TPC tracking with CLEO pattern recognition

LCD simulation provides
x,y,z crossing points
on concentric cylinders.

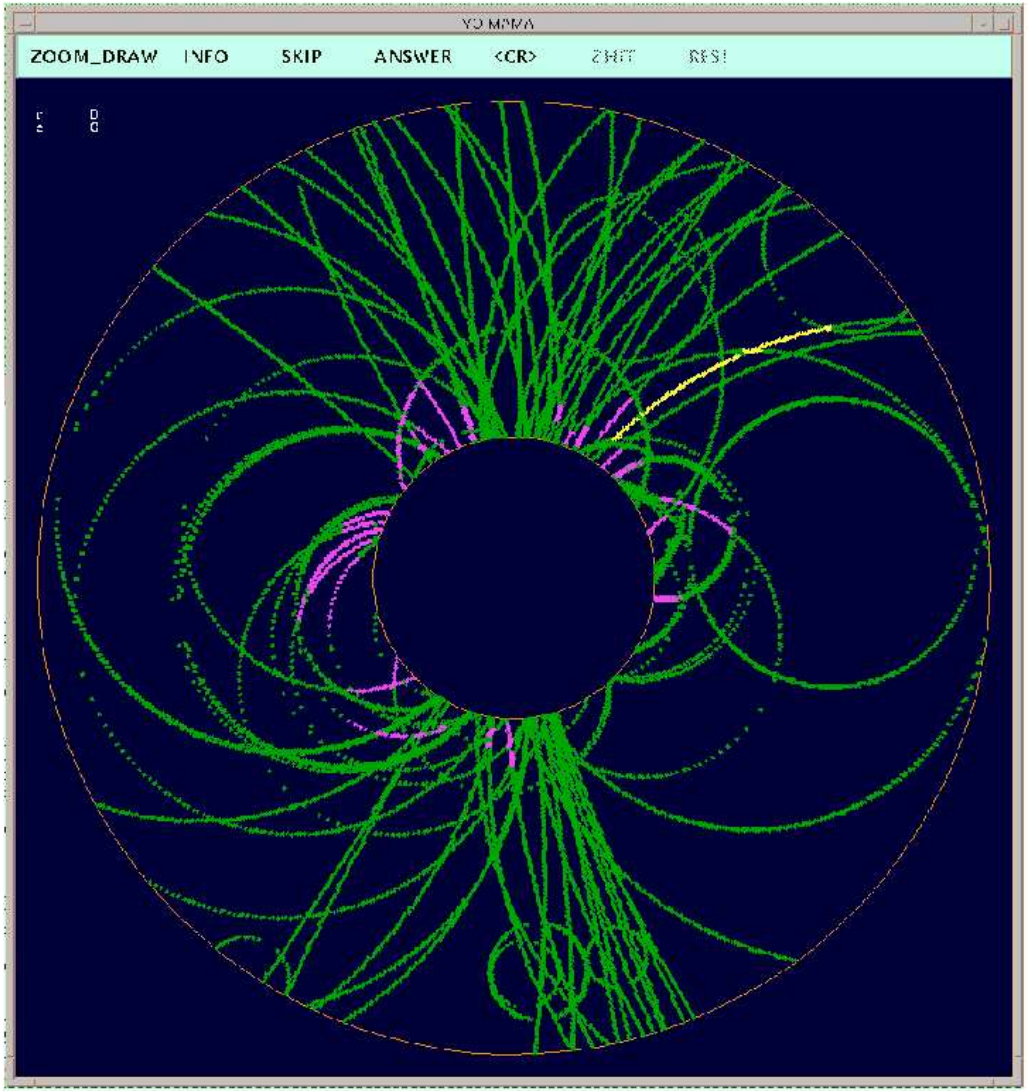
Mike Ronan has provided interface
of Cornell/CLEO pattern recognition
with LCD Java.

CLEO Pat. Rec. (FORTRAN) is
encapsulated in Java and
called from the Java main program
accessing the LCD crossing points.

