

MICROBOONE STATUS

WESLEY KETCHUM (LANL)
ON BEHALF OF*
THE MICROBOONE COLLABORATION

*SHAMELESSLY STEALING SLIDES FROM

OUTLINE

Brief description of MicroBooNE

Status of detector construction

Status of LAr simulation analysis tools

THE PURPOSE OF MICROBOONE

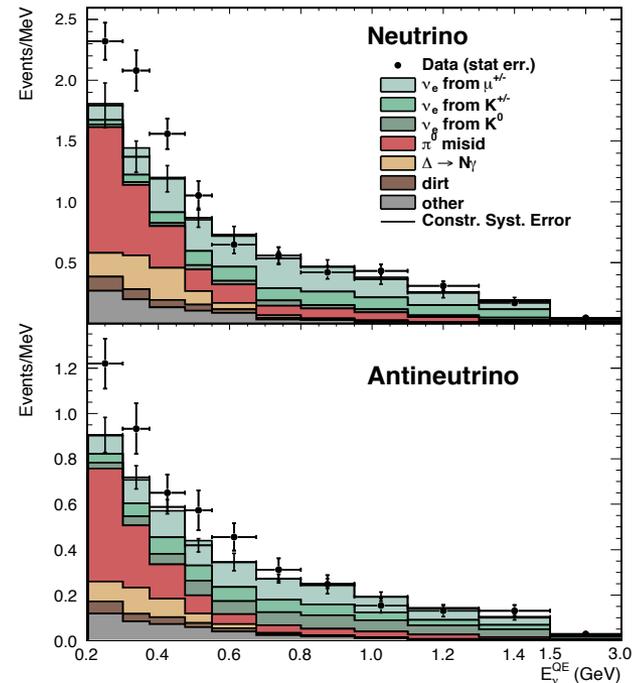
Investigate the MiniBooNE ν_e low-energy excess

- Improved discrimination between electrons and photons in LAr

Measurements of ν -Ar cross sections

Prove/provide insight for operation and reconstruction of large LAr detectors

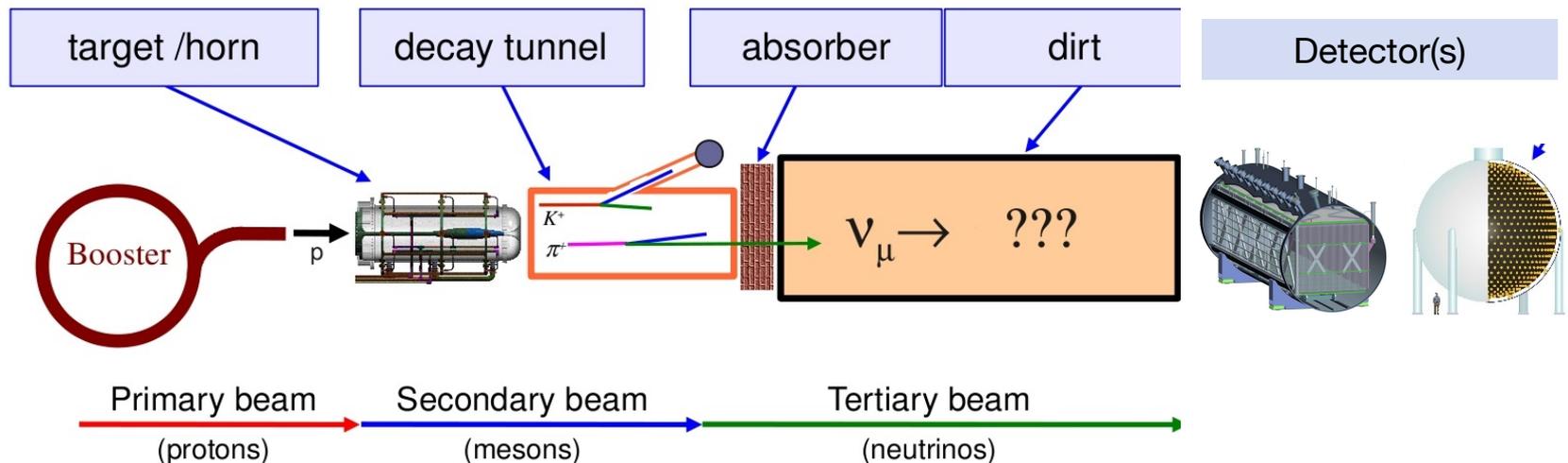
- Crucial for next-generation LAr experiments



