- ✓ Filled
- ✓ Purified

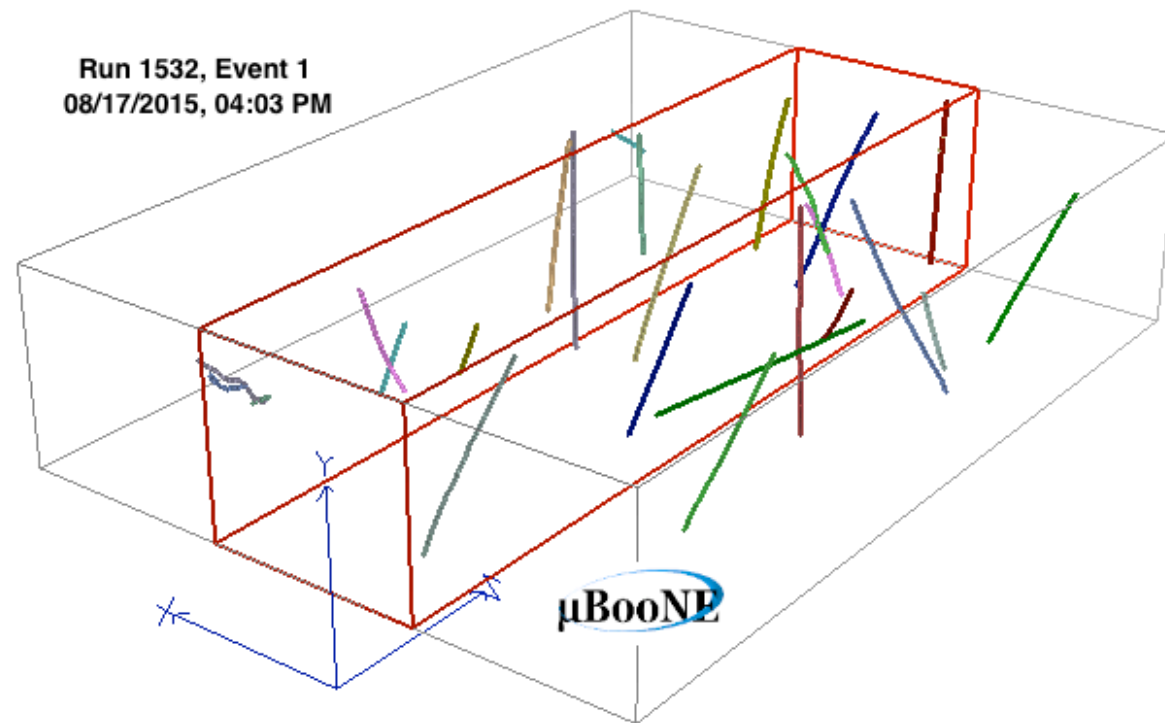


MicroBooNE Commissioning

- ◆ First tracks! (August 2015)



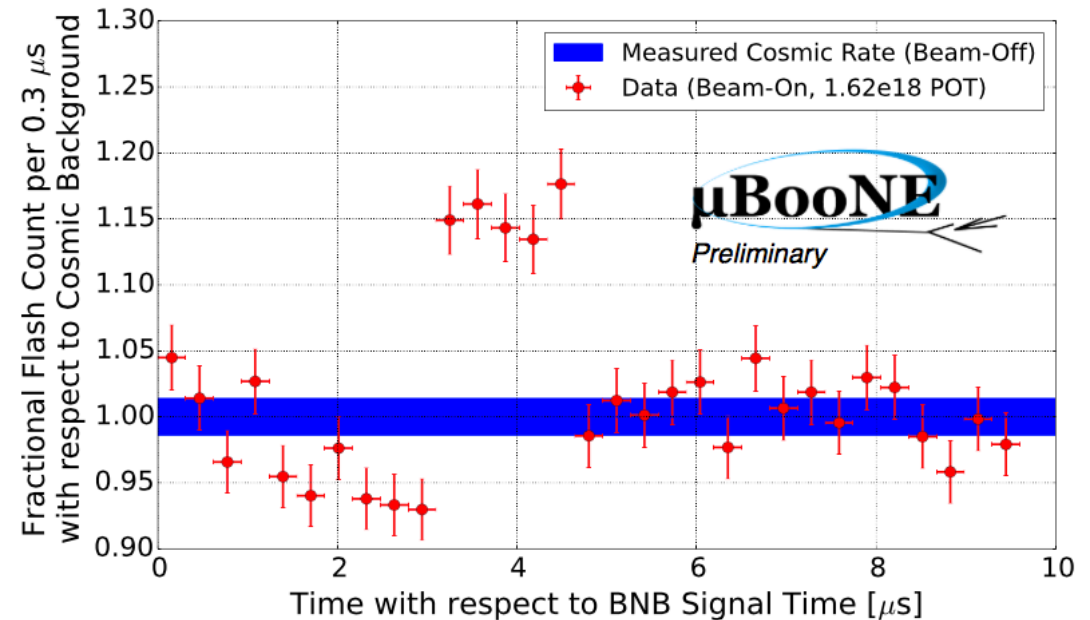
MicroBooNE automated reconstruction



4.8ms window (3 drift windows)

