Calorimetry likelihood

A new method for particle identification in liquid argon

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On behalf of the MicroBooNE collaboration

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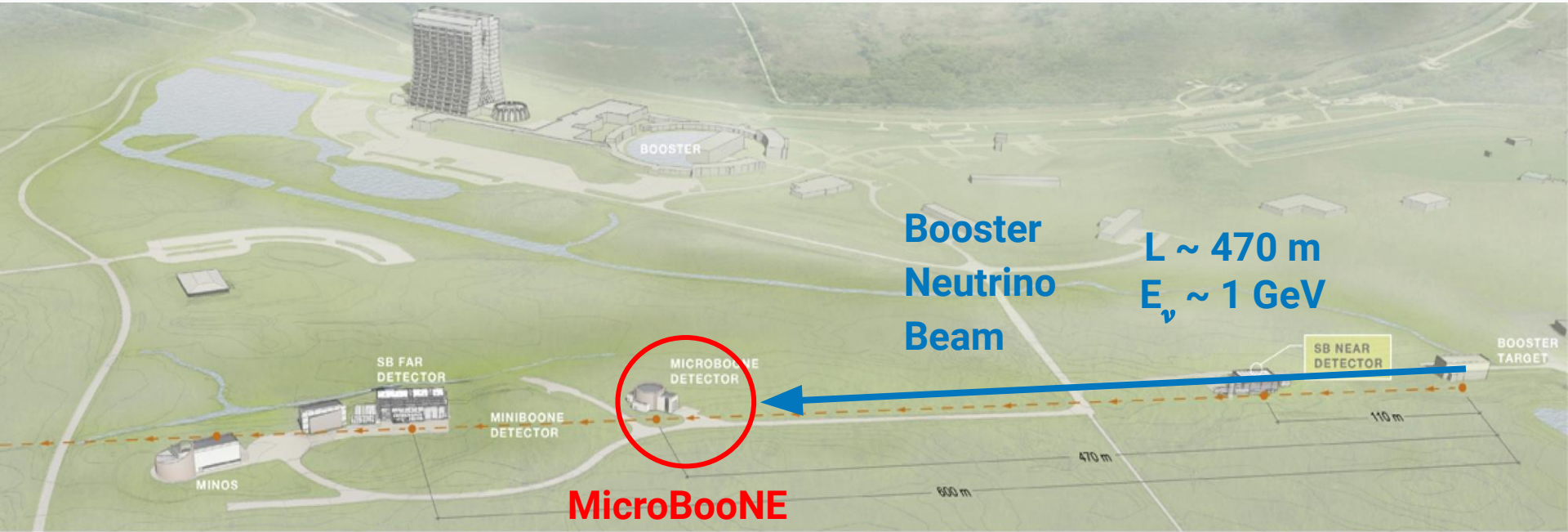
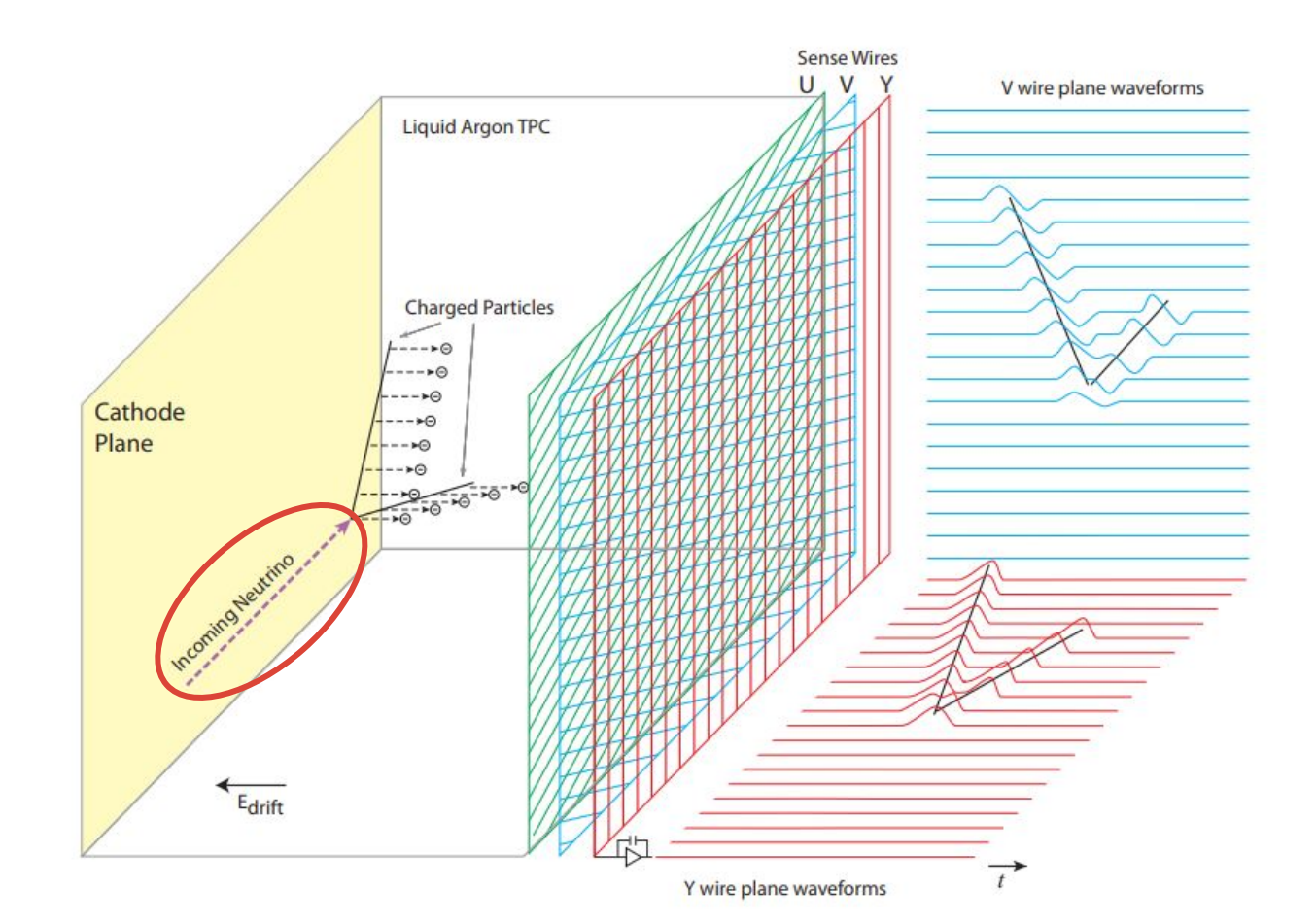
Micro Booster Neutrino Experiment at Fermilab

- Short baseline neutrino experiment
- Physics goals:
  - Investigate the anomalous excess of low energy events observed by MiniBooNE
  - Detailed measurements of neutrino interactions
- Technology:
  - Liquid argon time projection chamber - R&D towards new detectors, like SBND and DUNE



A liquid argon TPC - in theory



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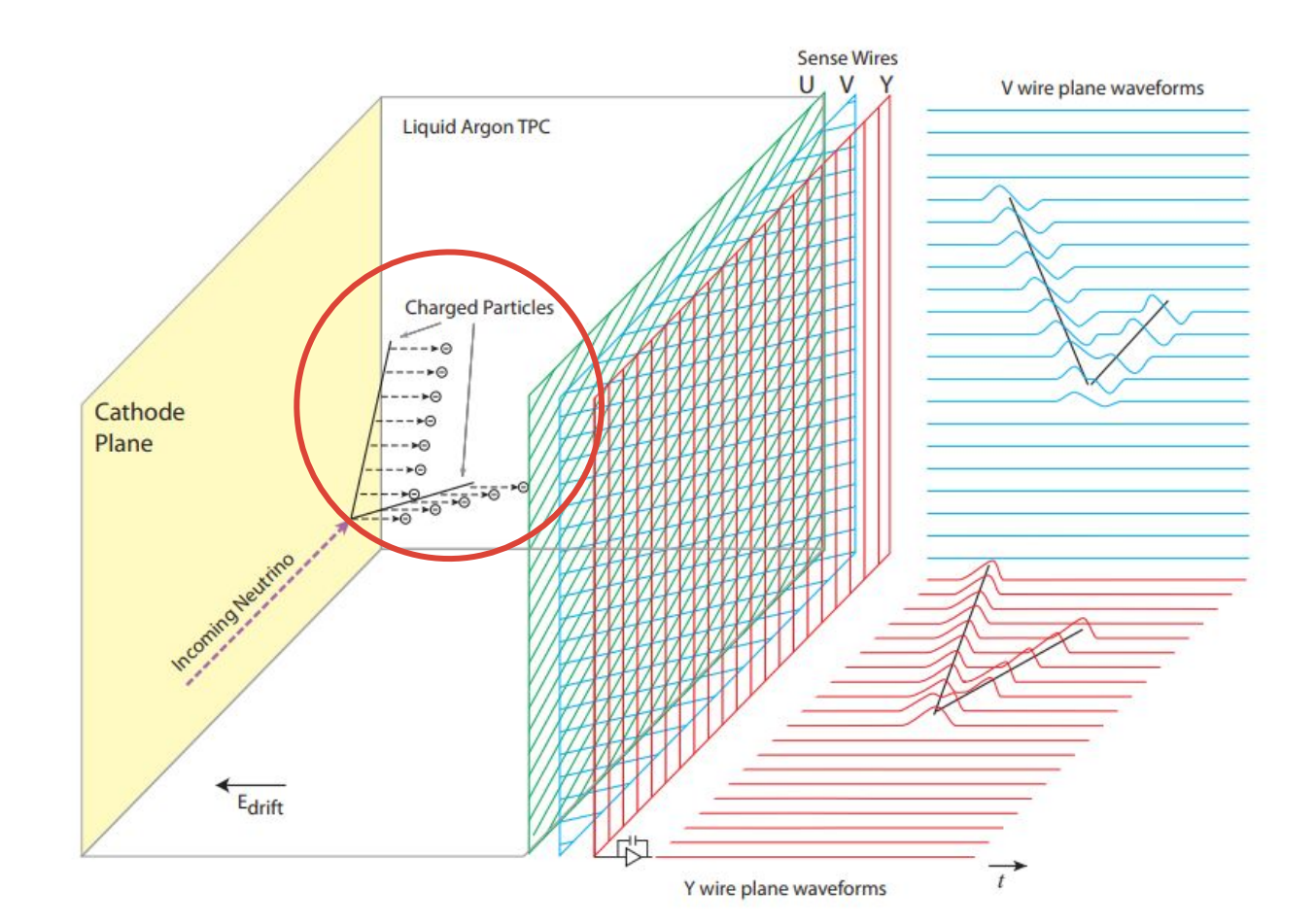

