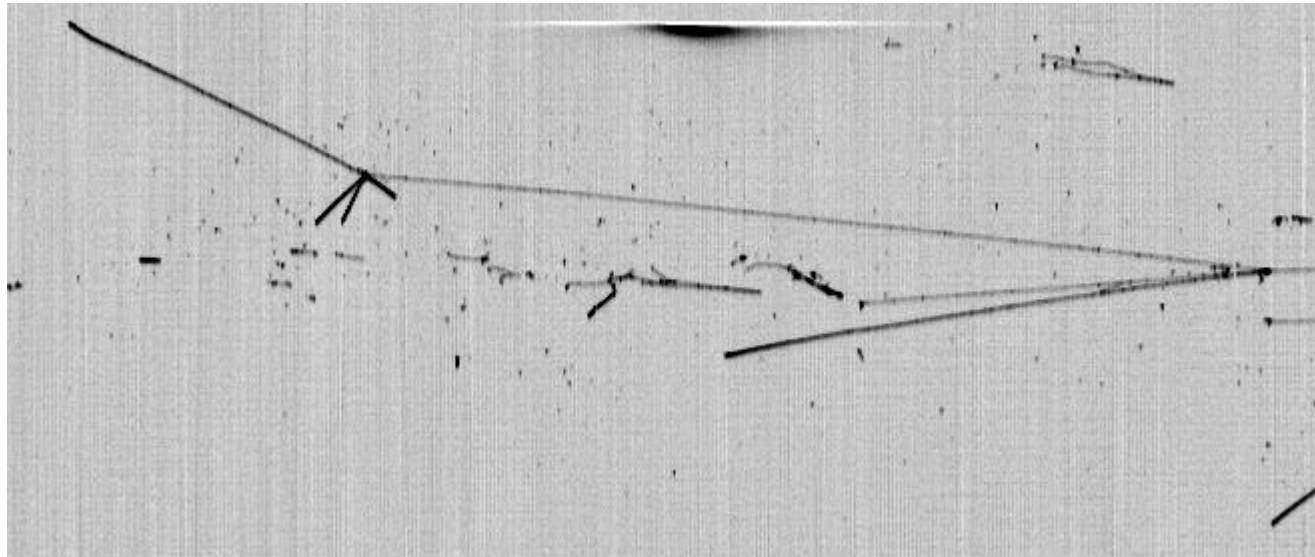


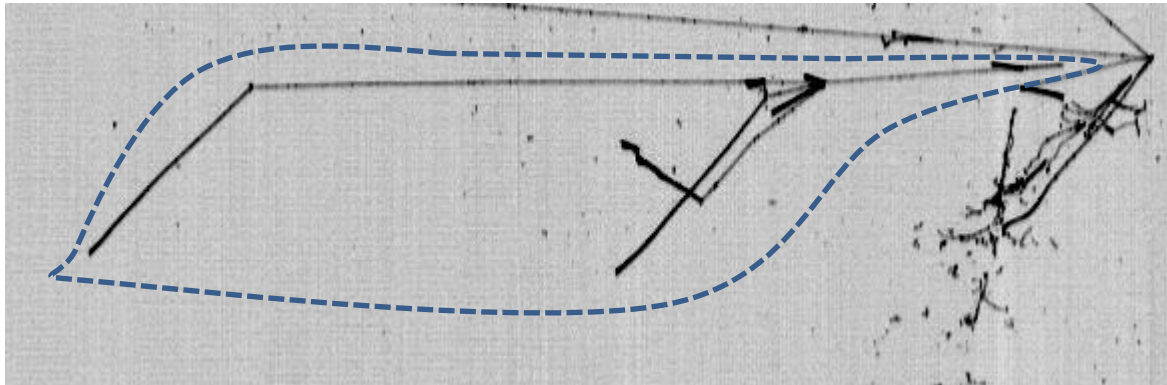
Update of the hadronic shower in ICARUS

- CNGS beam was creating high energy showers, we used part of them, measured deposited energy and estimated their sizes.
- Most of them were not contained in the detector or not possible to separate from a very dense and big events.
- Single T300 module is 3 m wide x 4 m tall, about 20 m long.
- We cannot provide full careful, systematic study in short term. There are only some examples to support MC prediction.
- The highest contained: 7.4 GeV.