Taking neutrino data

- ◆ Matching PMT light signal to beam trigger
- ◆ Fully automated reconstruction to find neutrino events:
 - ✓ 2D & 3D reconstruction
 - ✓ Select neutrino-like topology
- ◆ Low efficiency, but high purity sample



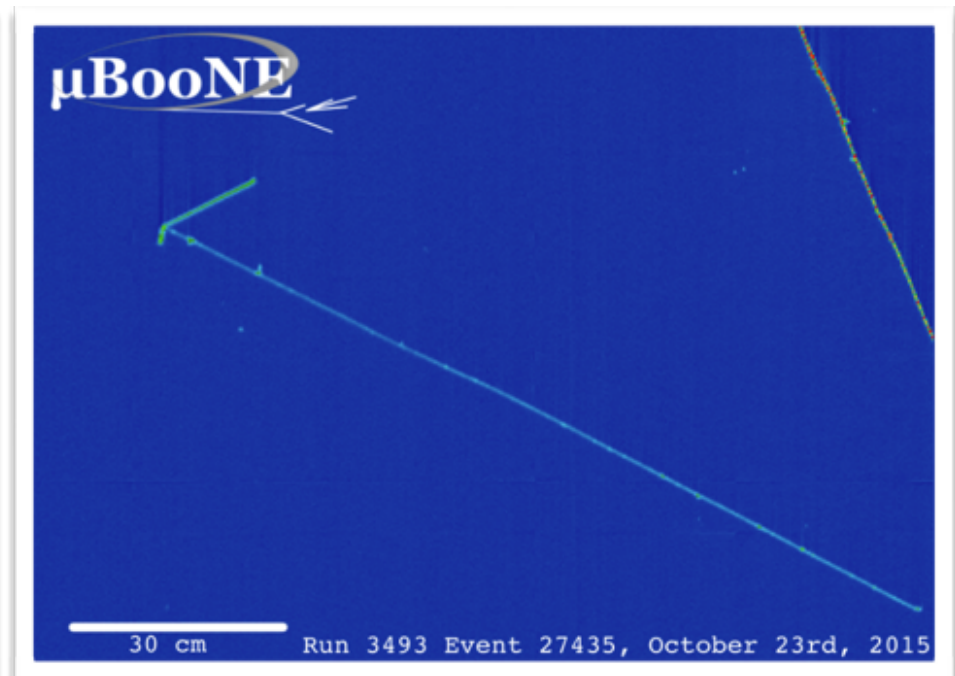
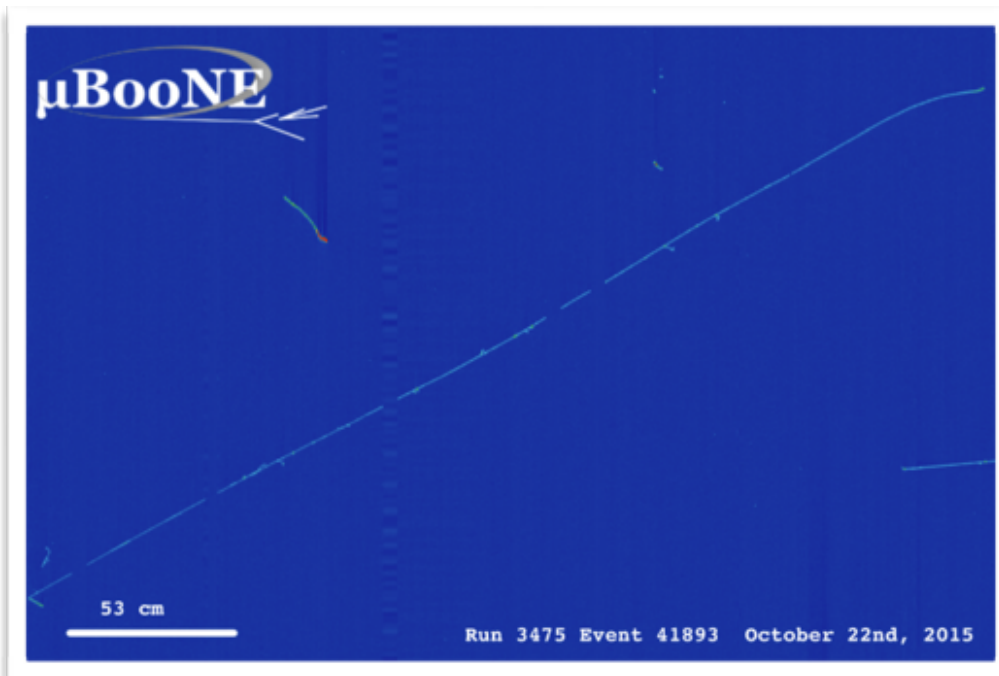
MicroBooNE preliminary 1.86e18 POT (BNB)