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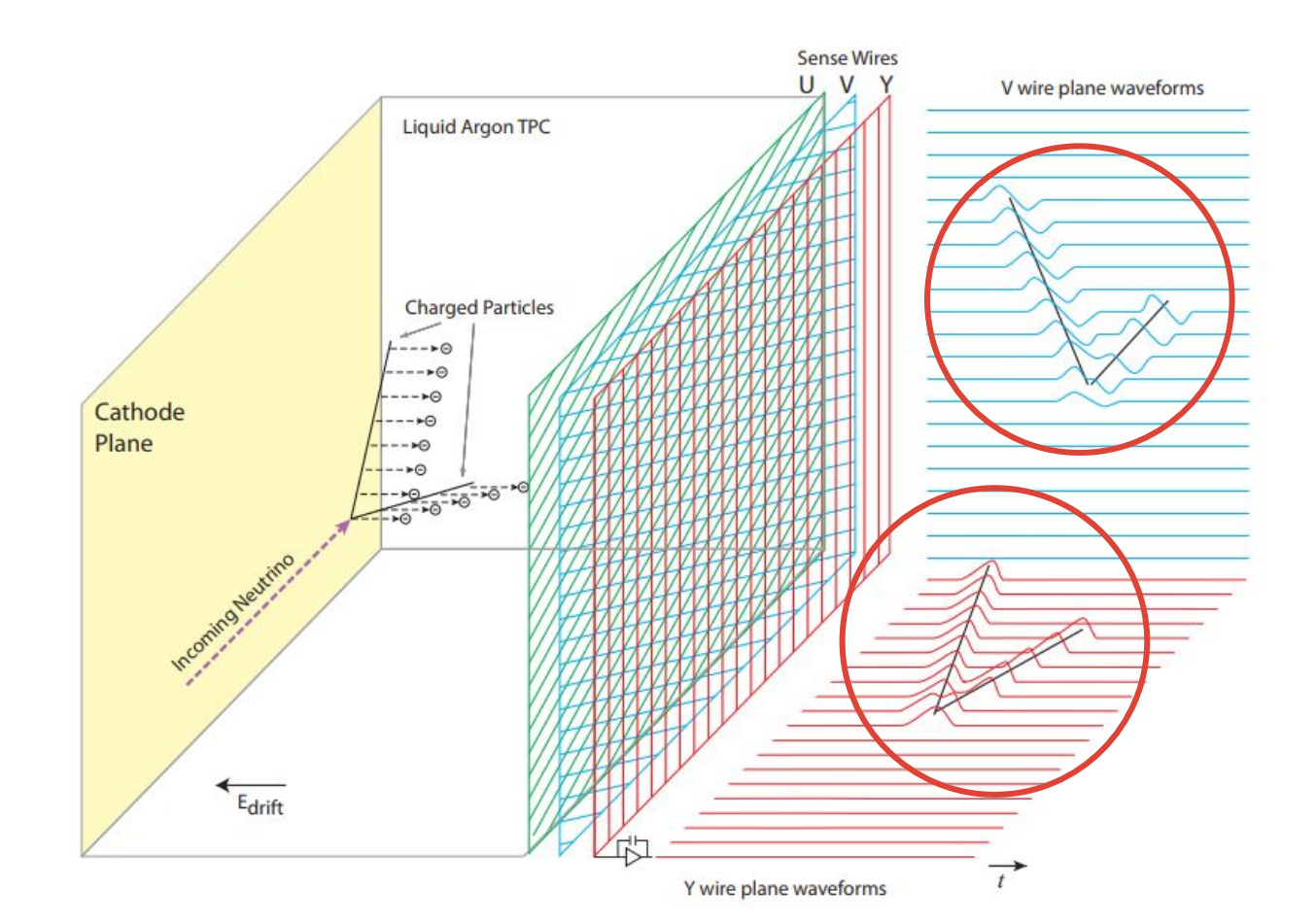
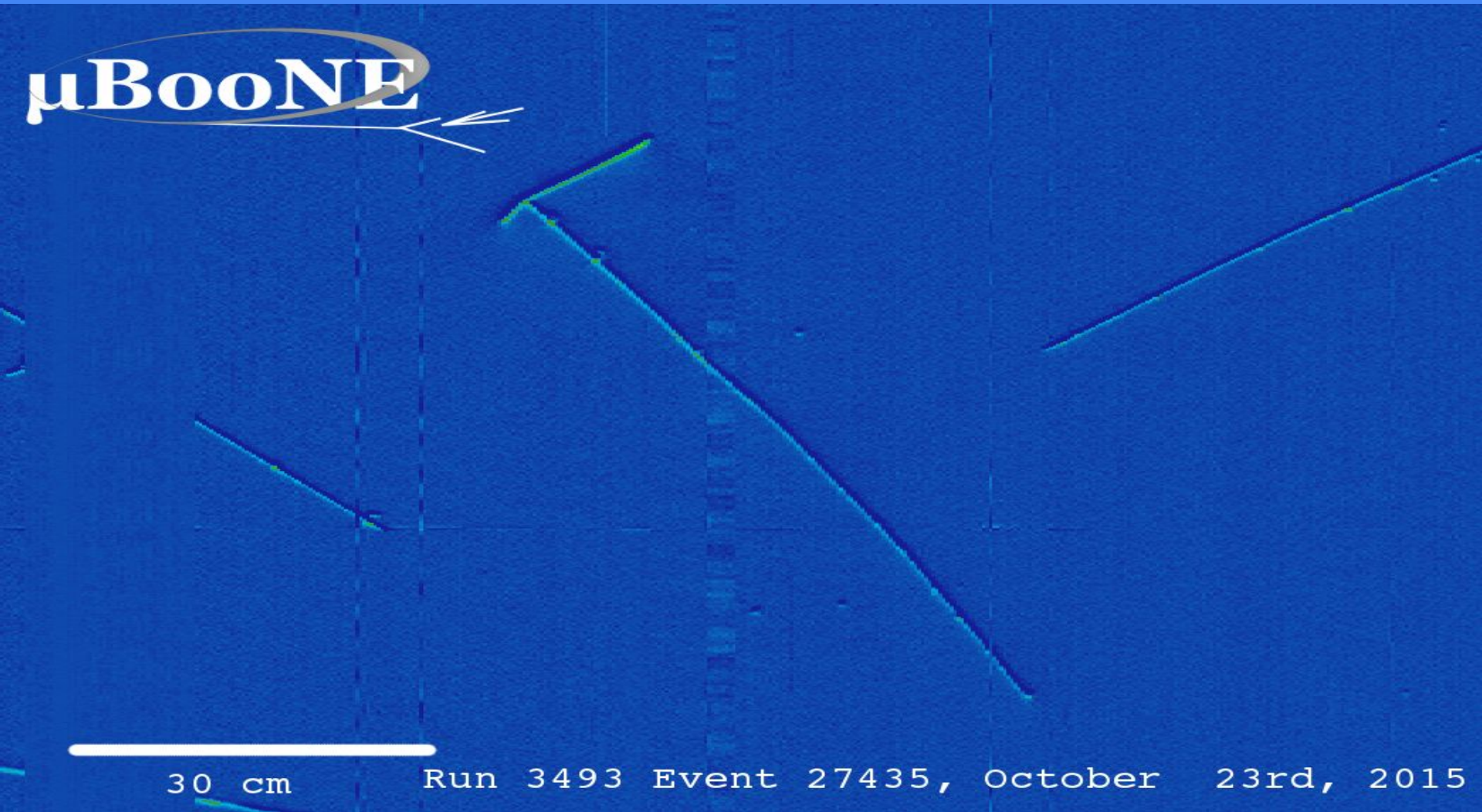