Shown:
LCD event
144 layers from 0.56 to 1.90 meter,
~ 1cm cell height

Detector characteristics (post LCD):
~ 1 cm pad width
signal is digitization of crossing point

Run CLEO Pat. Rec :
1st phase: cell level pattern recognition



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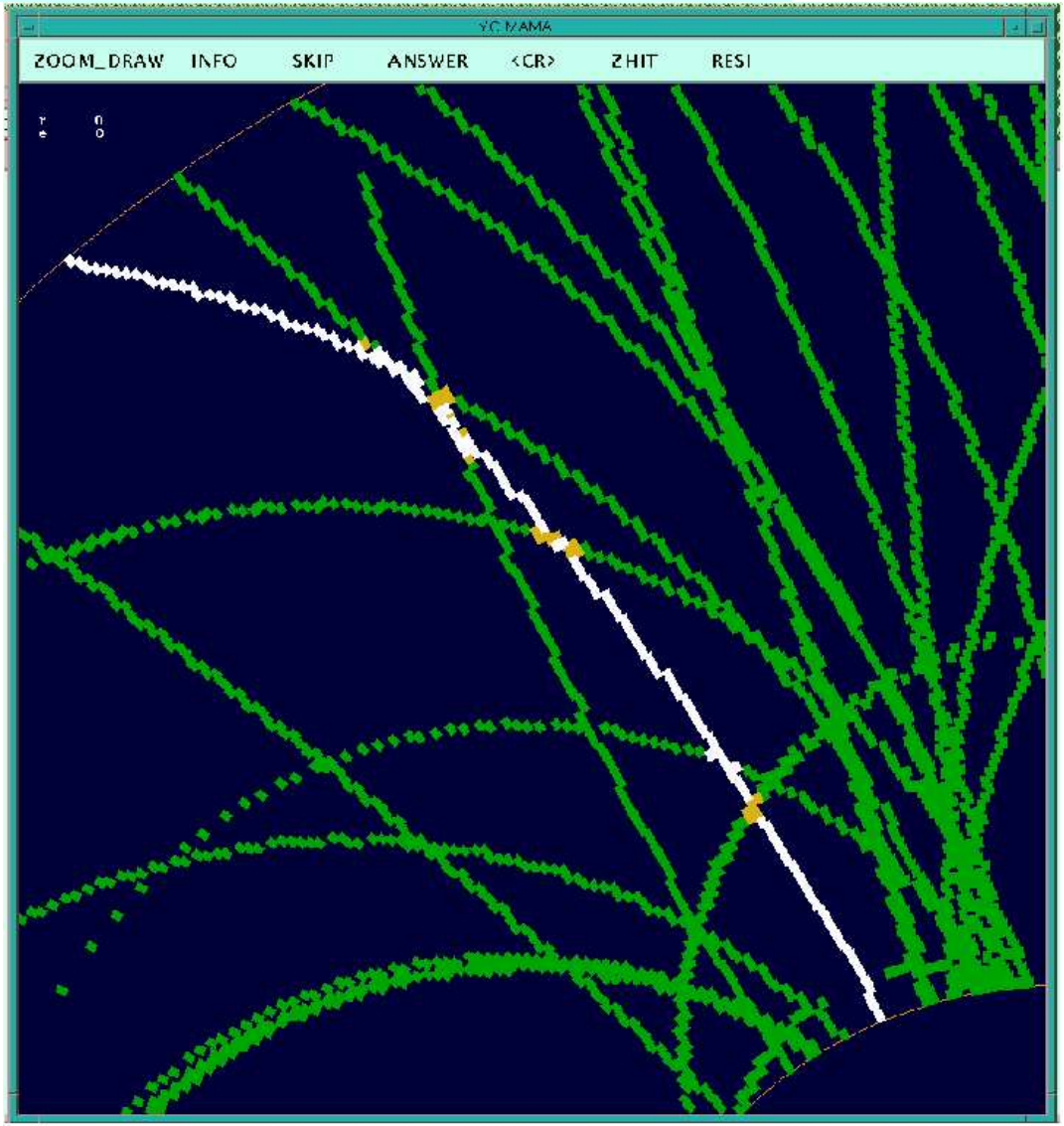
First attempt with cell level pattern recognition and "FAST_TRAK"

Shown in white:
1 "chain" from cell level phase
in cell location fitting in FAST_TRAK

This chain "jumps tracks" .

Entire event is projected onto the endplate; there is no z-slice selected. The event is very complicated.

But there are many improvements to the detector response that must be added before it would be relevant to start optimizing for the complicated events .