Fully automated selection

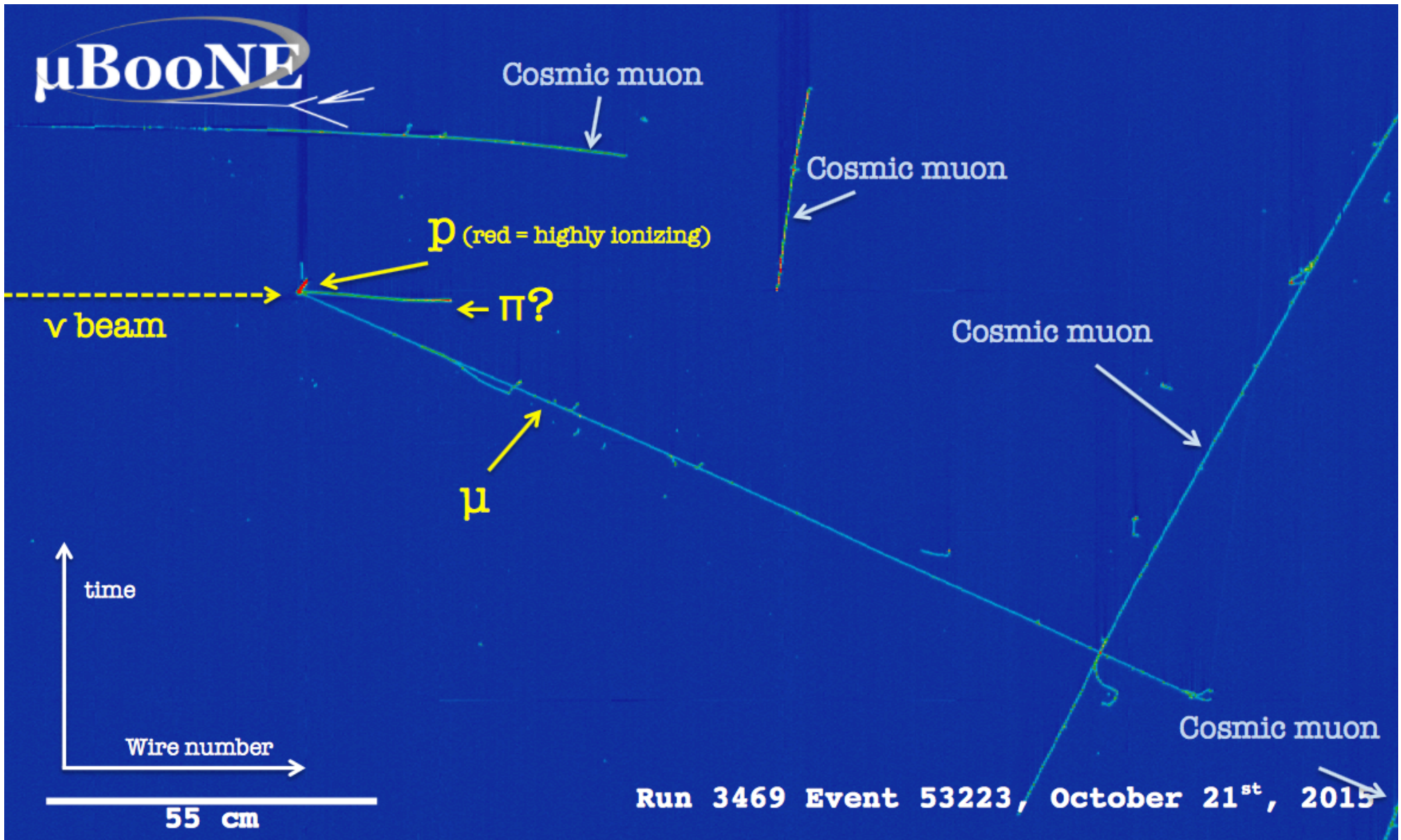
Number of events	Optical + 2D-based	Optical + 3D-based
Non-beam background (expected from off-beam measurements)	385 ± 24	4.6 ± 2.6
Total observed (during beam)	463	18

First Neutrino events!!

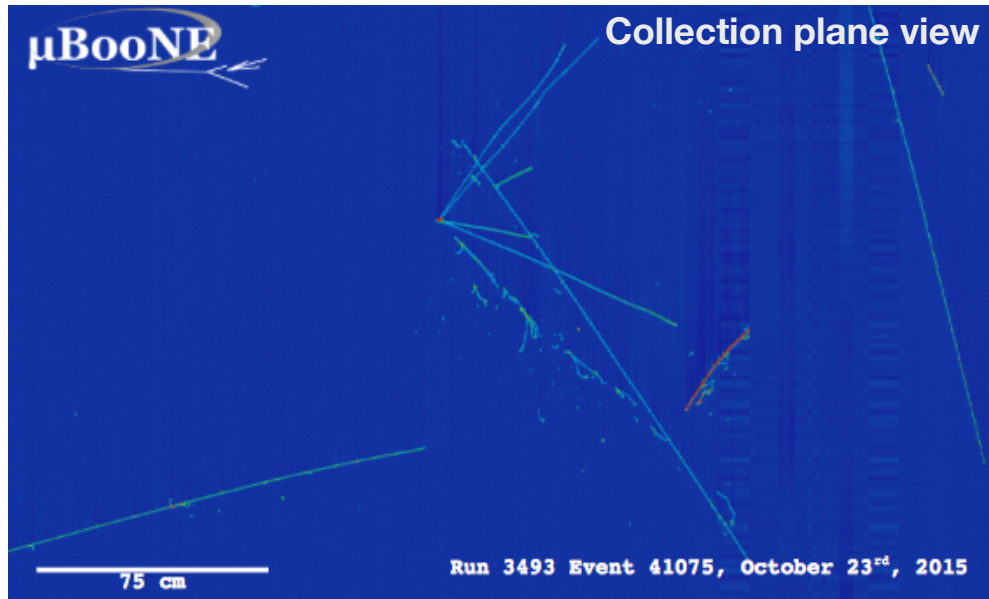
- ◆ First Neutrinos! (October 2015)