A liquid argon TPC - in practice



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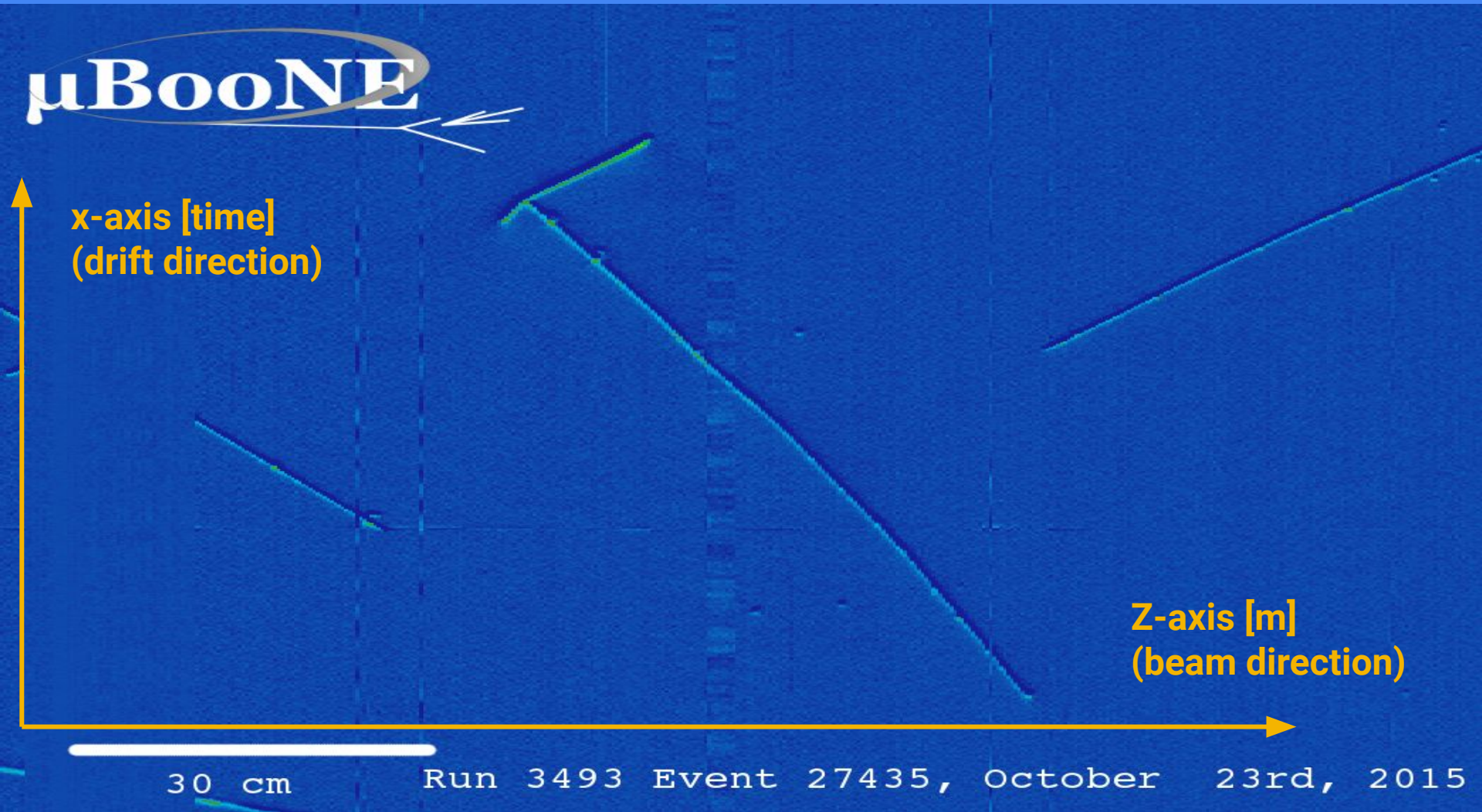

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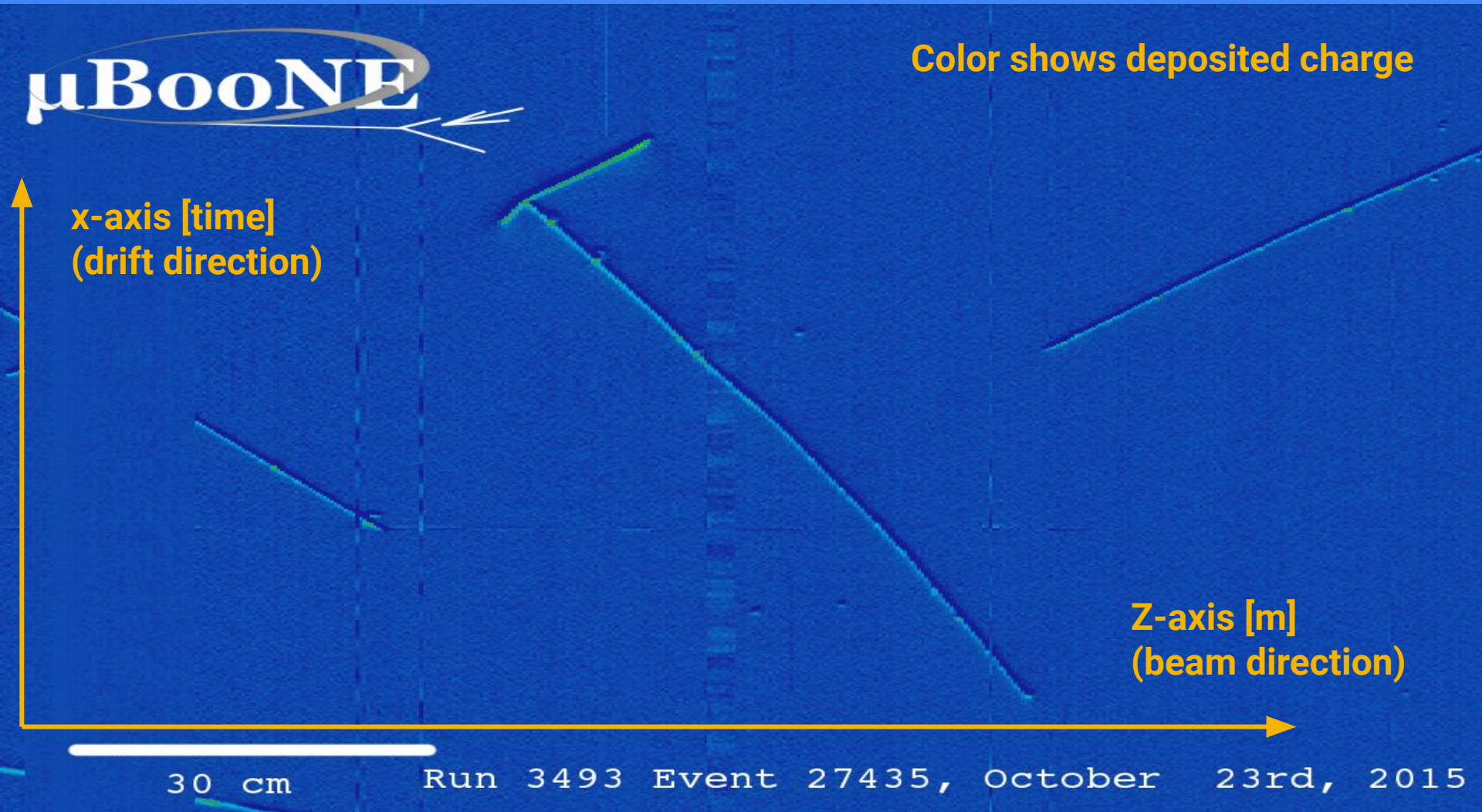

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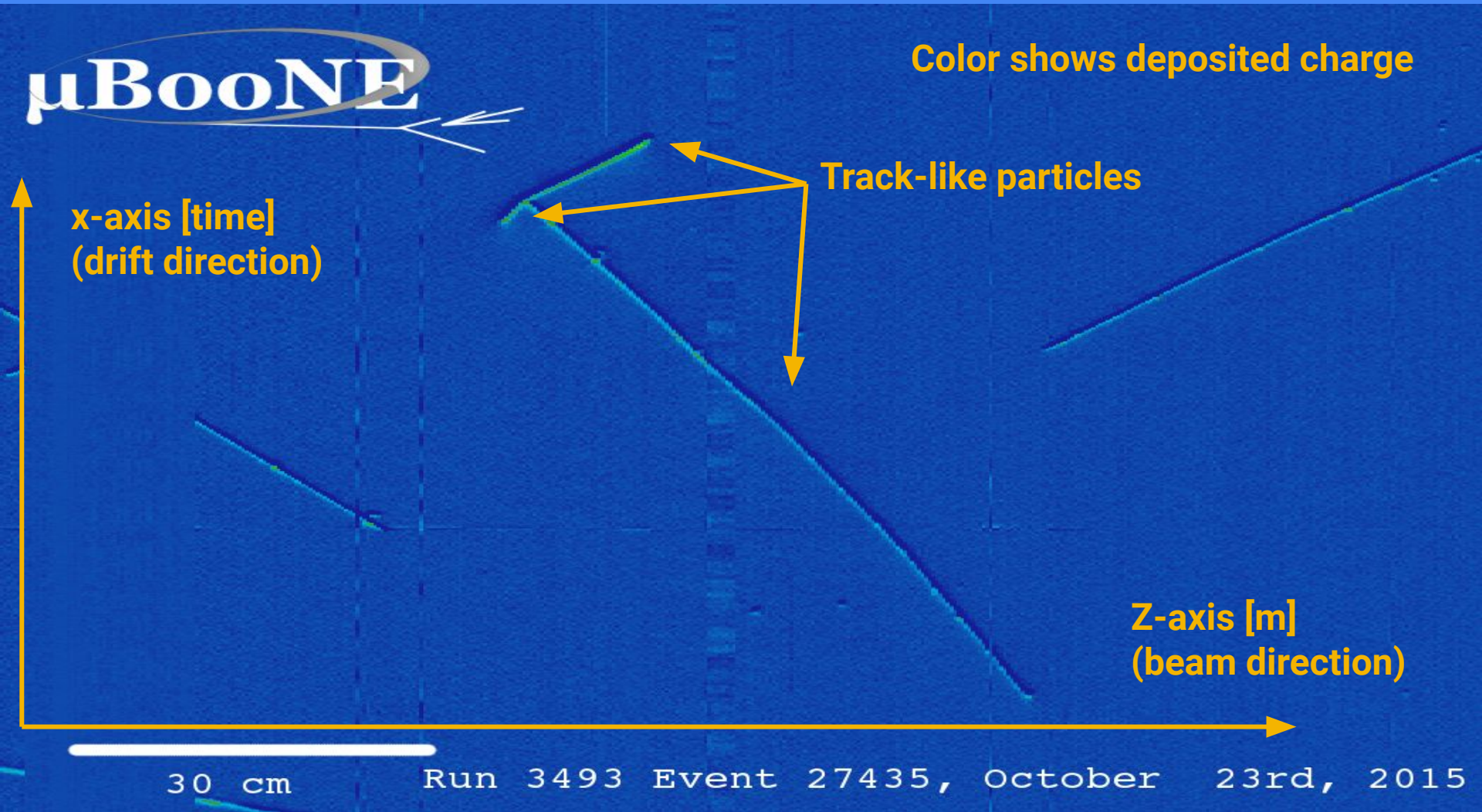