Examples of hadronic showers with energy deposited about **1 GeV**



Deposited energy ~ **1.3 GeV**
Longitudinal: ~ **2m**
Radial: ~ **0.75m**

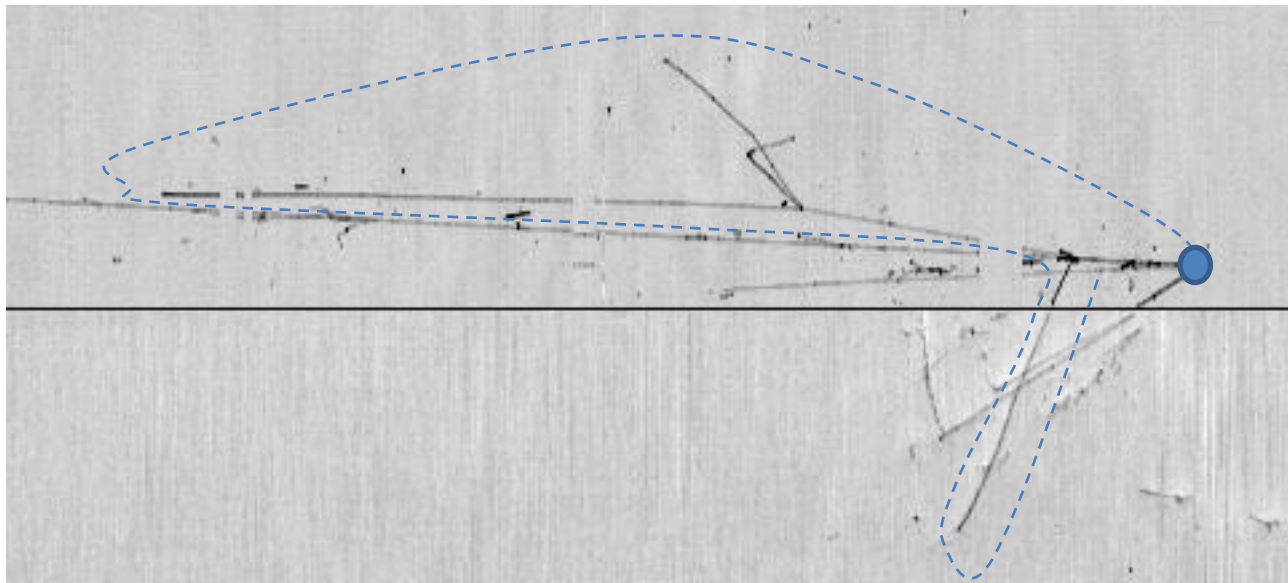


Deposited: ~ **1 GeV**
Longitudinal: ~ **1.6 m**
Radial: ~ **0.75 m**

Full containment when: 2 m x 0.75 m

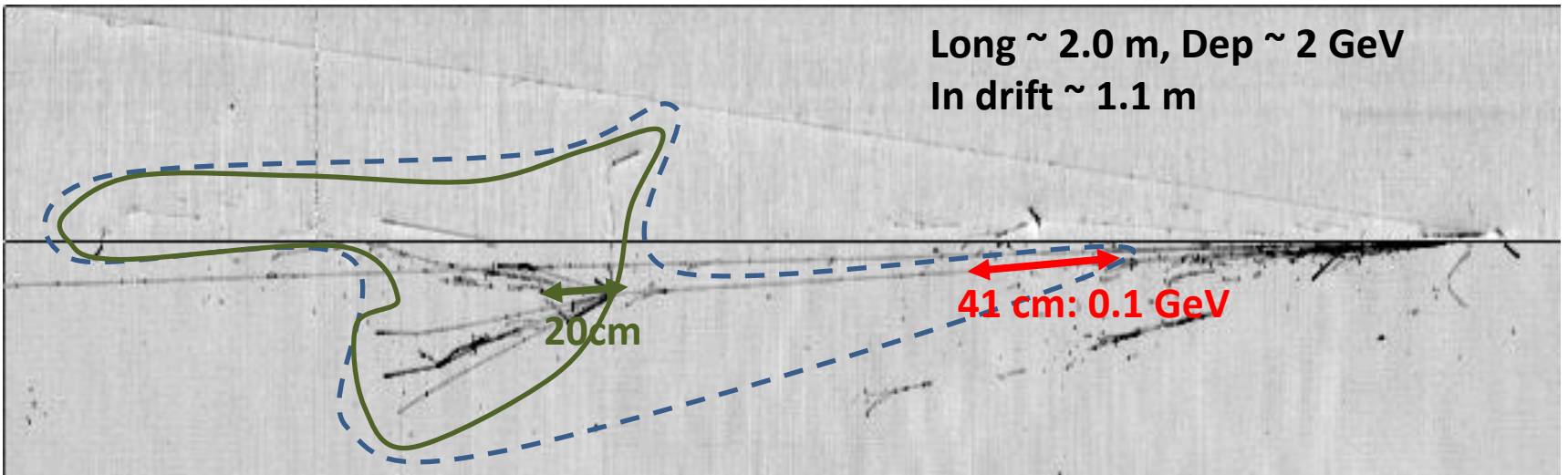
Examples of hadronic showers with energy deposited about **1 GeV**

When proton is stopping the full containment for 0.5 GeV is 115 cm
Or we take 50 cm, we get 0.3 GeV kinetic energy of proton