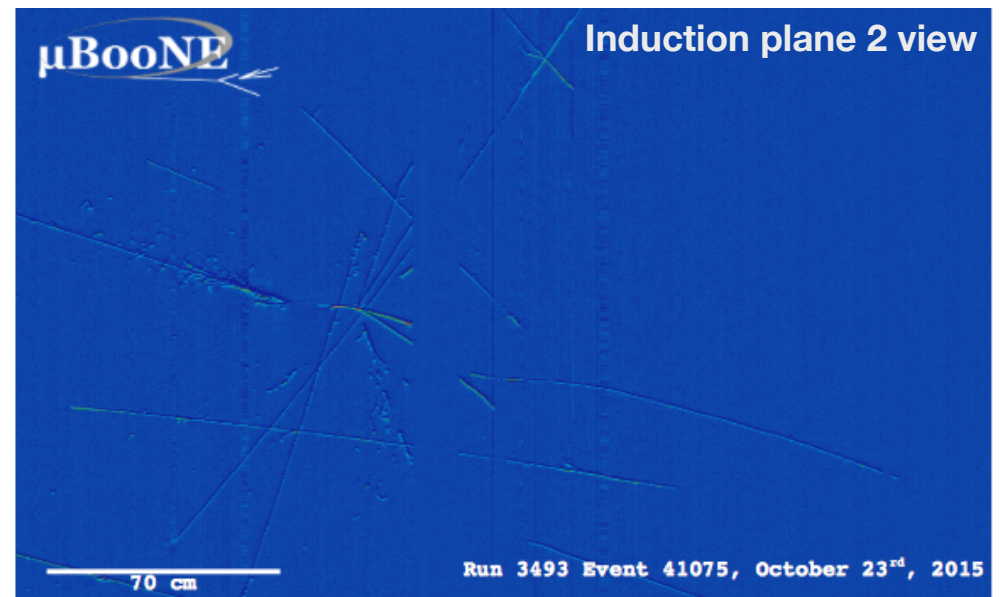
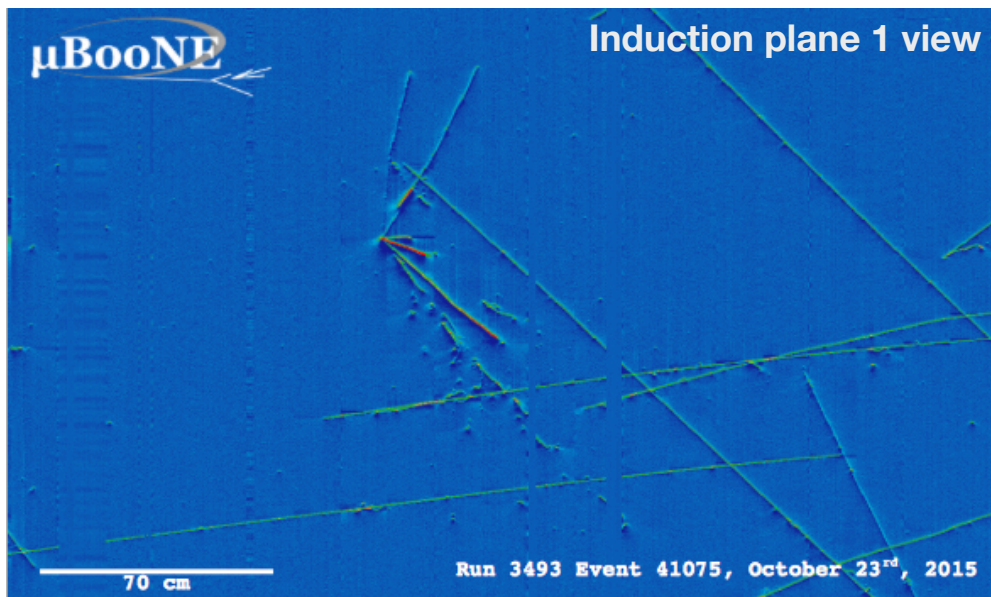
First Neutrino events!!



