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Announcements

Today's New Announcements

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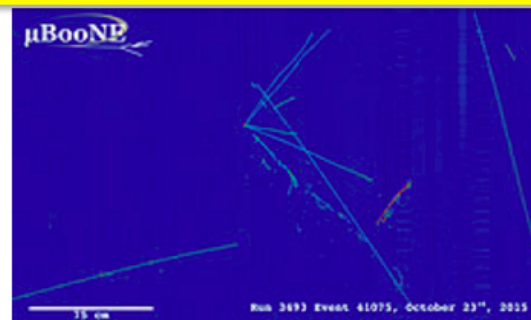
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Feature

MicroBooNE sees first accelerator-born neutrinos



This display shows a neutrino event candidate in the MicroBooNE detector. *Image: MicroBooNE*

Today the MicroBooNE collaboration announced that it has seen its first neutrinos in the experiment's newly built detector.

"It's nine years since we proposed, designed, built, assembled and commissioned this experiment," said a MicroBooNE co-spokesperson and a professor of physics at Yale University. "That kind of investment makes seeing first neutrinos incredible."

After months of hard work and improvements by the Fermilab Booster team, on Oct. 15, the Fermilab accelerator complex began delivering

In Brief

Kautz Road closed - Nov. 4-5



[Click to enlarge view of Kautz Road closure.](#)

As part of a utilities upgrade project, a section of Kautz Road near the west Booster Tower, as well as a part of the nearby parking lot, will be closed from Nov. 4-5.

Detour signs and flagmen will be posted to facilitate traffic flow. Please follow the signs and drive safely. Refer to the above map for more information.

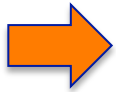
Further construction projects will take place throughout November. FESS will announce them as the construction dates approach.

Photo of the Day

Fermilab All Experimenter's meeting
 Anne Schukraft on behalf of the MicroBooNE collaboration
 Nov 2, 2015

Automated neutrino event selection

- MicroBooNE received first beam on Oct 15!
- We are expecting about 1 neutrino interaction inside the detector per 650 beam spills.
- We are triggering on every beam spill, which corresponds to trigger rates between 1 Hz and 5 Hz.



Most of our recorded events contain only cosmics.
Each neutrino interaction is overlaid by ~ 30 cosmic muon tracks.

How to automatically tag neutrino events?

1. There must be optical activity in the event in coincidence with the beam spill time.
2. The event topology must resemble a neutrino interaction.