LOCATION: FERMILAB

MicroBooNE sits in Booster Neutrino Beam

- 8 GeV protons strike Be target at up to 15 Hz
- Magnetic horn
- MicroBooNE ~500 m downstream of target
 - In front of MiniBooNE



MiniBooNE Collaboration

MICROBOONE BY NUMBERS

Dimensions: 10.4 m x 2.3 m x 2.5 m

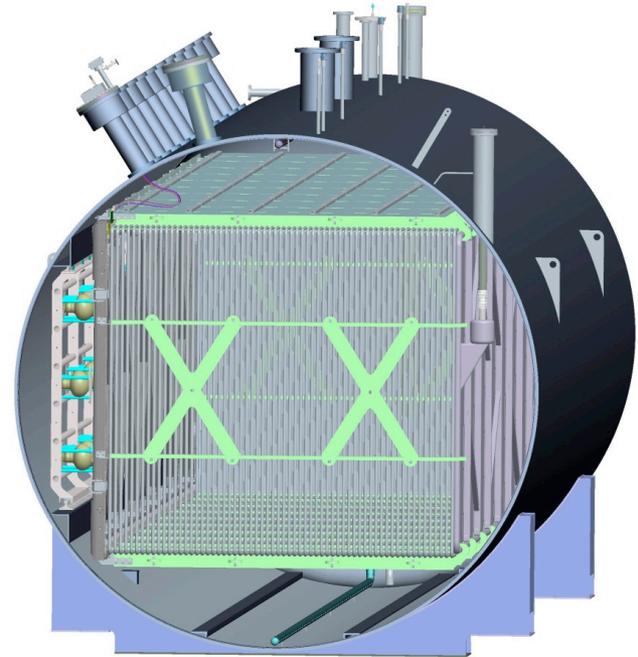
- Drift time ~ 1.5 ms

3 planes of wires at 3 mm pitch

- 2 induction planes,
1 collection plane
 - 3mm spacing
- 8256 total channels

Cryostat holds 170 ton LAr

- Fiducial volume smaller (~ 85 ton)



LARTF BUILDING CONSTRUCTION

February, 2012



April, 2012



June, 2012



*From J. Raaf, June
FNAL Users' Meeting*

December, 2012



Should be completed some time this year

CRYOSTAT

Cryostat as of January 4



Cryostat

*From S. Duffin, Jan
Collaboration Meeting*

Nozzles



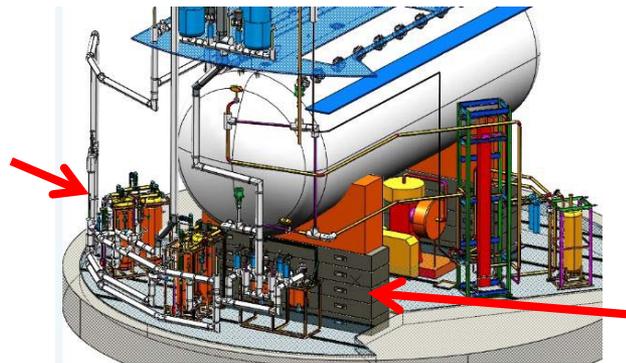
- Should be finished sometime this month