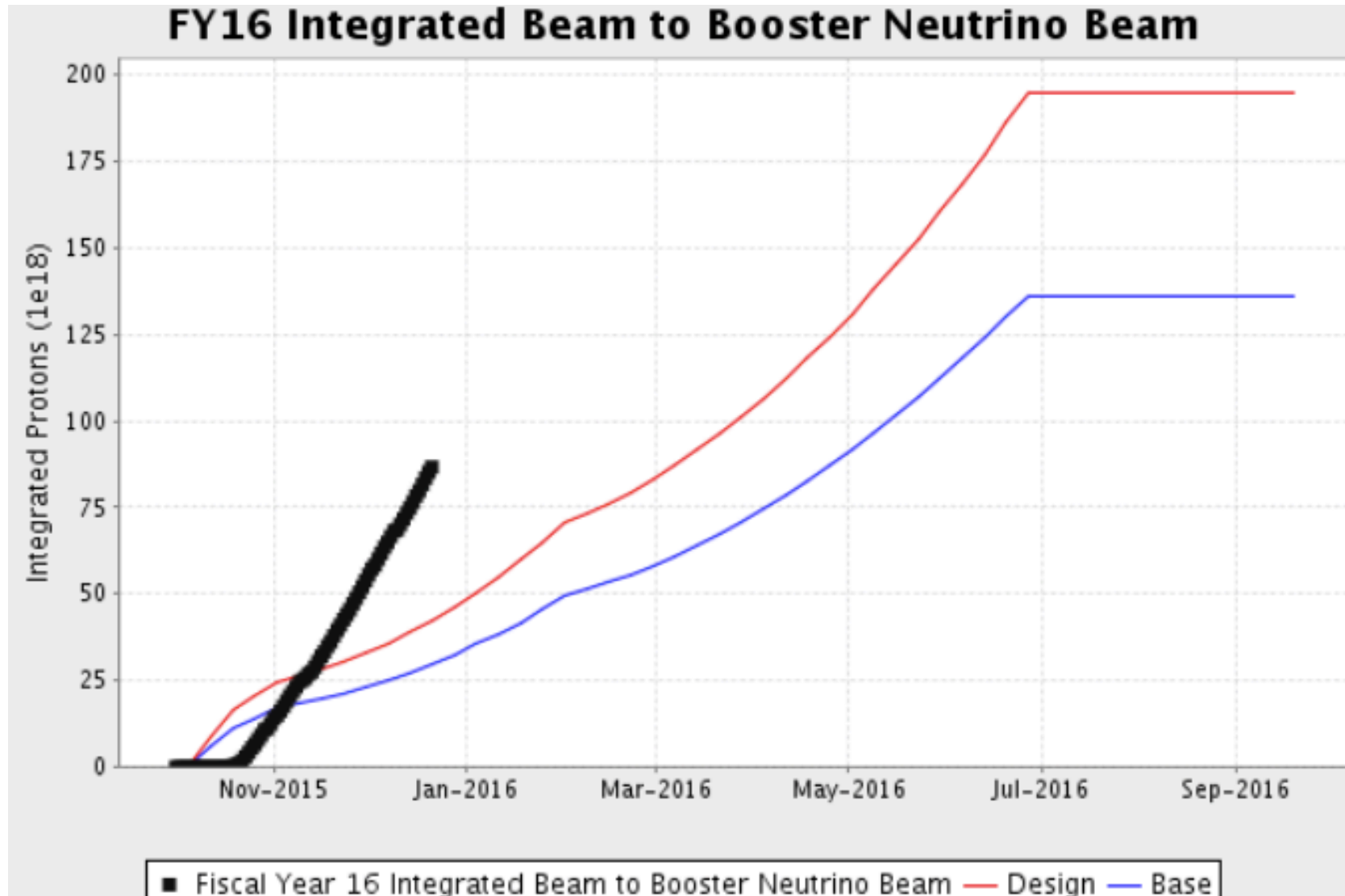
First Neutrino events!!