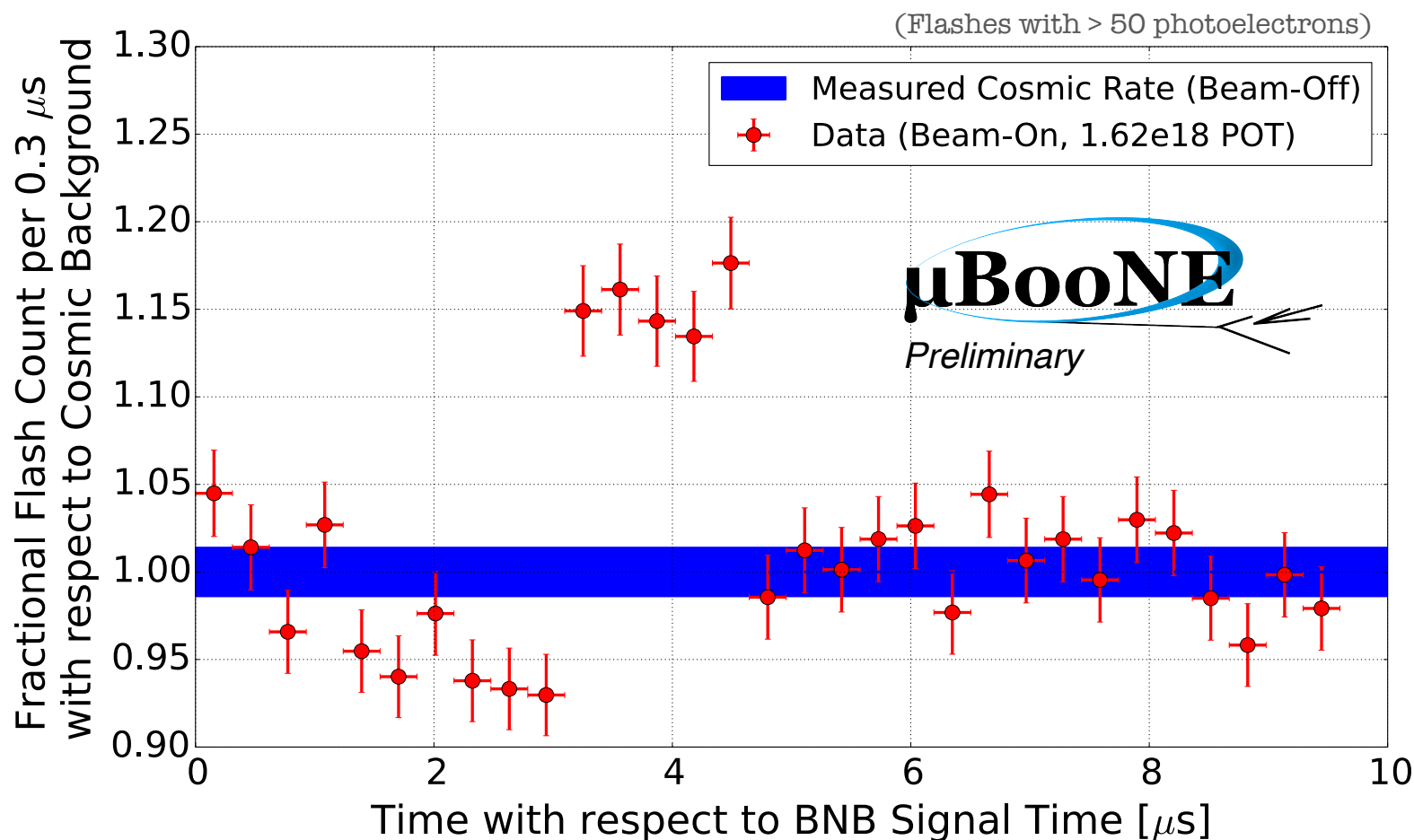
Note: this first selection is aiming for high purity and not high efficiency.

Calibrating the beam timing

- A recorded event is 4.8 ms long, with a time window ranging from $t = -1.6$ ms to 3.2 ms.
- The beam spill window is only 1.6 μ s long.
- The beam trigger is received at $t = 0$, but the offset between the trigger and the actual beam spill needs to be determined.