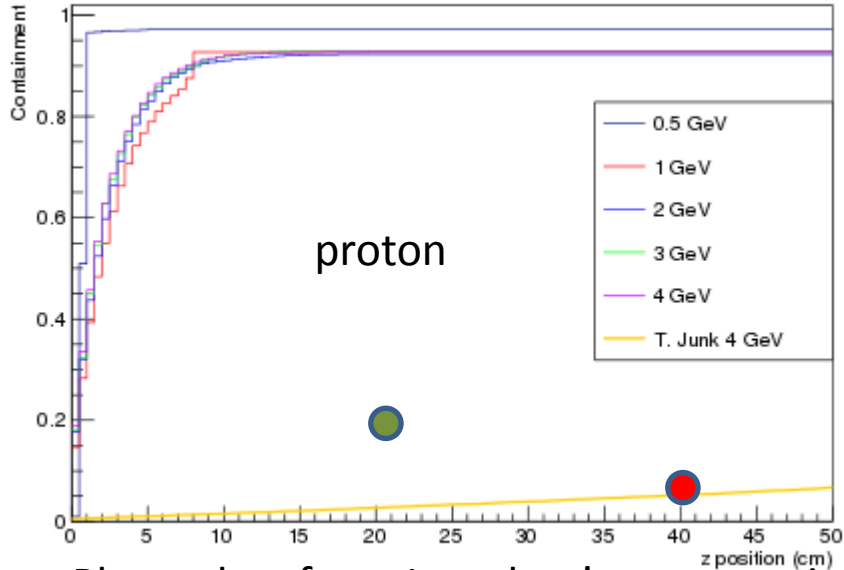


Depositon: **1.3 GeV**
Longitudinal: **2.5 m**
Radial: **3 m**

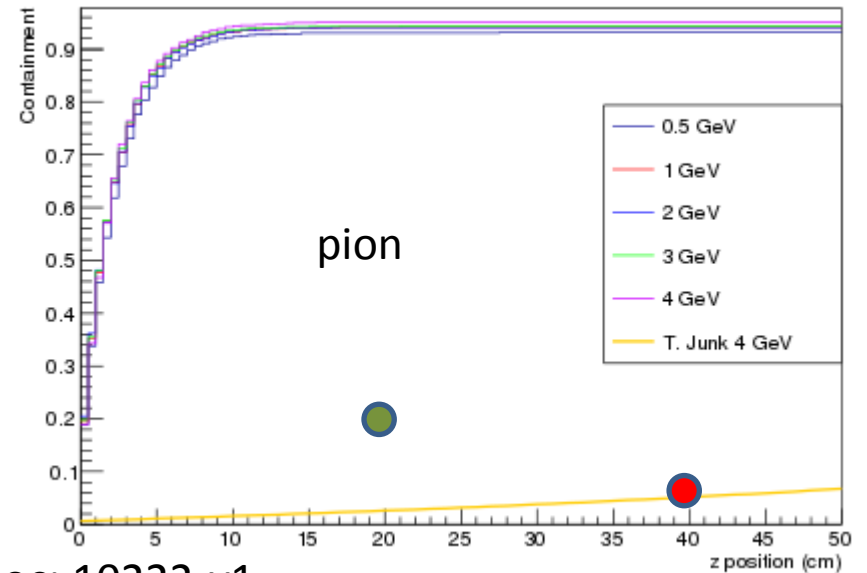
Full containment when: 3.5 m x 3 m



Mean Containment vs Detector Length

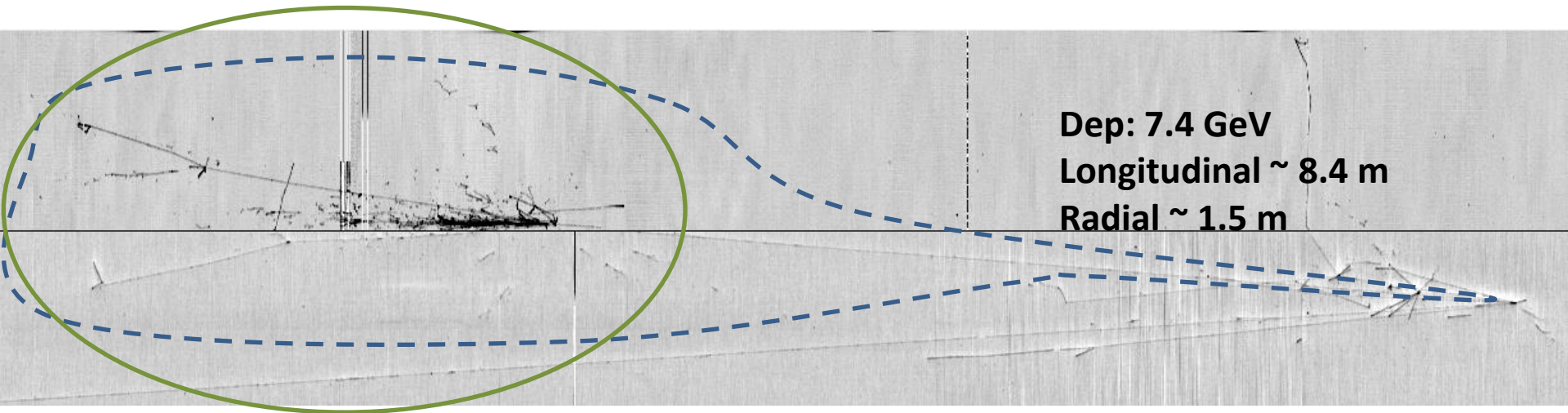


Mean Containment vs Detector Length



Plots taken from Jonathan's presentation, doc: 10222-v1

Example of high hadronic showers inside the detector



Dep: 7.4 GeV
Longitudinal ~ 8.4 m
Radial ~ 1.5 m

Dep: 6.5 GeV
Longitudinal ~ 3 m