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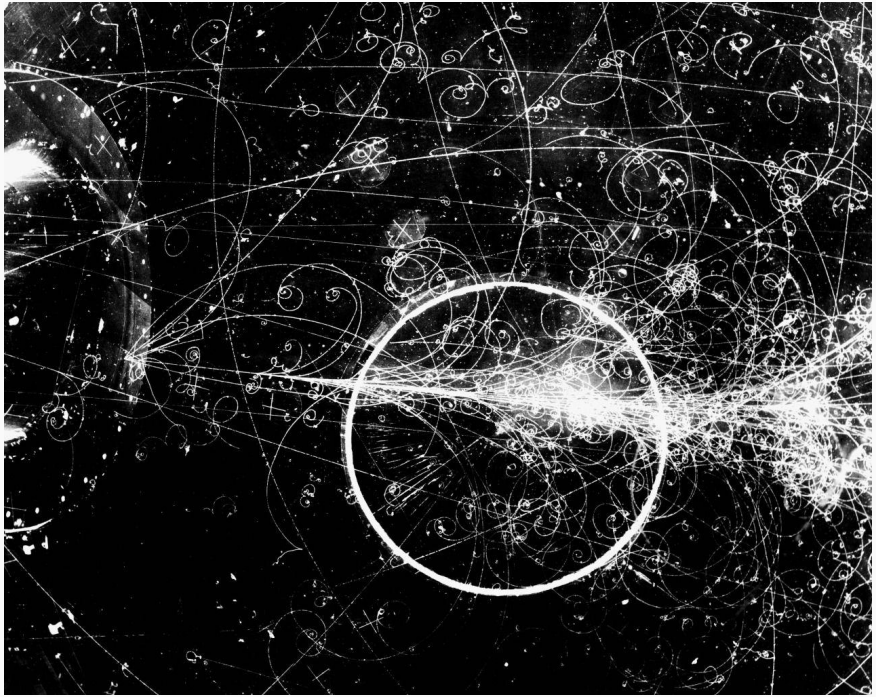

Bubble chambers-like detectors...

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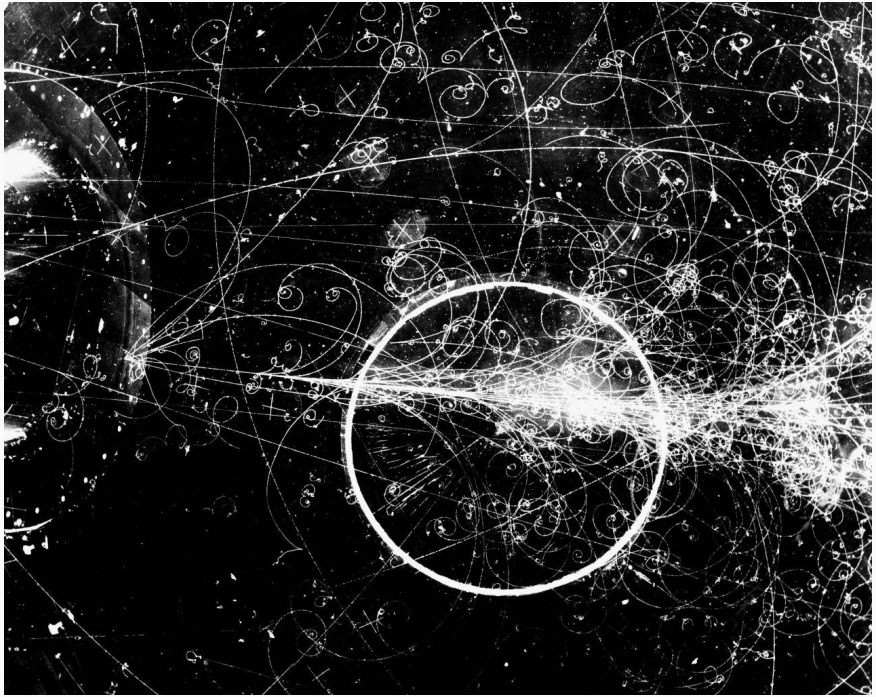

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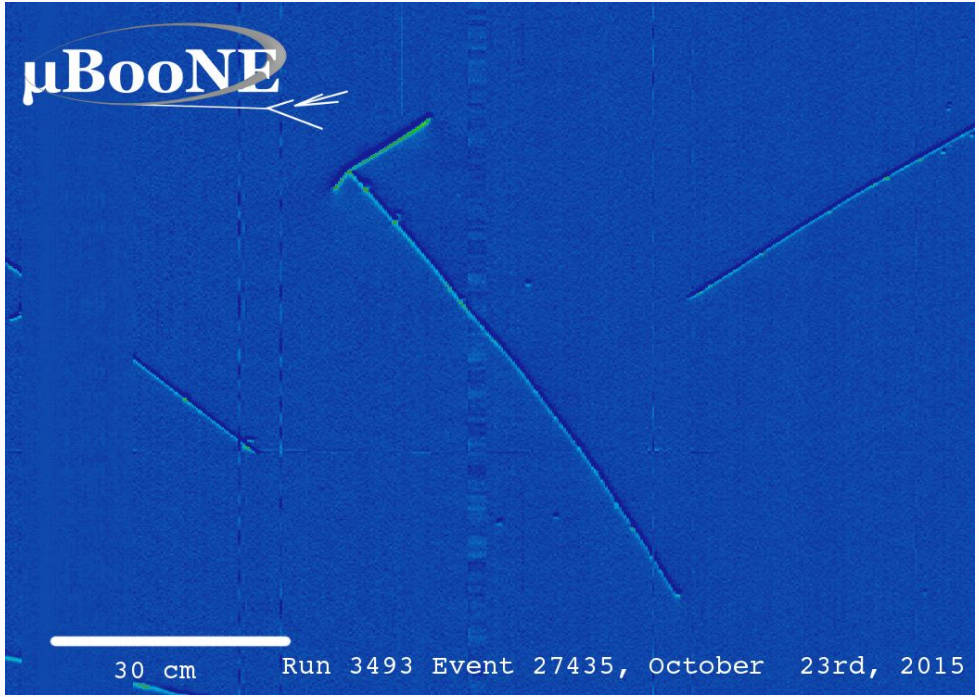
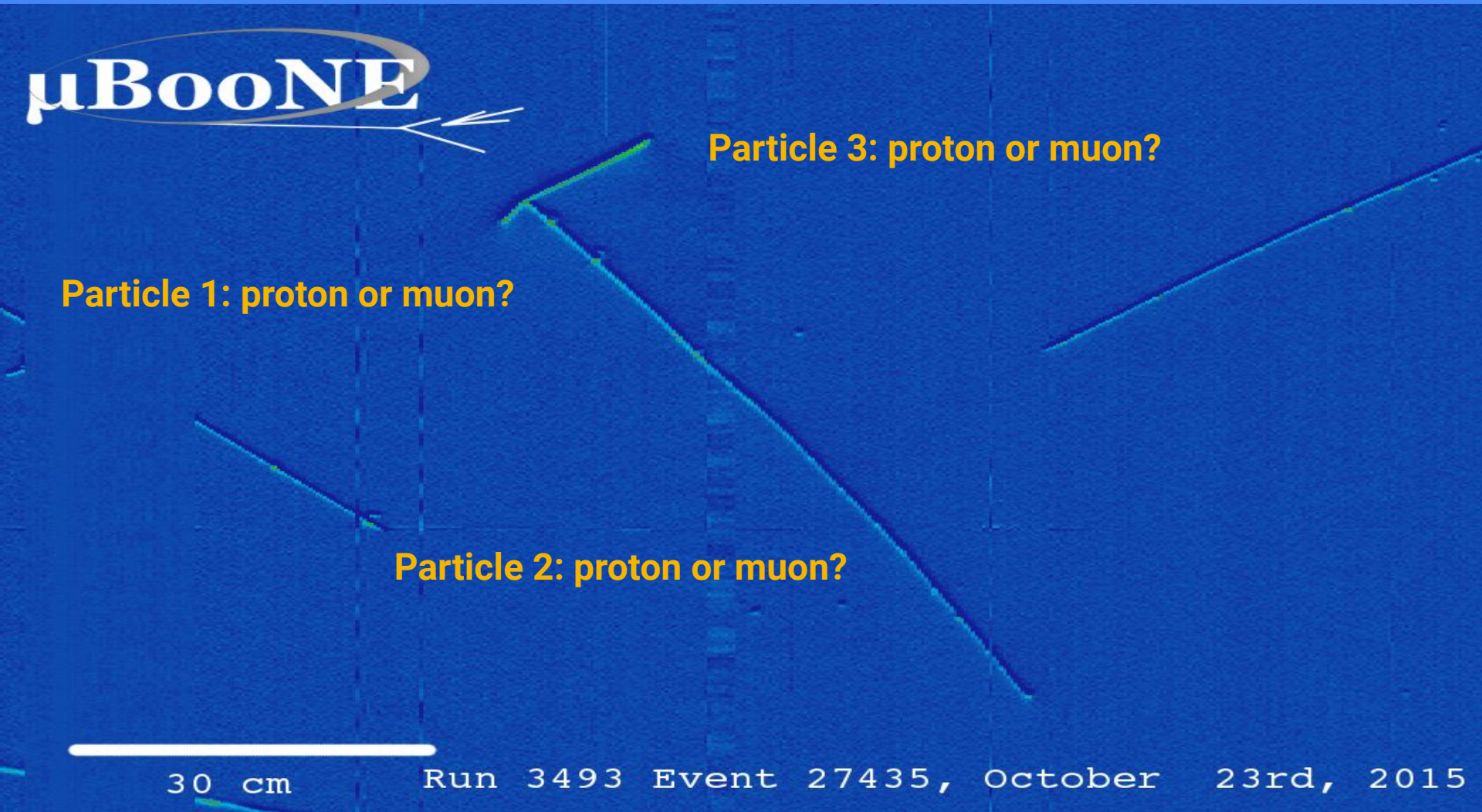
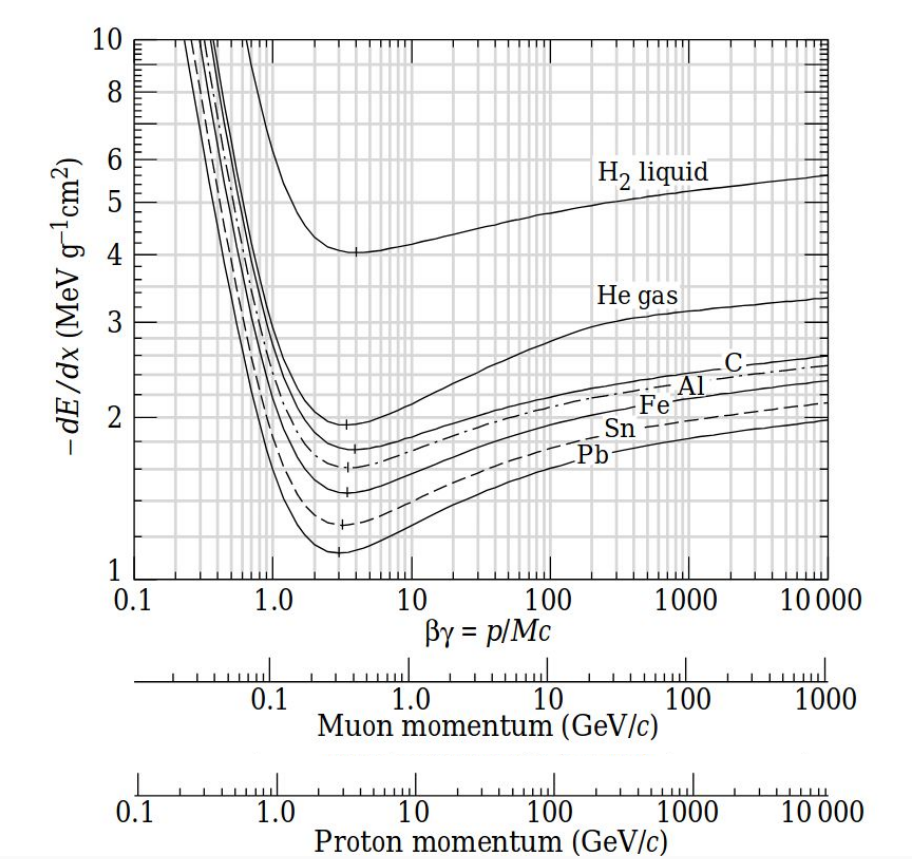