CRYOGENICS

Progress to Date Cryogenics pre-fabrication



↑
View
from
Here



↑
View
from
Here

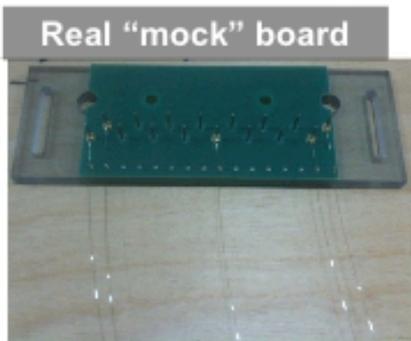
*From C. James, Jan
Collaboration Meeting*

1/17/2013

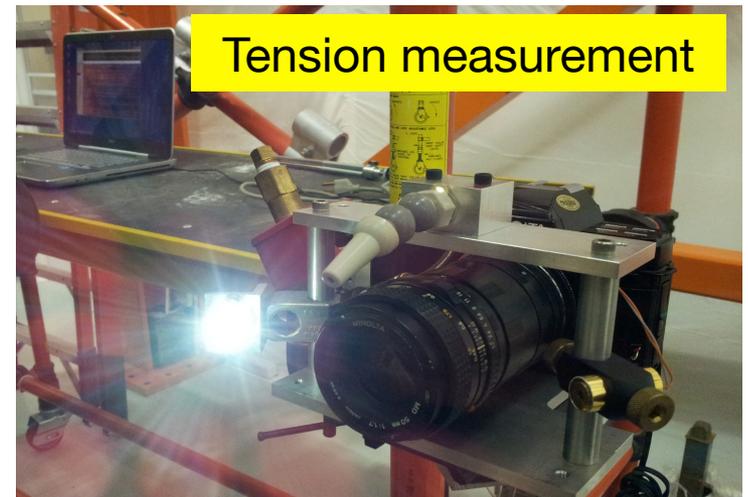
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TPC

- Frame built last summer/fall
- Mock wire installation tests in preparation for real deal