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Detector Response

Shown:
first attempt at charge spread
a simple gaussian, limit: 2 cells

Require:
multi-hit due to charge spread (shown)
shape, σ , cut-off

multi-hit due to track path
note the sparse hits at top-of-curler

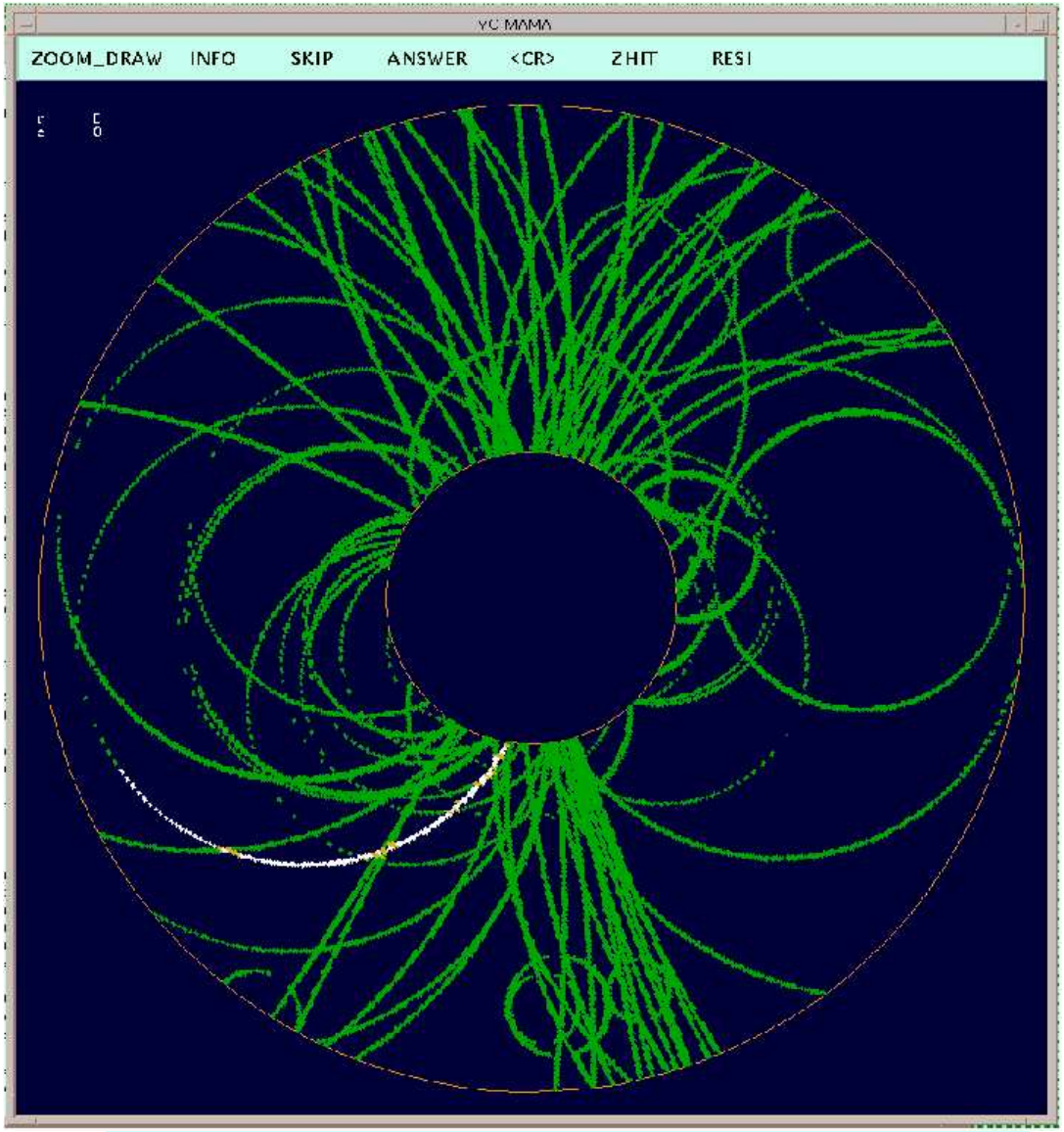
ϕ clustering in the reconstruction

multi-hit readout in the reconstruction

z-clustering in the reconstruction

noise, created on each cell as a
(time dependent) fraction
of average minimum ionizing signal