...with calorimetric capabilities

Particle identification



Ionisation from the Bethe-Bloch theory



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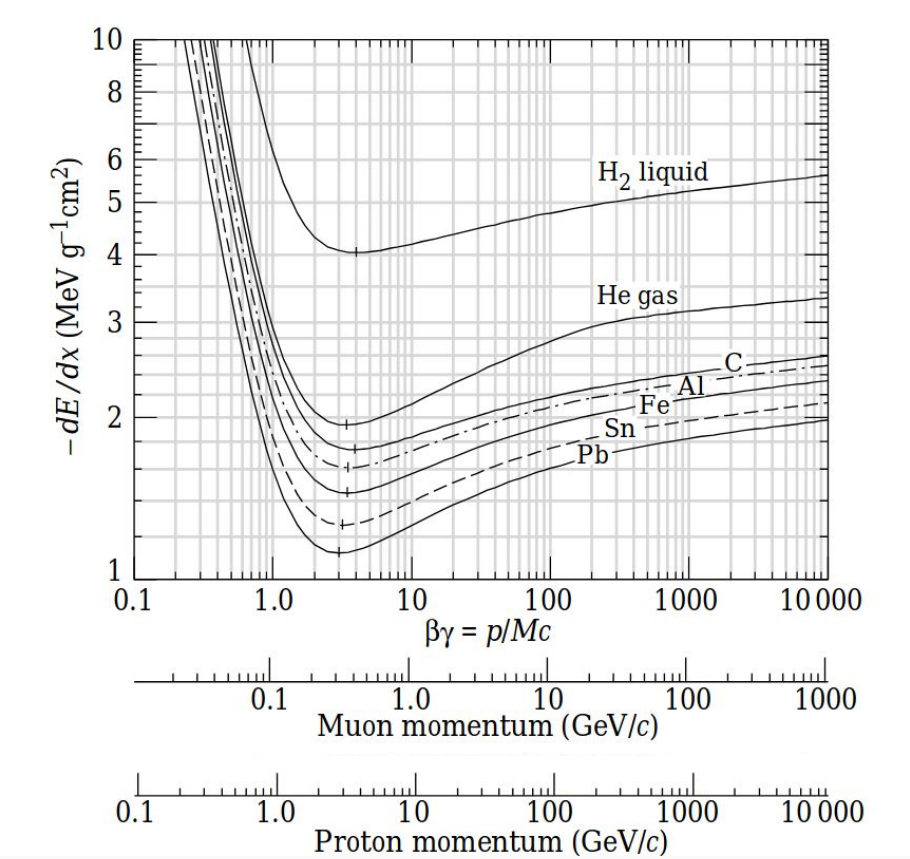

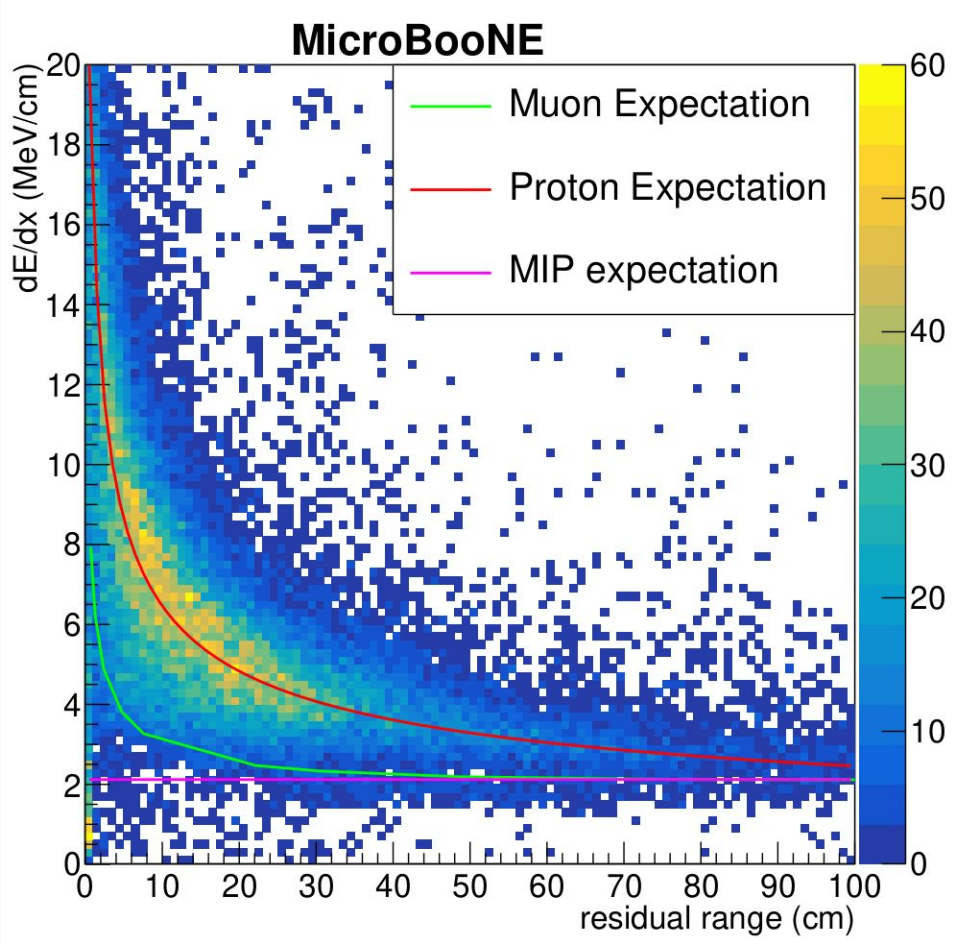

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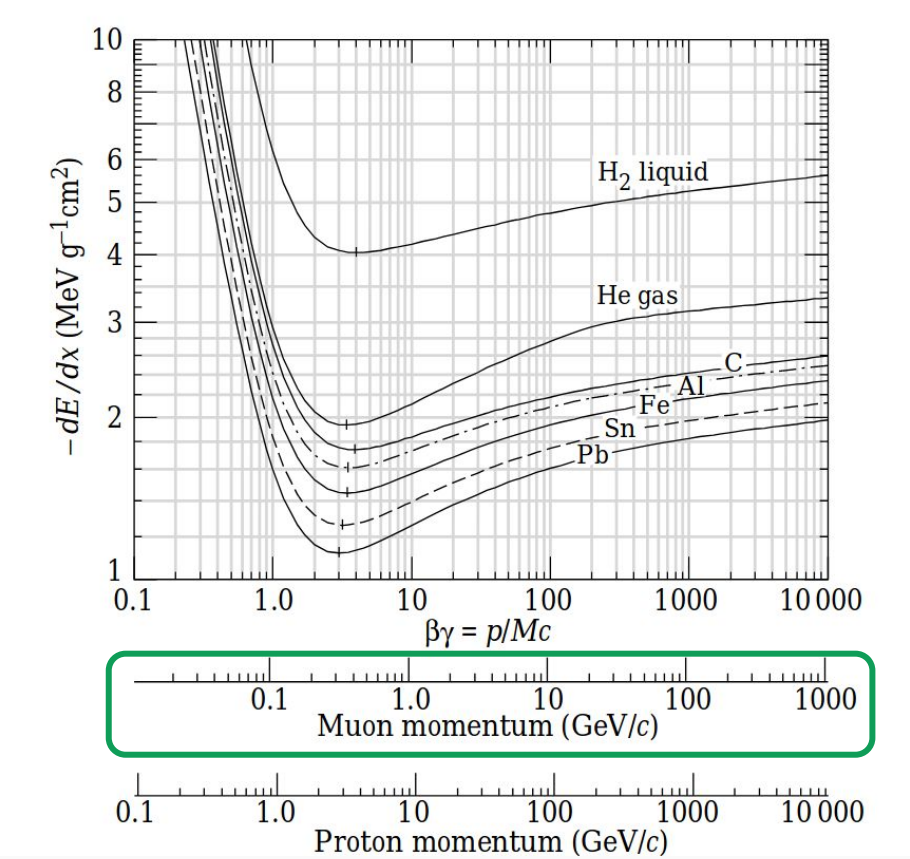