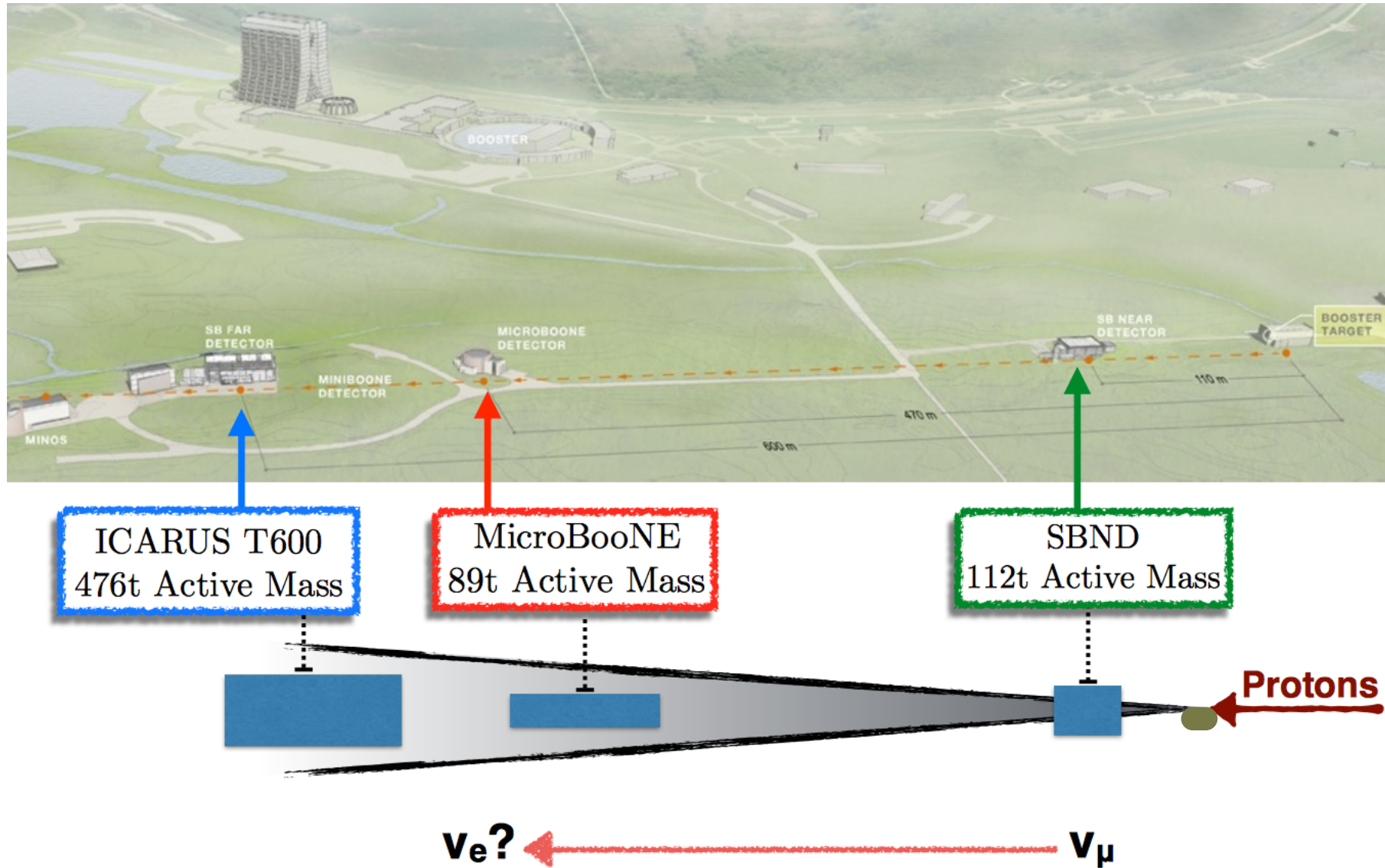
Same event in all 3 planes



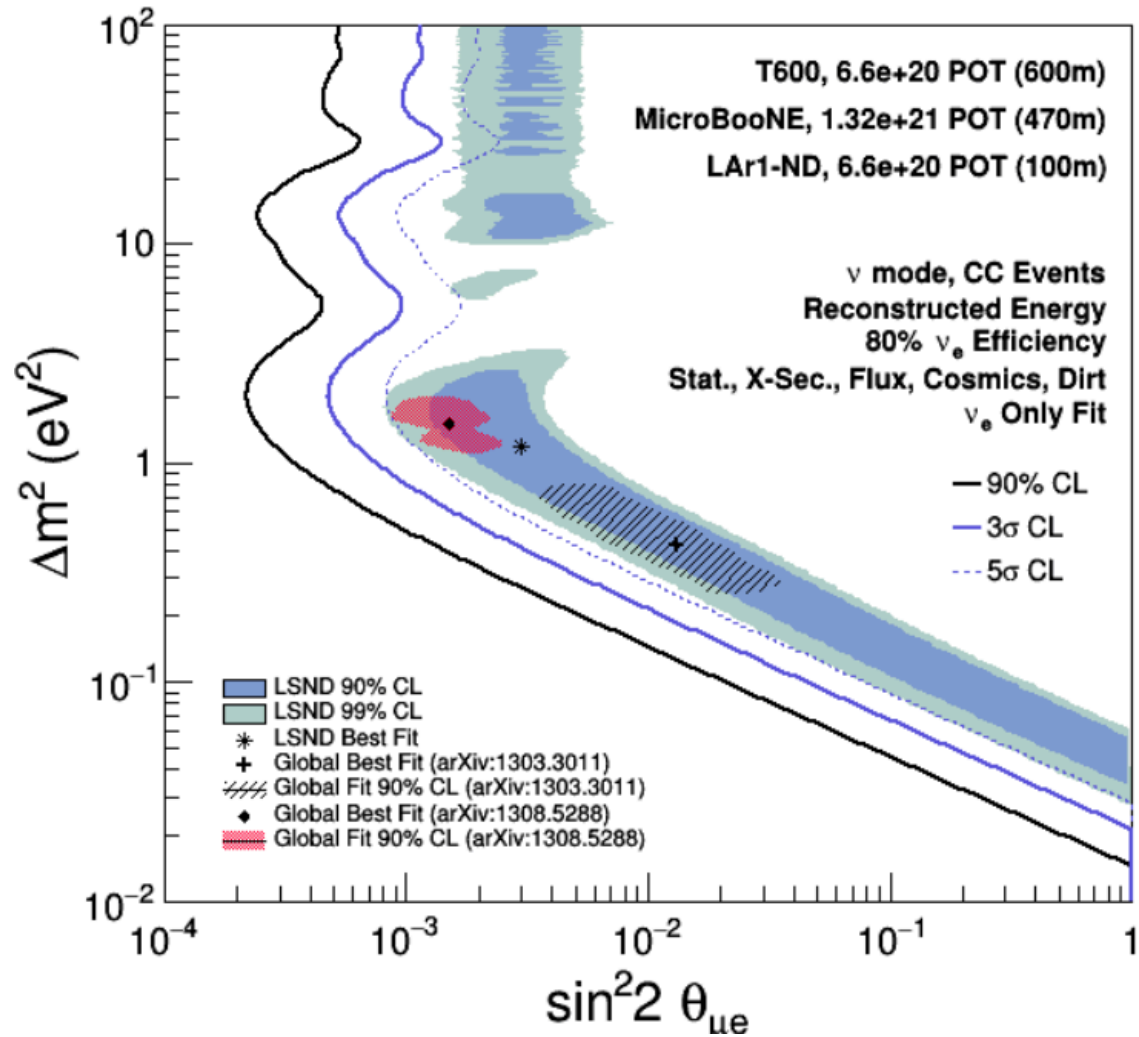
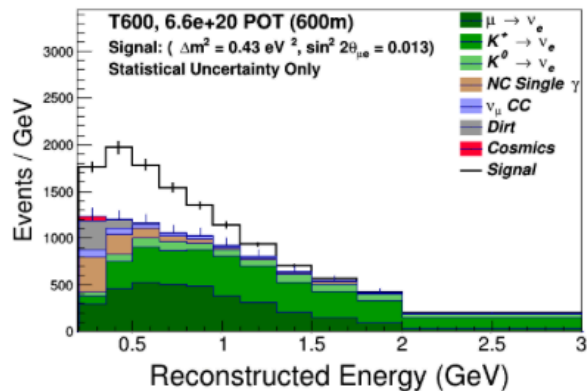
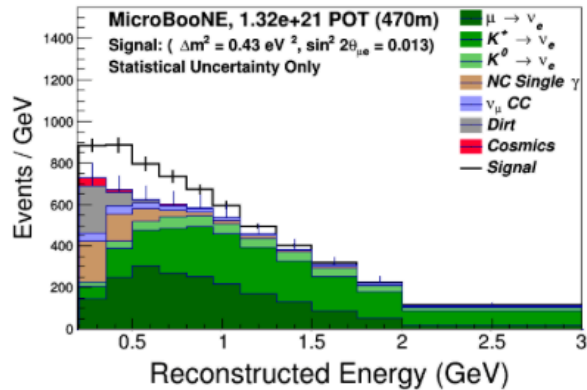