Also required in pattern recognition:
detector specific tuning
z-slice procedure



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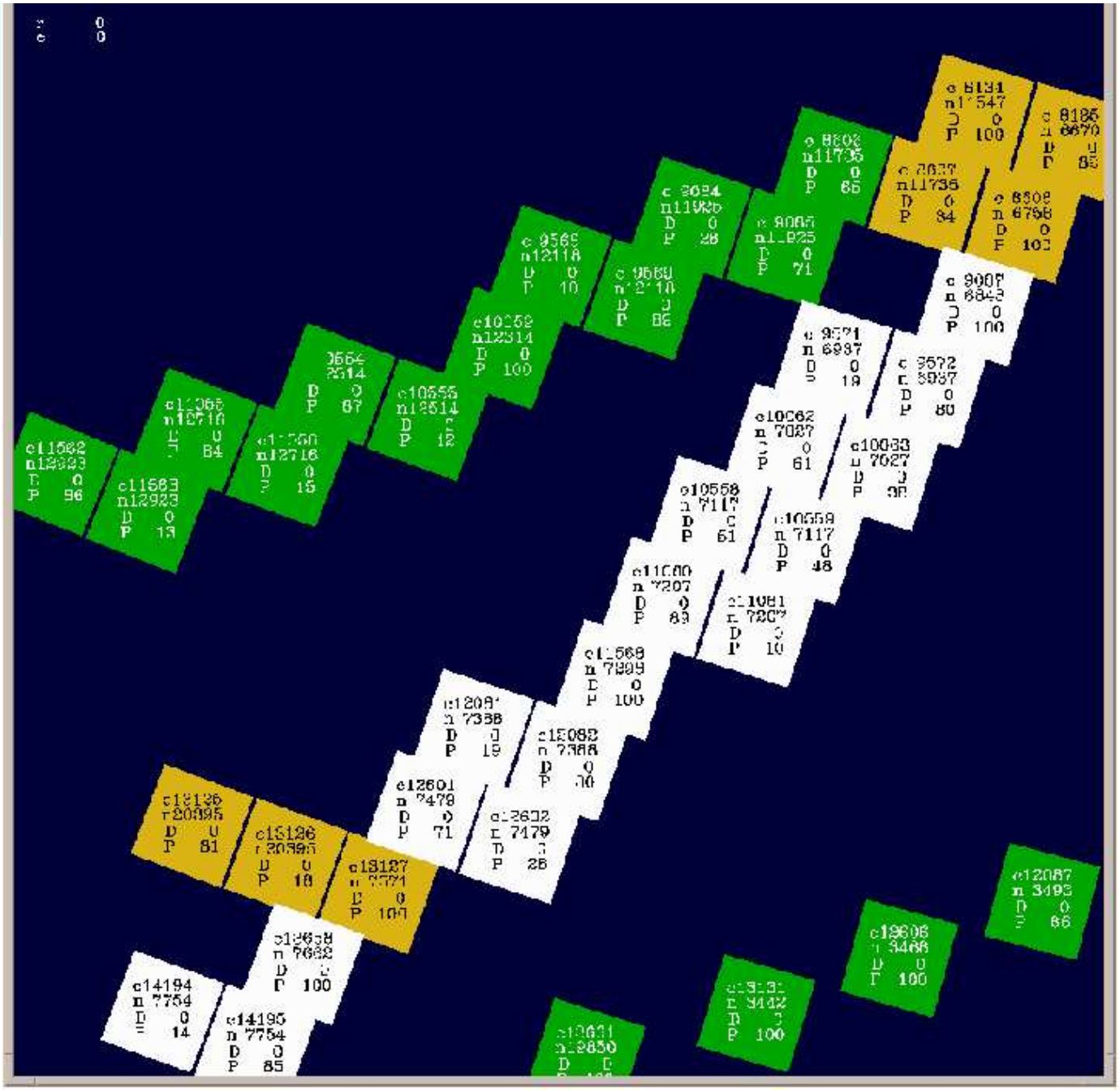
Zoom to inspect pulse heights

This is a “zoom-in” of the track shown in the previous slide.

Pulse heights are shown for each cell.

After clustering, only the center cell of the cluster will be enabled for cell-level pattern recognition.



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