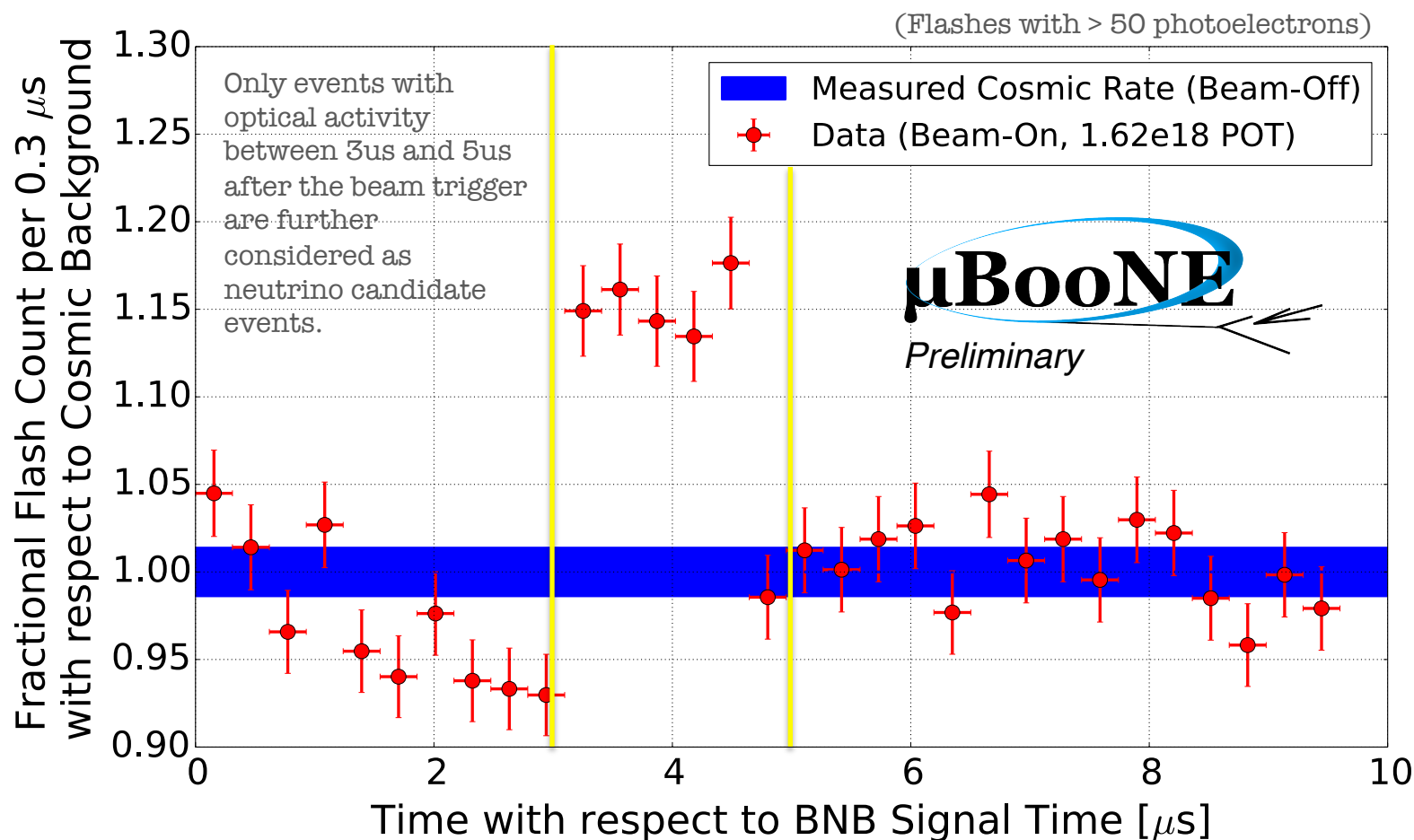
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Topological selection

We developed two different topological filters

2D filter: running on reconstructed 2D clusters in the collection plane (beam direction and time)

3D filter: running on 3D reconstructed tracks

Selection criteria are:

- Track/Cluster must be contained inside the TPC volume in space and time
- There must be at least two clusters/tracks connected at a common vertex
- There must be a long cluster/track in beam direction

Rates for background passing the filters is estimated from off-beam data.

MicroBooNE Preliminary 1.86E18 POT, BNB		
First ν identification		
Number of events	Automated event selection Optical + 3D-based	Automated event selection Optical + 2D-based
Non-beam background (expected)	4.6 ± 2.6	385 ± 24
Total observed	18	463

The events in this table were selected fully automated.

We do see a very clear excess of filtered events, especially for the 3D filter.

Example events

(collection plane view)