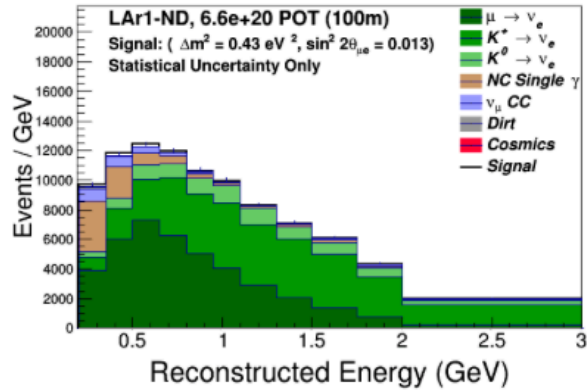
Data is coming... fast!



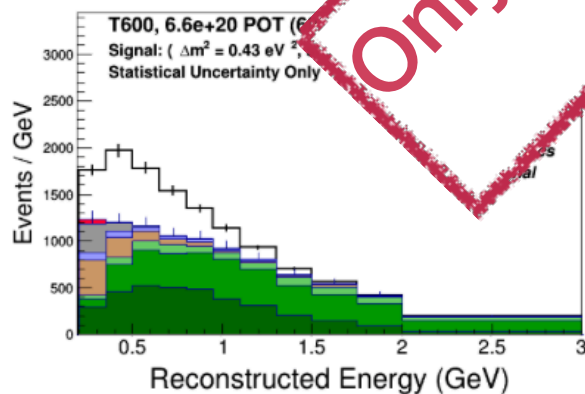
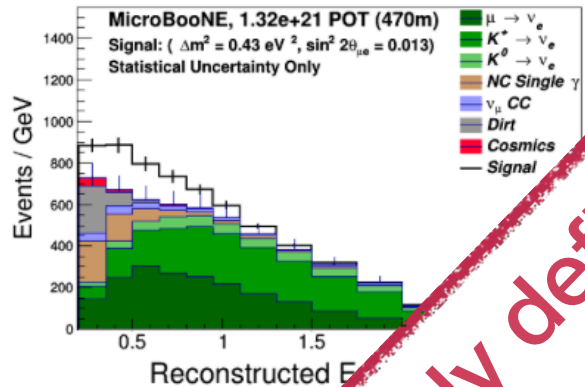
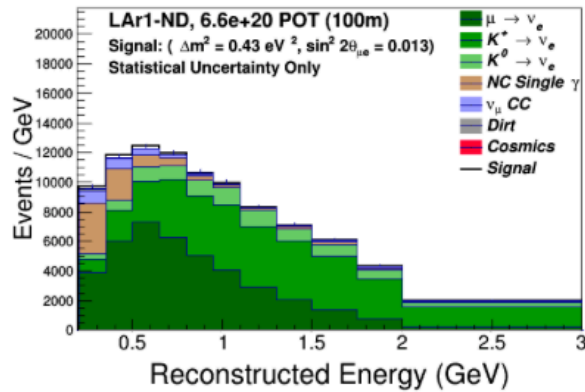
The SBN Programme