*From J. Asaadi, Jan
Collaboration Meeting*

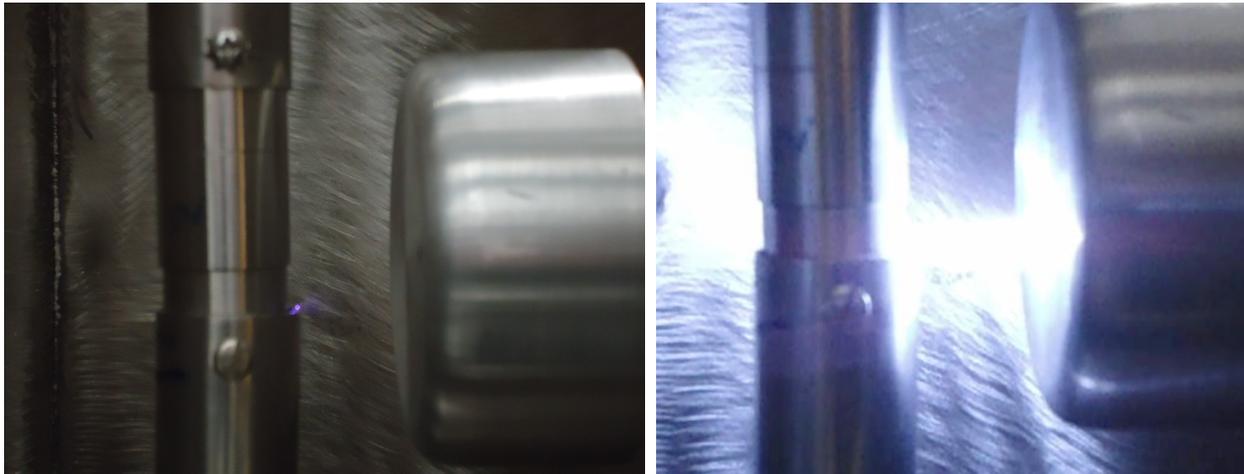


HIGH VOLTAGE

High voltage design parameters

- Cathode plane at -128 kV
- Drift field of 500 V/cm

Spark testing to measure breakdown voltages

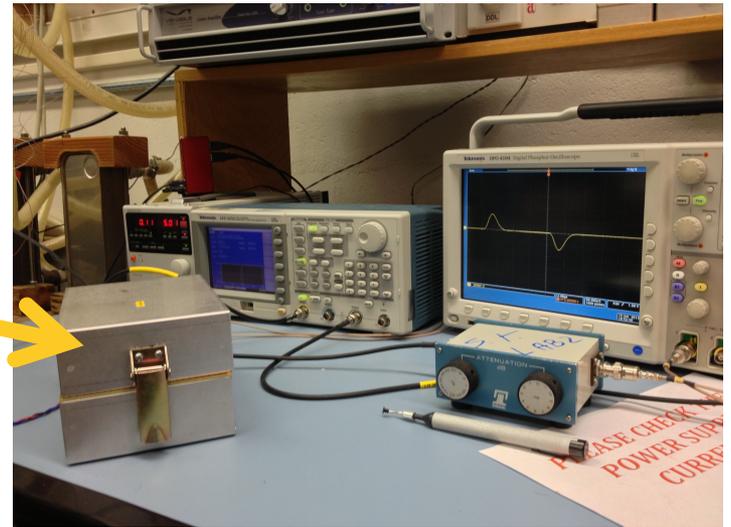
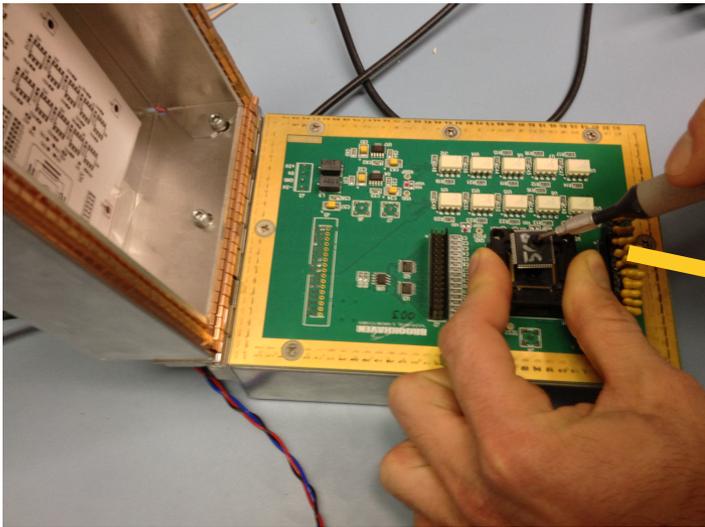


From H. Jostlein and S. Lockwitz

ELECTRONICS

Final production testing of CMOS ASICs at BNL

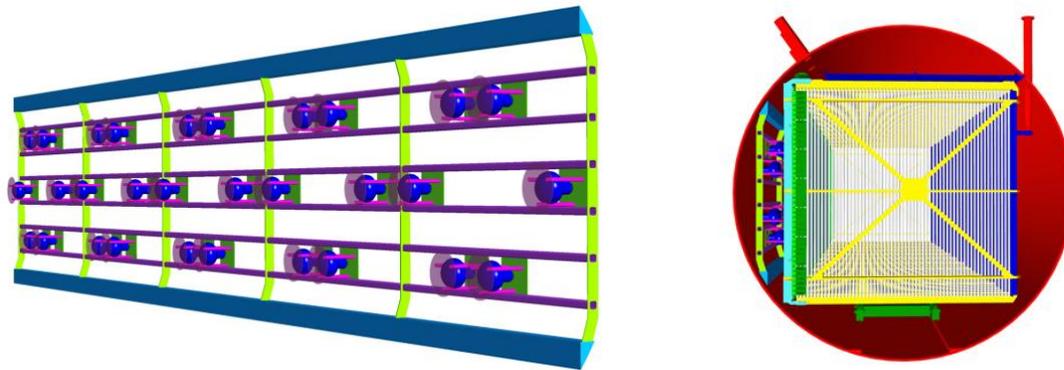
- Will be mounted to motherboards soon, then test those



