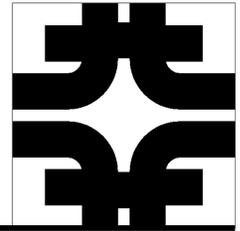


# The MINERvA Test Beam Project at Fermilab

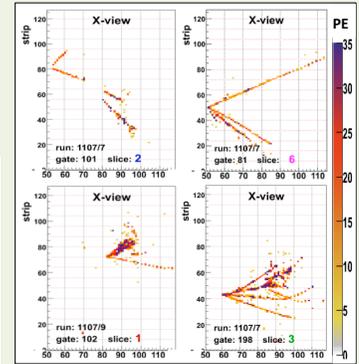
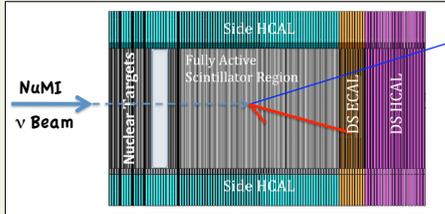
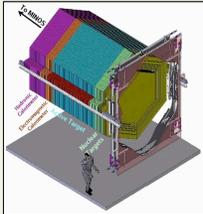
David Schmitz, Fermilab

On behalf of MINERvA and the MINERvA Test Beam Group



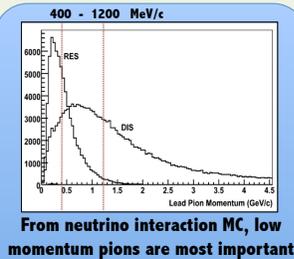
## MINERvA is a dedicated **neutrino-nucleus cross-section** experiment

- MINERvA can provide **important input to future neutrino oscillation experiments**
- Single detector with **multiple nuclear targets** allows study of nuclear effects in  $\nu$  interactions
- Neutrino interactions provide a **unique probe of the nucleus**
- MINERvA makes use of the **NuMI neutrino beam** and the **MINOS near detector** at Fermilab
- Compact, fully-active detector design provides excellent detail in complex final states

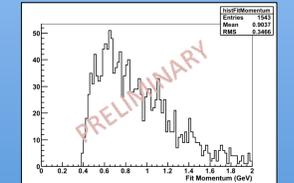


## The **MINERvA Test Beam Detector and Beamline** is a program to provide the **hadronic energy calibrations** needed for the MINERvA neutrino detector

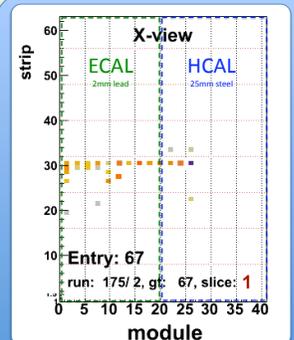
Basic idea of the test beam: Expose the MINERvA detector (or a smaller replica) to a beam of pions of known momentum and make a precision measurement of the single particle response.



From neutrino interaction MC, low momentum pions are most important



Preliminary momentum reconstruction of a beam run 6 June, 2010 showing the 400-1200 MeV/c range of the final configuration



One of the first events with 40 detector planes in beam run 6 June, 2010

- Brand new beamline at Fermilab Test Beam Facility (FTBF) **designed and assembled by MINERvA collaborators** with support from FTBF and Fermilab technical division
- Beamline optimized to deliver and identify a **400 MeV/c to 1.2 GeV/c tertiary hadron beam**
- Beam directed at small-scale, **replica MINERvA detector**:  
extruded scintillator triangles and readout electronics **same as main detector**  
40 scintillator planes and **fully configurable Pb, Fe absorber positioning** allows testing of **electromagnetic and hadronic calorimetry** in MINERvA

Collimator selects 17° production

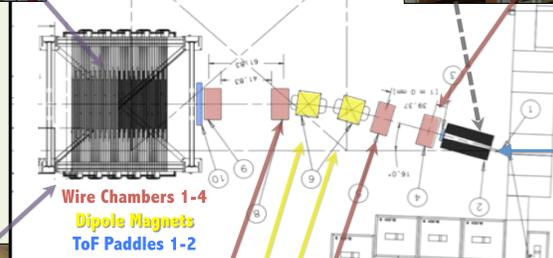


### Virtual Tour of the MINERvA Test Beam



**First physics run started just last week!**

MINERvA Test Beam detector consists of 40 mini-planes (63 strips instead of 127) 1.1 x 1.1m



16 GeV incident pion beam  
Copper target



Four wire chambers and two dipole magnets provide momentum reconstruction



Beamline components ToF, WC, and Halo Vetos combined into DAQ hardware trigger to select relevant events