μ BooNE



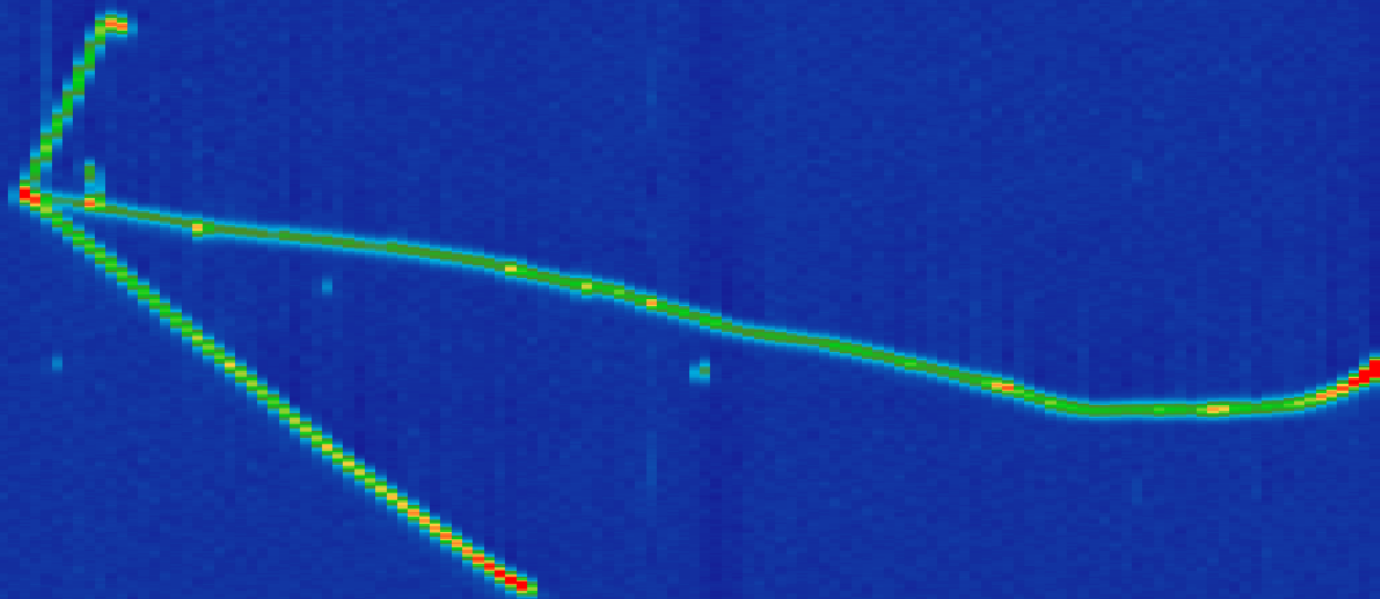
55 cm

Run 3469 Event 53223, October 21st, 2015

Example events

(collection plane view)