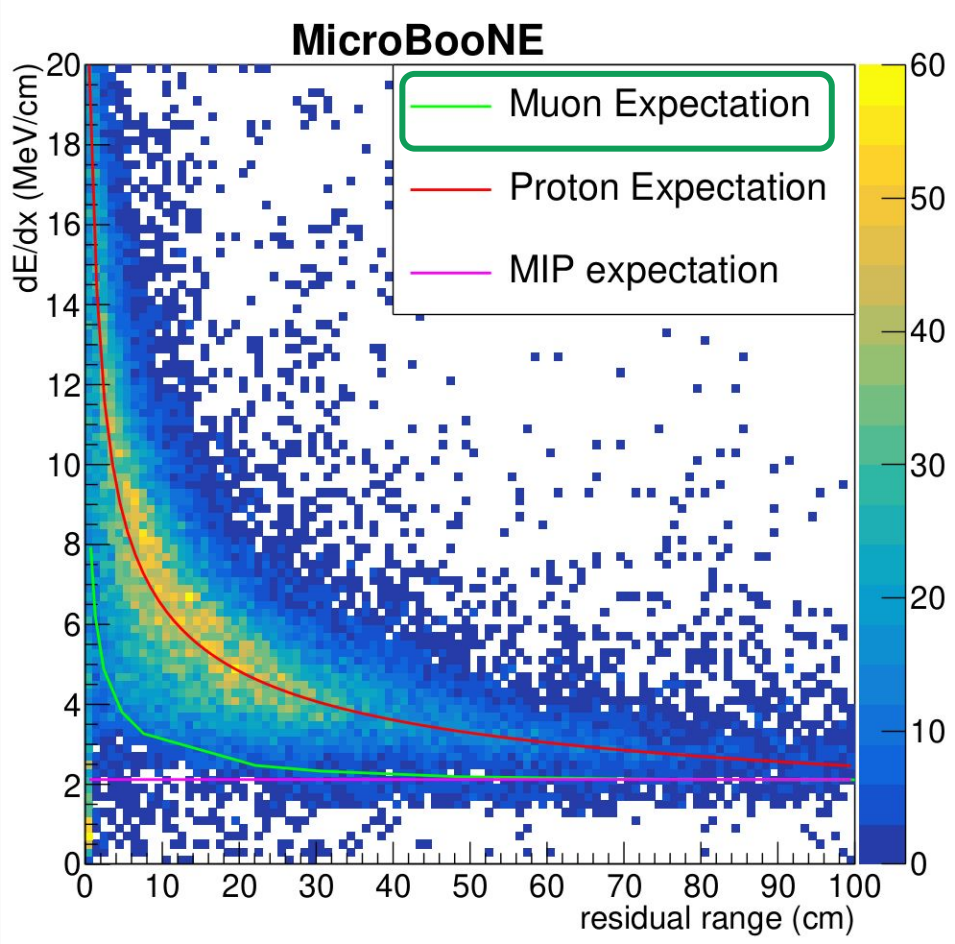

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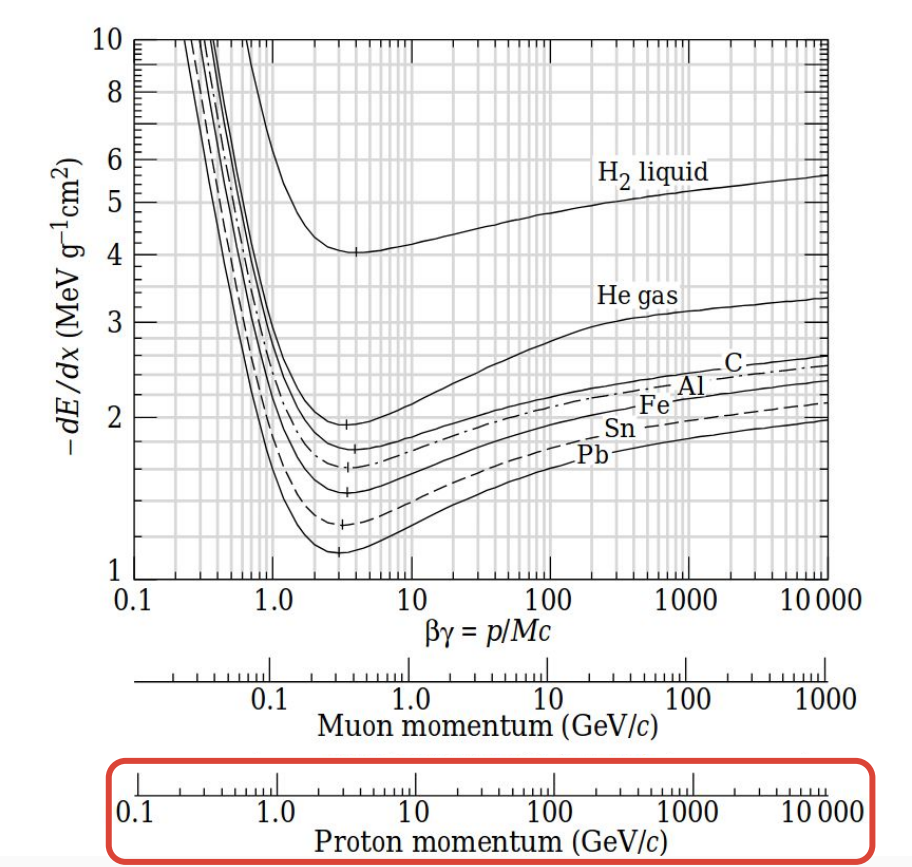
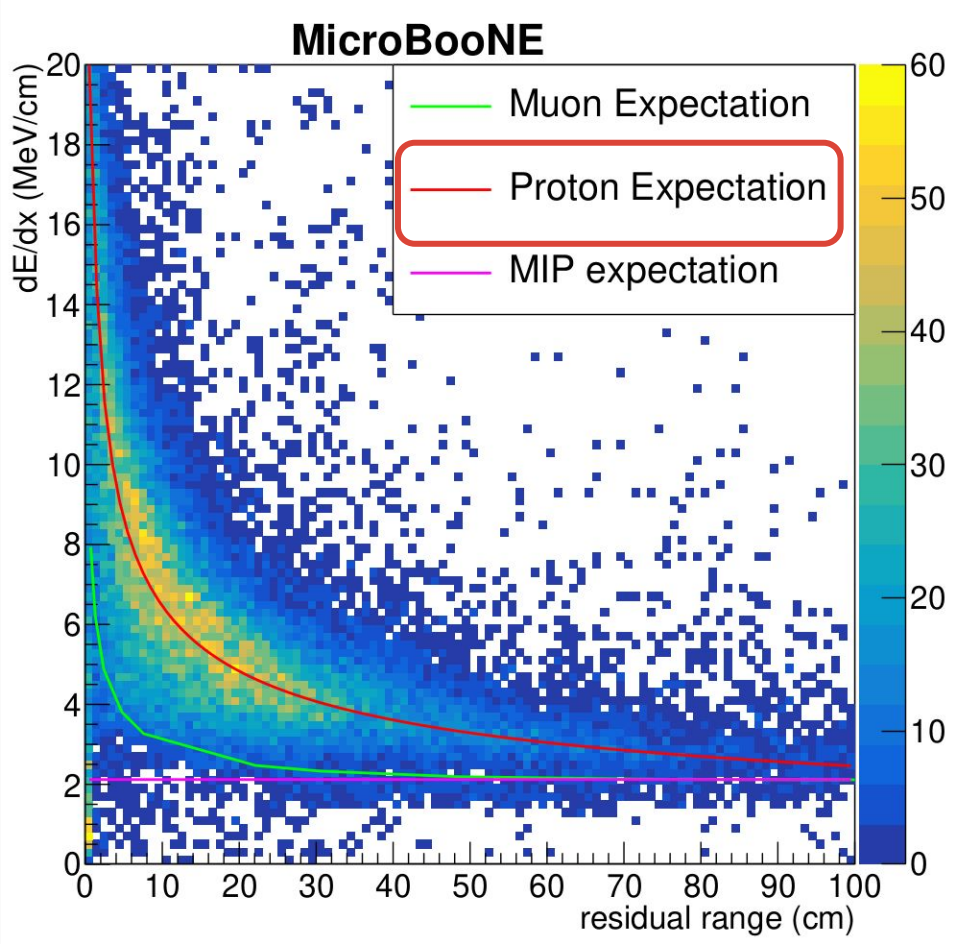
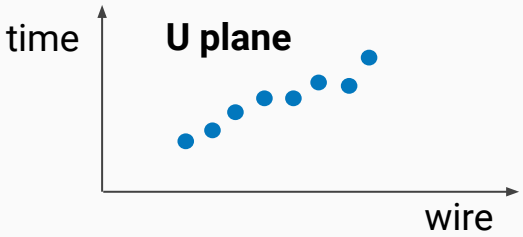
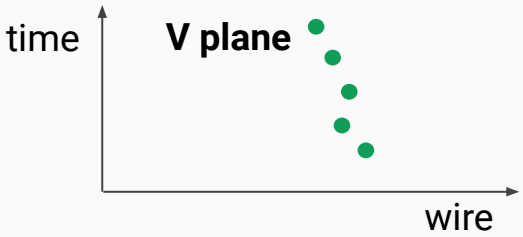
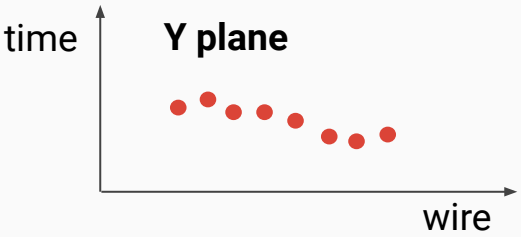