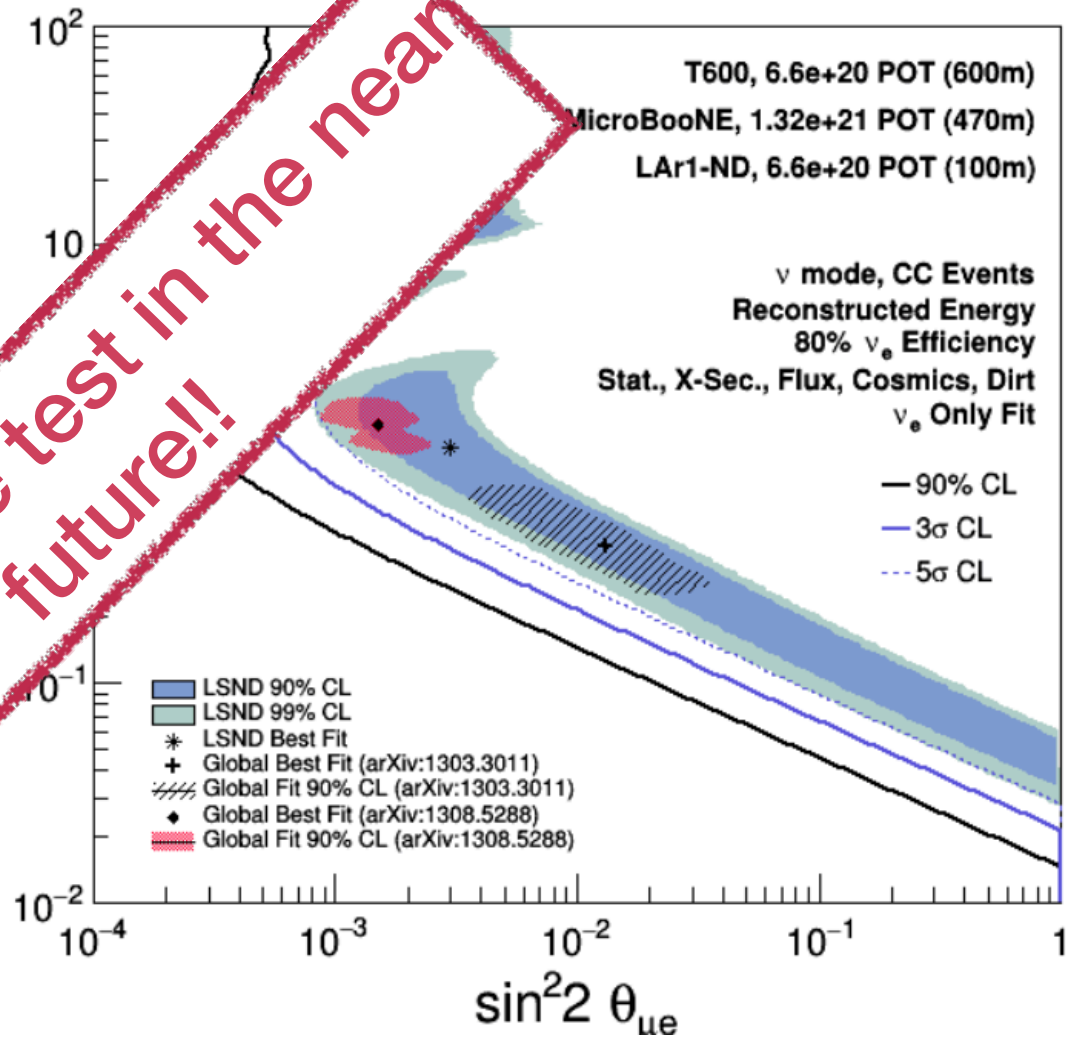
The SBN Programme



The SBN Programme



Only definite test in the near future!!



Conclusions

- ◆ MicroBooNE has successfully turned on and is taking neutrino data
- ◆ MicroBooNE will address the MiniBooNE low-energy excess and make many crucial cross-section measurements
- ◆ Data already collected will allow us to produce first physics results
- ◆ SBN will provide a definitive answer to LSND/MiniBooNE anomaly
- ◆ Sterile neutrino question is critical for DUNE (perfect timescale)
- ◆ MicroBooNE and SBND will produce the first measurements of neutrino-argon cross sections in a region relevant for DUNE