Warm electronics either done and out the door or will be soon

PMTs

30 PMTs inside cryostat/outside field cage to collect scintillation light

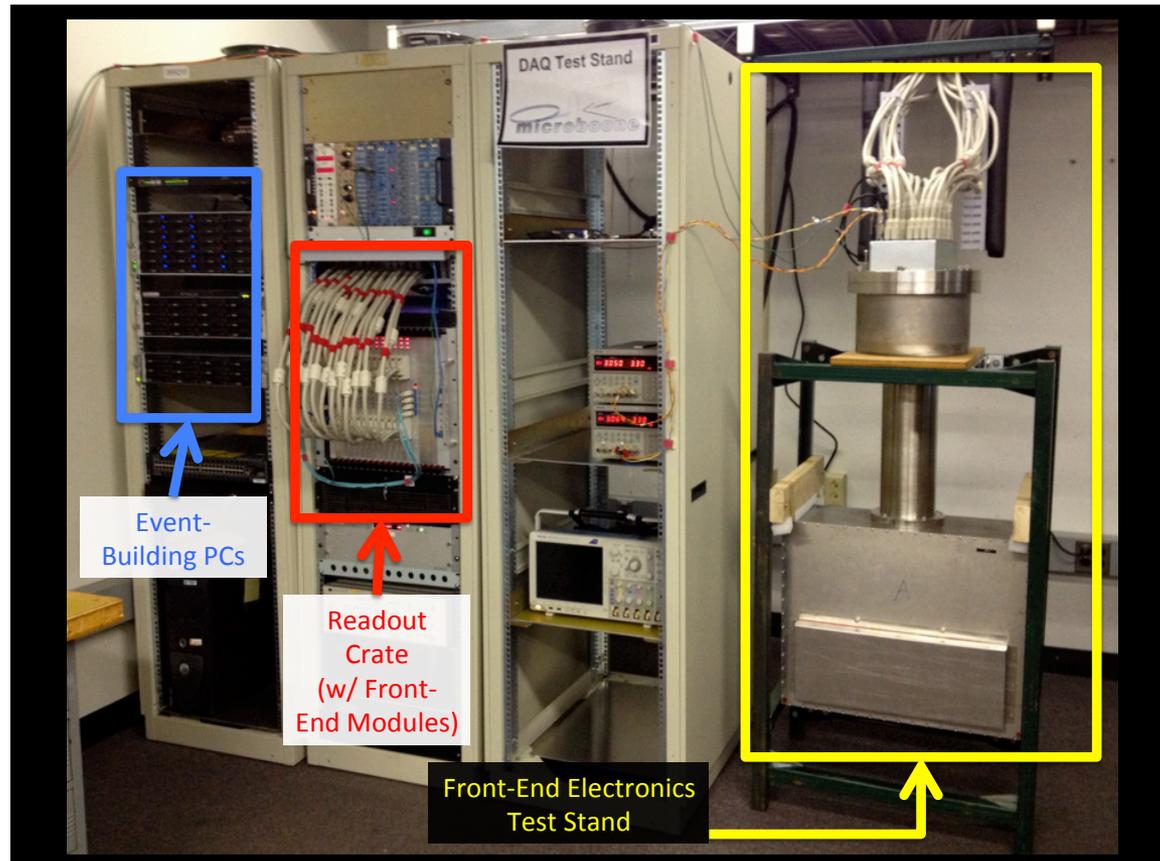


Ongoing testing

- Performance/degradation of TPB wavelength shifter
- Vertical slice at FNAL to test performance, readout, etc.