μ BooNE



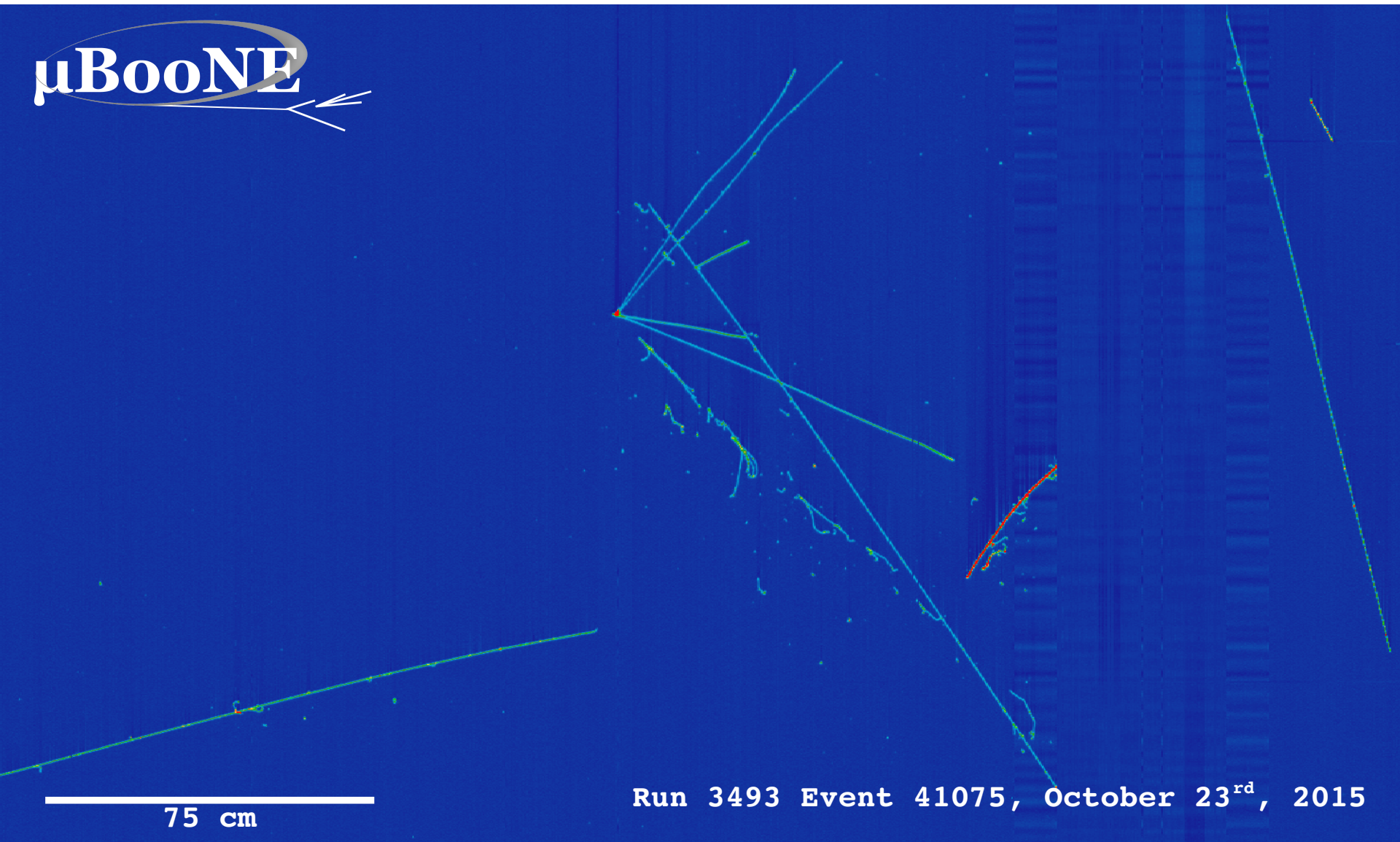
12.5 cm

Run 3470 Event 61421, October 21st, 2015

Example events

(collection plane view)

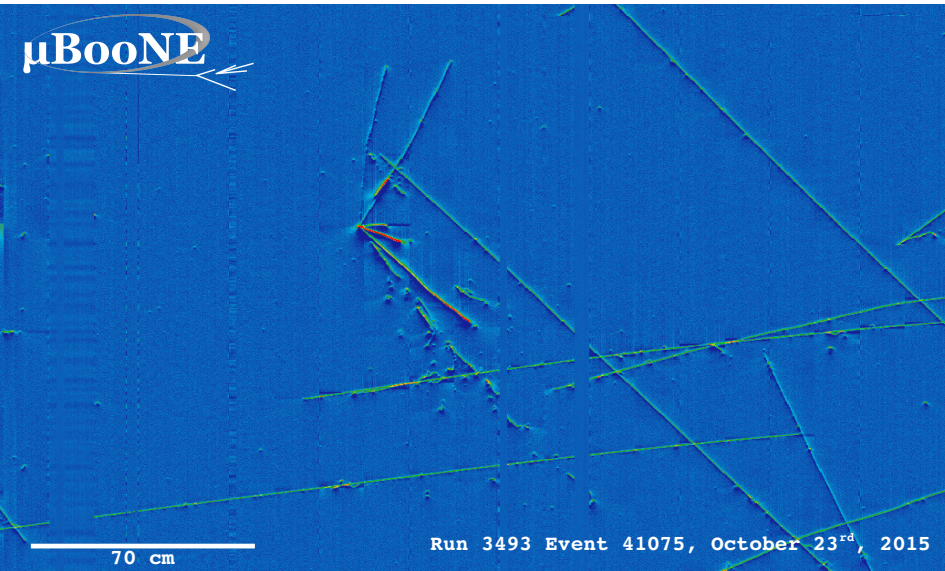
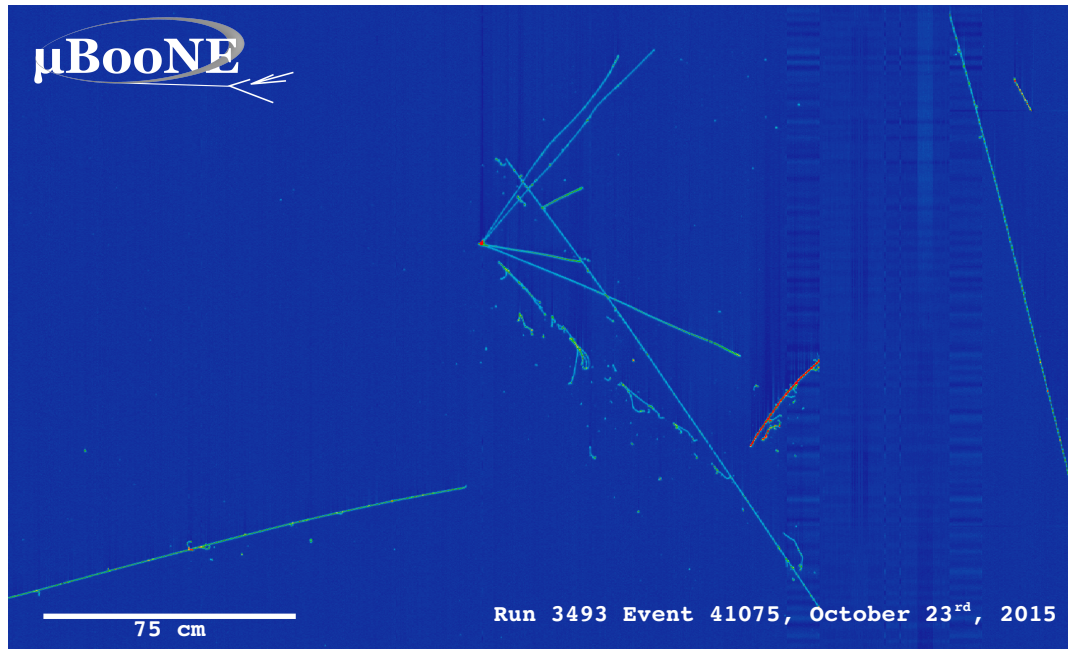
μ BooNE