From 2D images to 3D reconstruction







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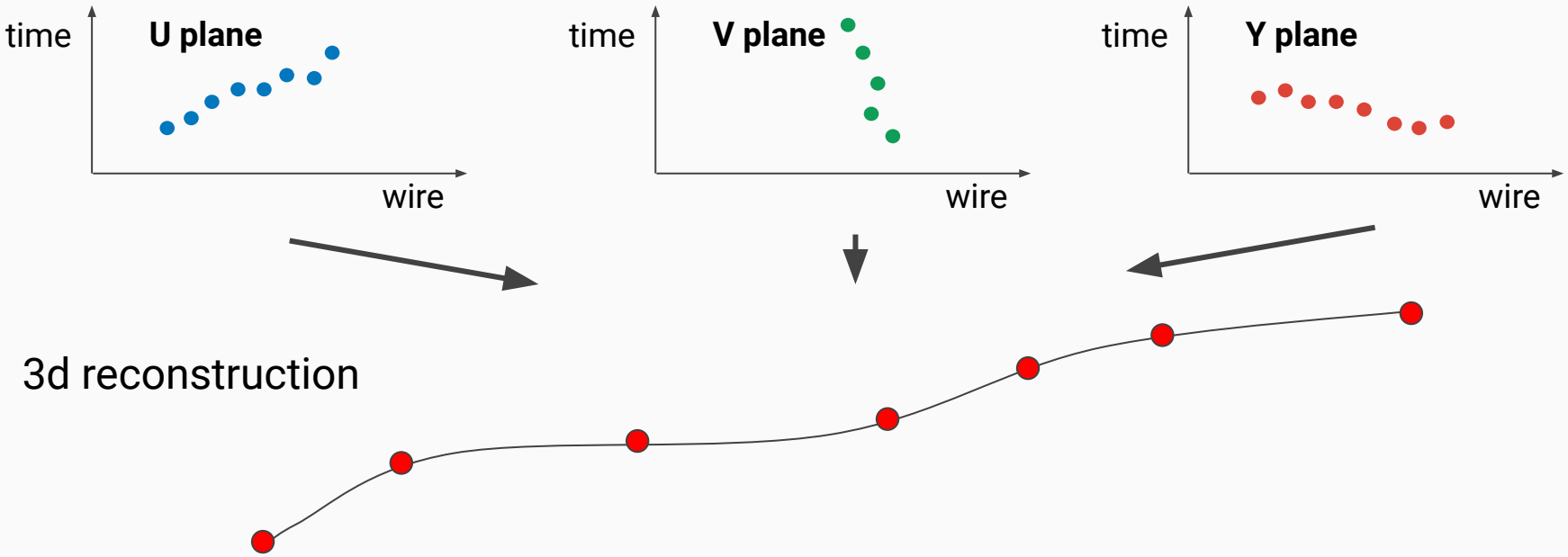

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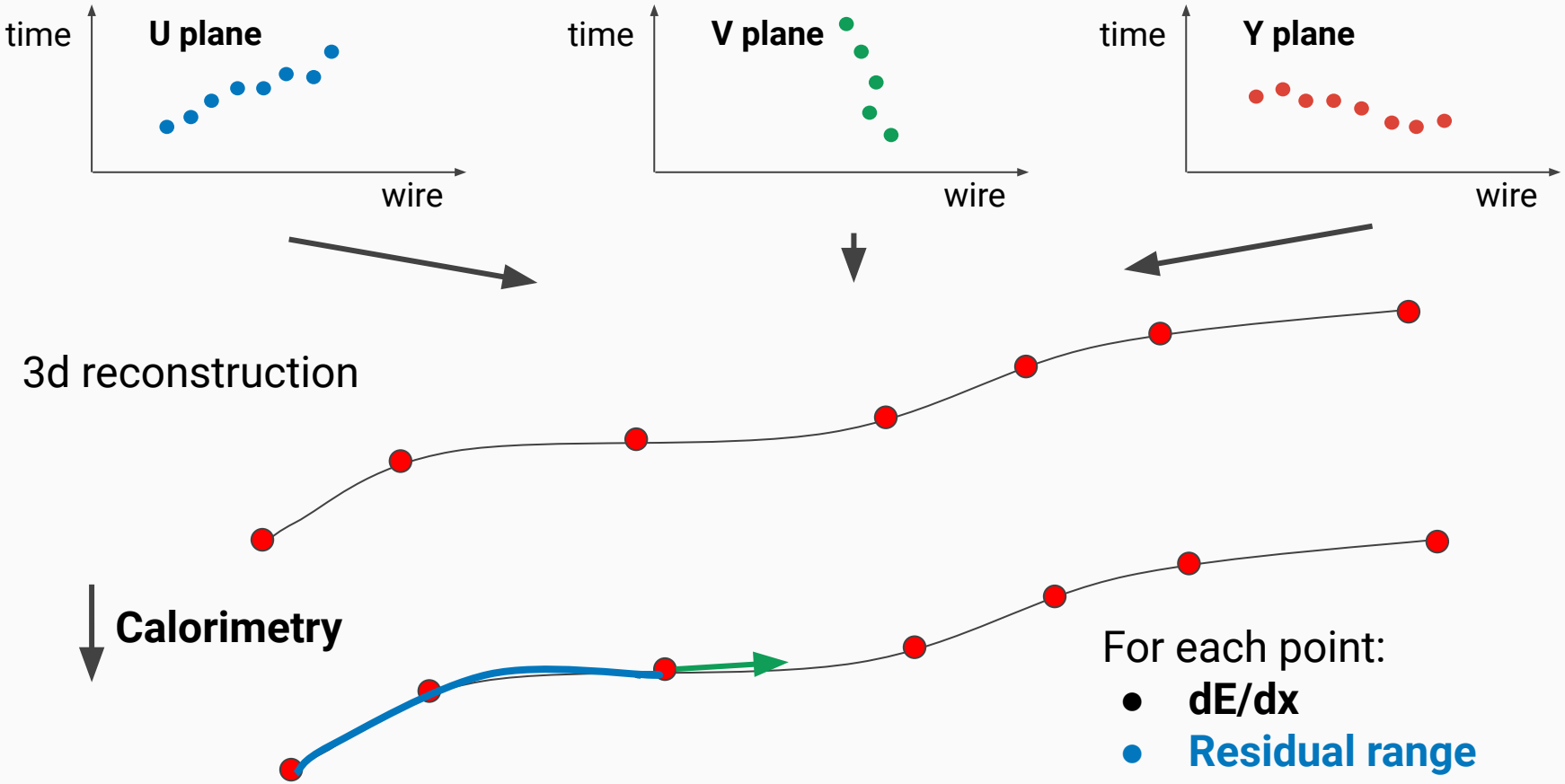

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Model the dE/dx distribution taking into account detector anisotropies

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Combine the measurements of the three planes in the optimal way

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Correct the simulation to match the data

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Model the dE/dx distribution taking into account detector anisotropies