DAQ

You've heard enough here hopefully...



LARSOFT

Common LArSoft software package in use by many LAr experiments

- ArgoNeuT, MicroBooNE, LBNE...
 - Designed to be detector inclusive
- Many involved in simulation and reconstruction issues

SIMULATION

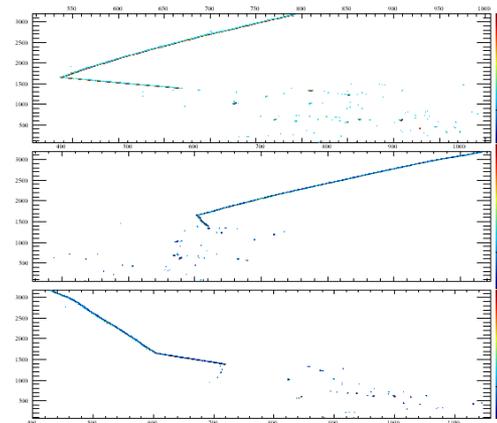
Recent effort in generating new MC

- Single particle samples
- GENIE
- Cosmics and SN interactions

CPU time

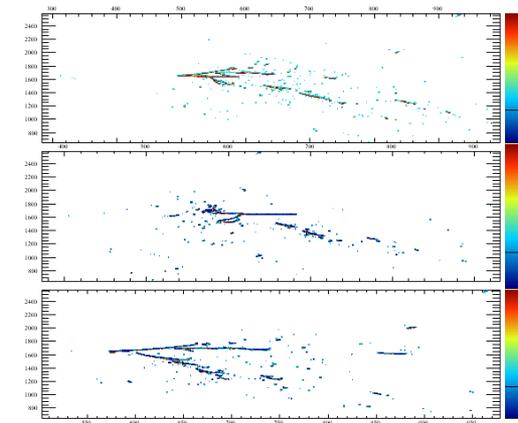
- Simulation: 100-200 s/event
- Reconstruction: ~100 s/event