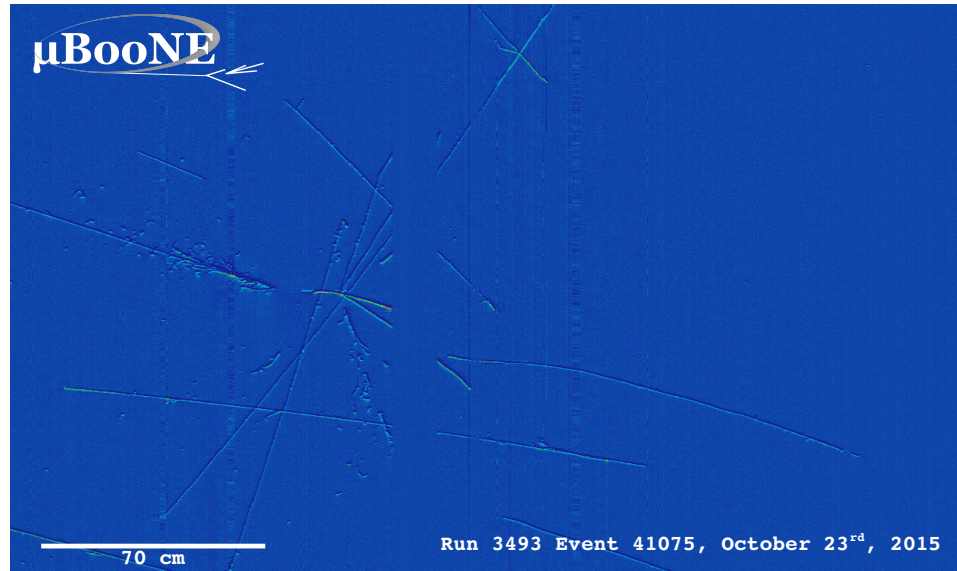
(collection plane view)

Example events

Same event in all three anode plane views.



(induction plane view (V))



(induction plane view (U))

We are very happy to have seen our first neutrinos!

See more of them: <http://www-microboone.fnal.gov/first-neutrinos/index.html>



We would like to thank everybody inside and outside the experiment who helped make this happen.

In particular, we would like to thank the accelerator division for sending us these beautiful neutrinos!