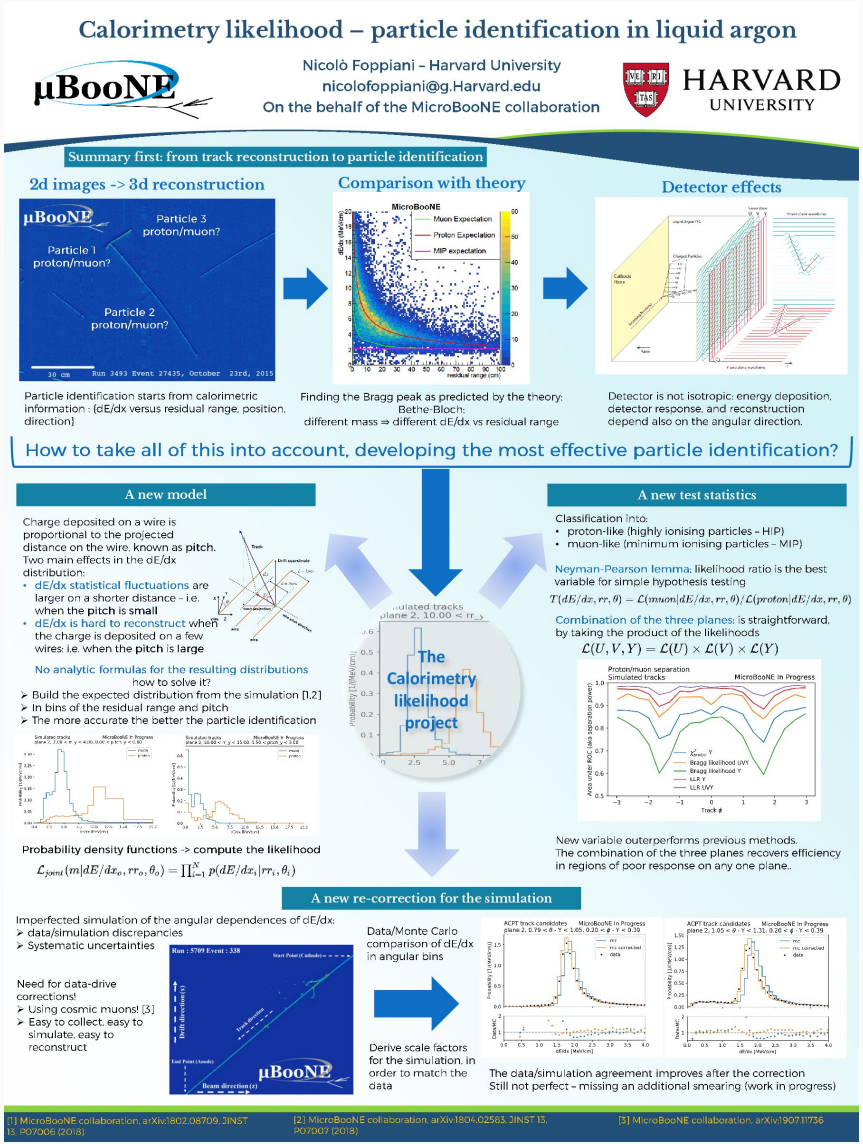
The Calorimetry Likelihood Project

Combine the measurements of the three planes in the optimal way

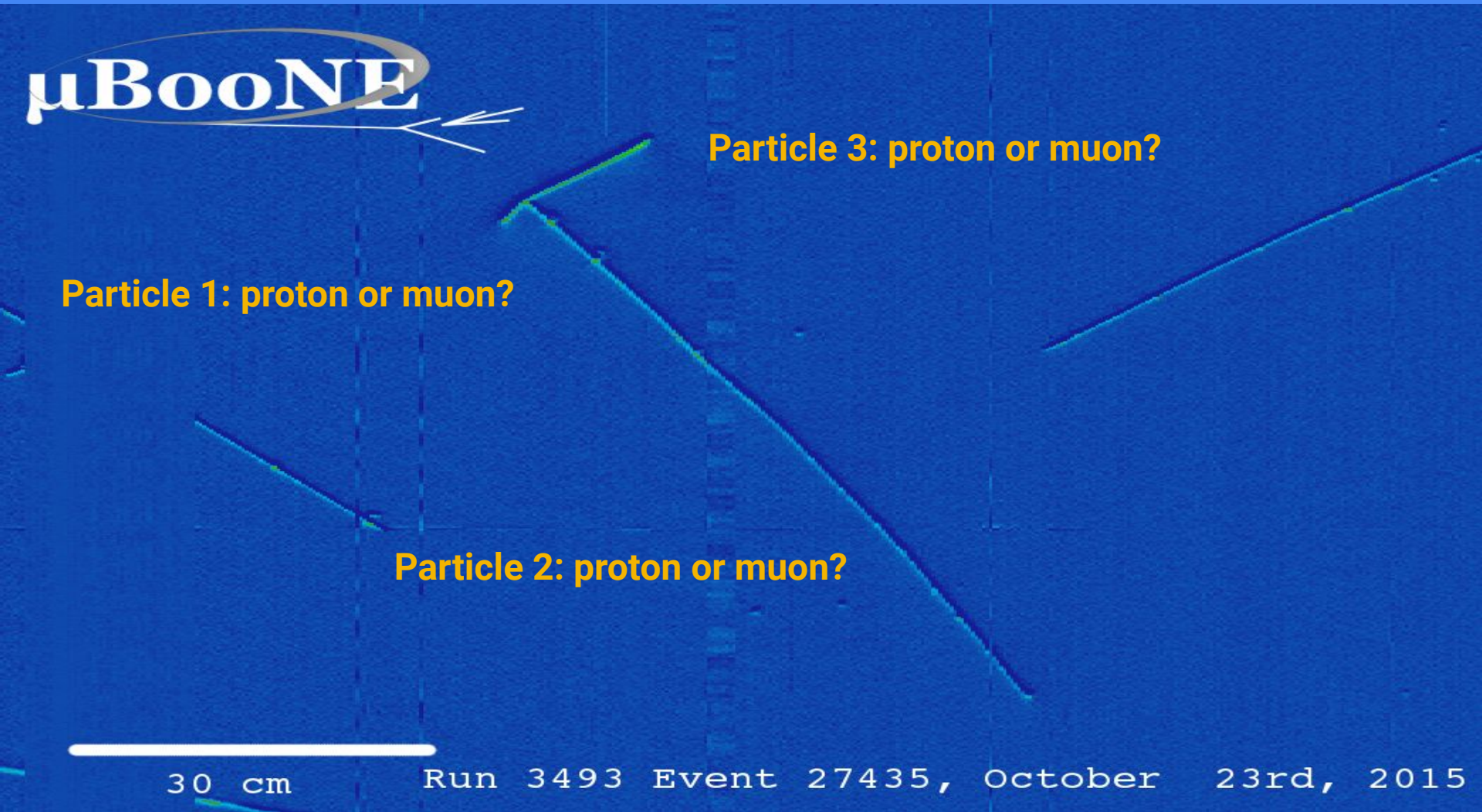
Correct the simulation to match the data

Poster E9

Stop by my poster to learn more!
(Or look for me during the coffee breaks!)



Do you want to know the answer?



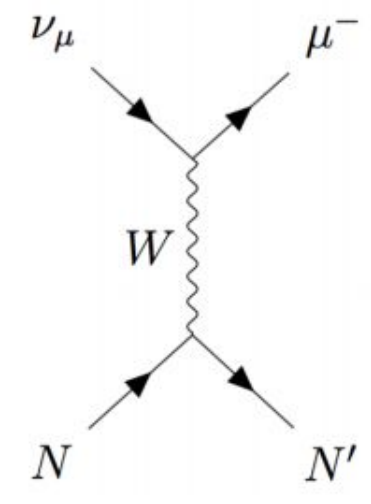
BACKUP

Neutrino Interactions in MicroBooNE

Typical neutrino energy ~ 1 GeV

➔ In this energy range interactions with the nuclei are predominant

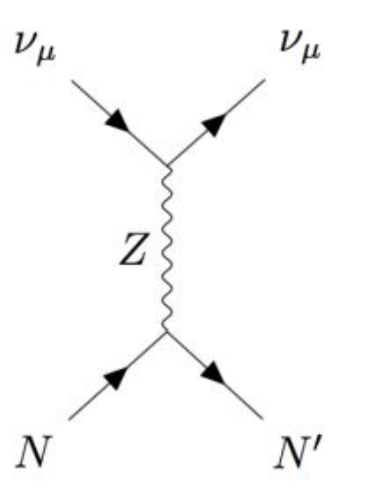
Charged current interactions



Production of a lepton: clear exp signature.

Distinguish different flavours

Neutral current interactions

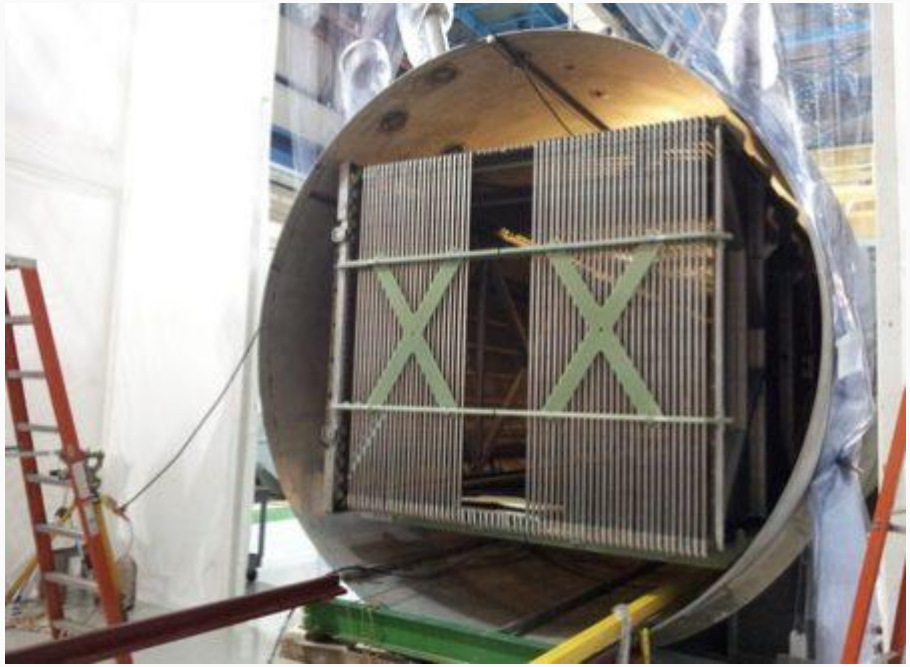


Only nucleus recoil, hard to detect.

No information about the flavour

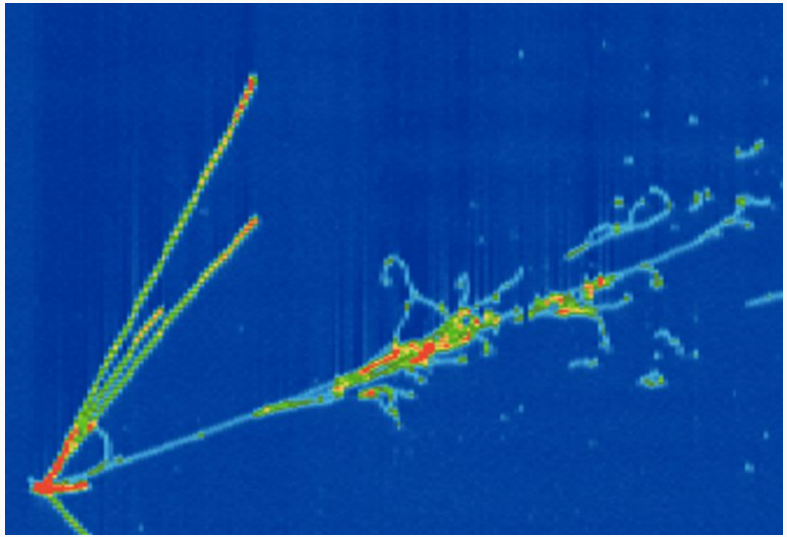
For the LEE search -> need to distinguish the two flavours, only Charged Current (CC) are of interest!

MicroBooNE during the construction



Shower-like event

Electron showers



Photon showers