GENIE



ν_{μ} CC

*From B. Carls, Jan
Collaboration Meeting*

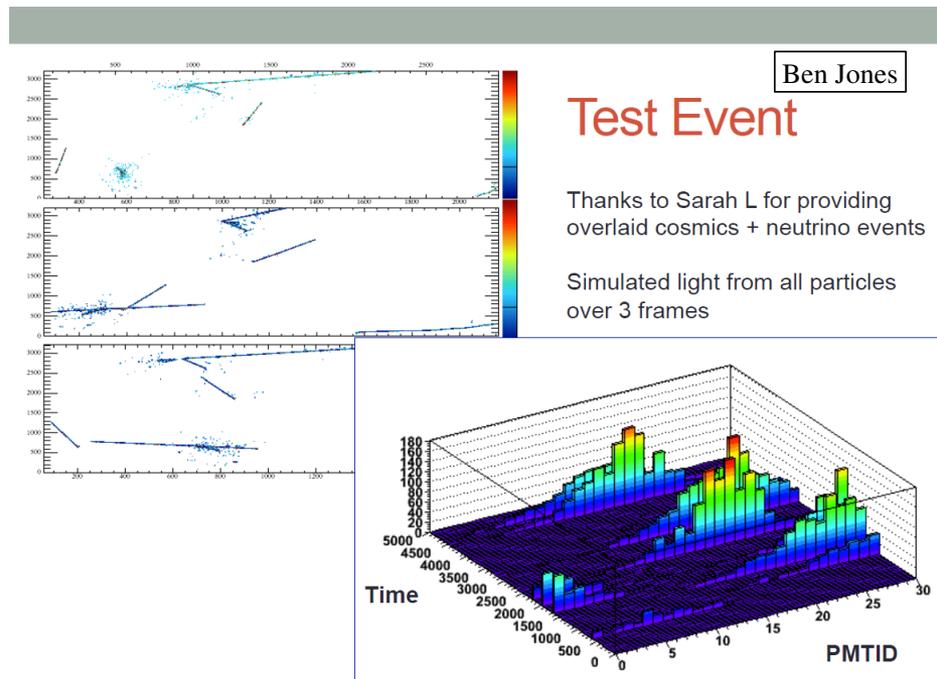


ν_e CC

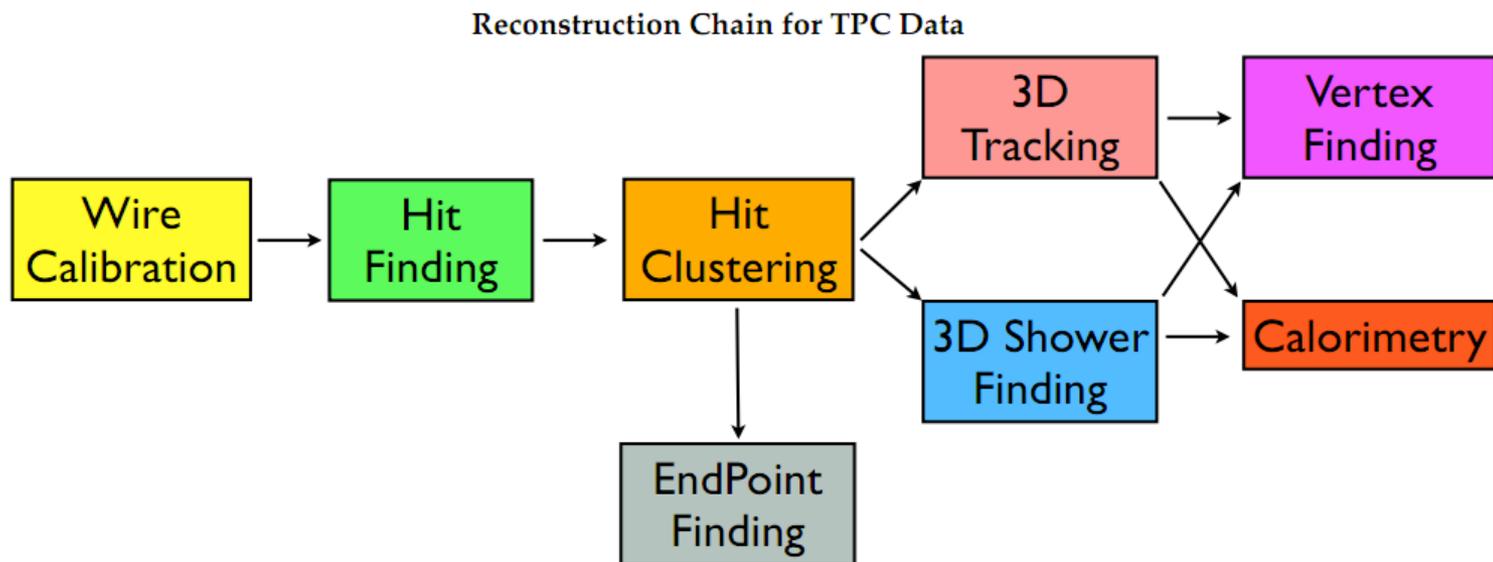
OPTICAL SIMULATION

Recently got various optical simulations working

- Full model rather slow, but faster versions that don't track *every* photon available
- Optical reconstruction also available and being investigated

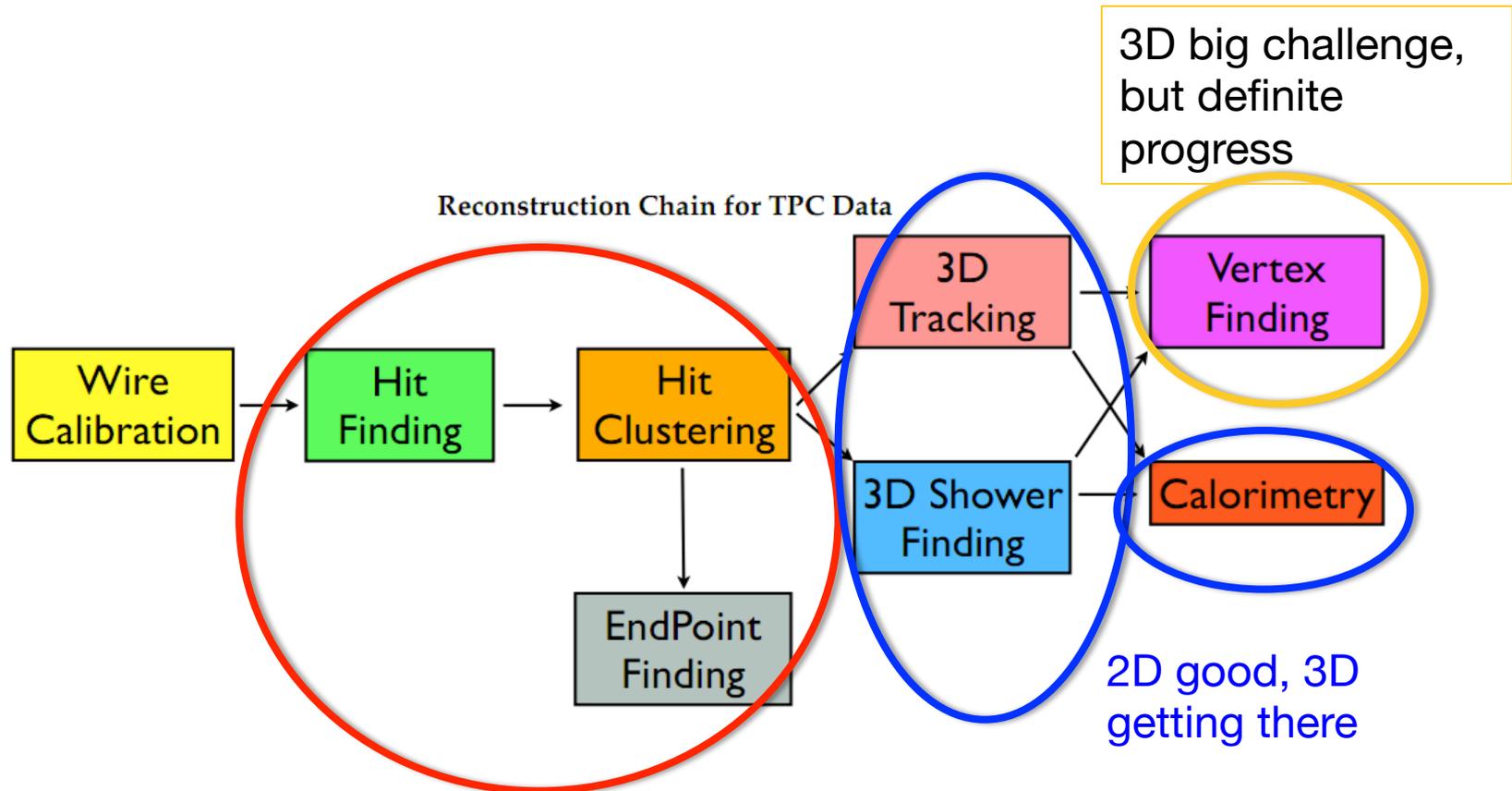


RECONSTRUCTION GOAL



From E. Church

RECONSTRUCTION PROGRESS



CONCLUSIONS

Lots of progress happening quickly

Significant work to be going on this calendar year

- Finish assembly of TPC, attach wires and electronics
- Cryostat arrives, seal everything up
- Move everything into our new building
- Oh, and a DAQ ready to take all that data, and the ability to reconstruct it

From someone coming from CDF, very exciting to be working on something being built!