Impurity Capture Analysis Update

Mu-X Meeting - 9/19/2008

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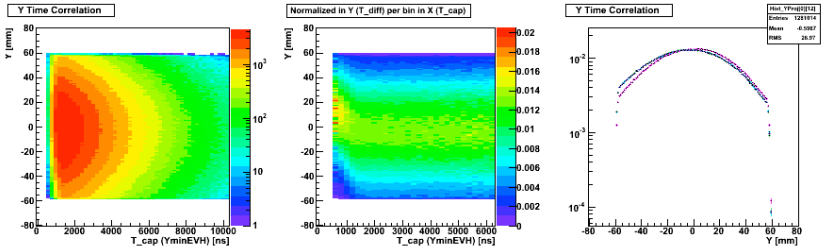
Part 1: The Y distribution variation with N_{EH}

I am going to recap a few things I mentioned at the collaboration meeting and elaborate a few things which I've done to study the problem.

At this time I don't have a solution, but I have worked to identify what and where that problem lies as will be shown in the next few slides.

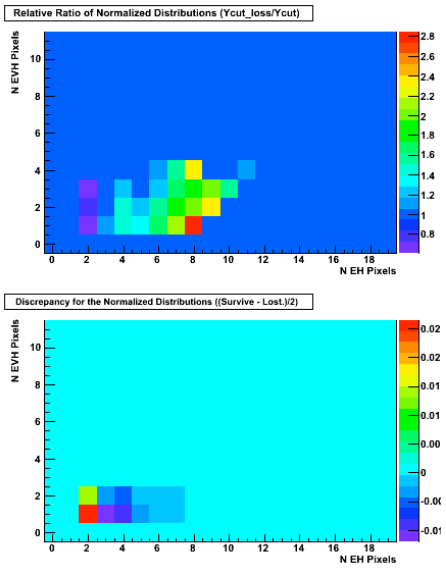
Cut on the μ^- stop position in the TPC in the (Y) drift plane.



• Events observed in the upper most regions of the TPC may represent noise in a greater proportion than the events found in lower portions of the TPC.

• Notable because this is the direction in which the drift of the charge clouds occur, and a correlation in this direction has serious consequences for a believable analysis of the capture time spectrum.

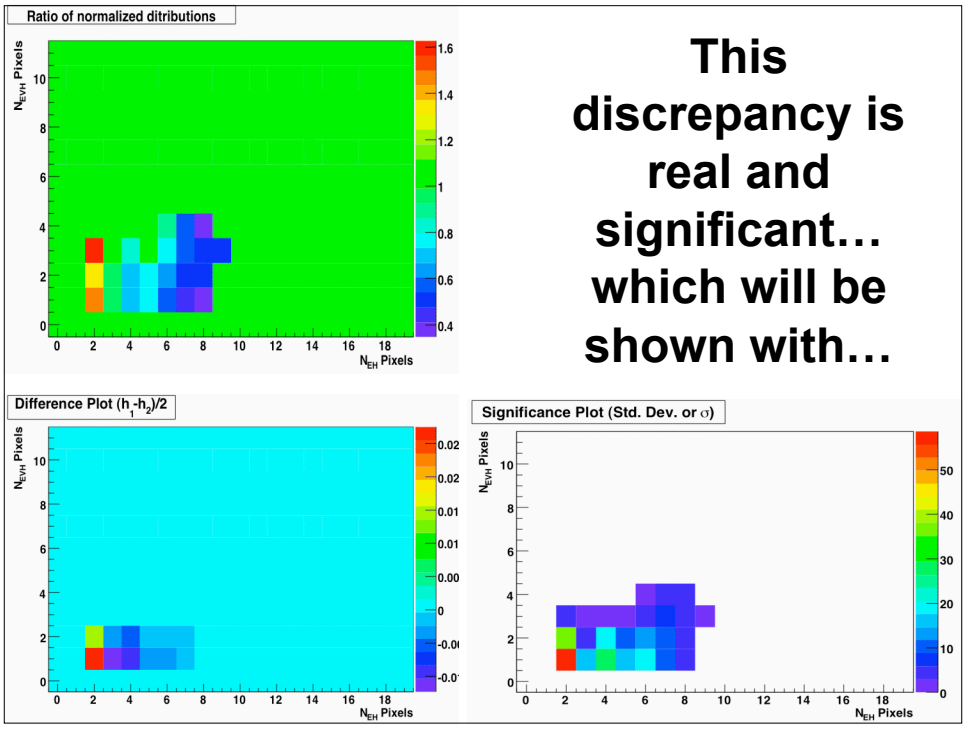
Cut on the μ^- stop position in the TPC in the (Y) drift plane.



• The distribution of the events in Y<45 mm is different in the N(EH) vs N(EVH) pixels space.

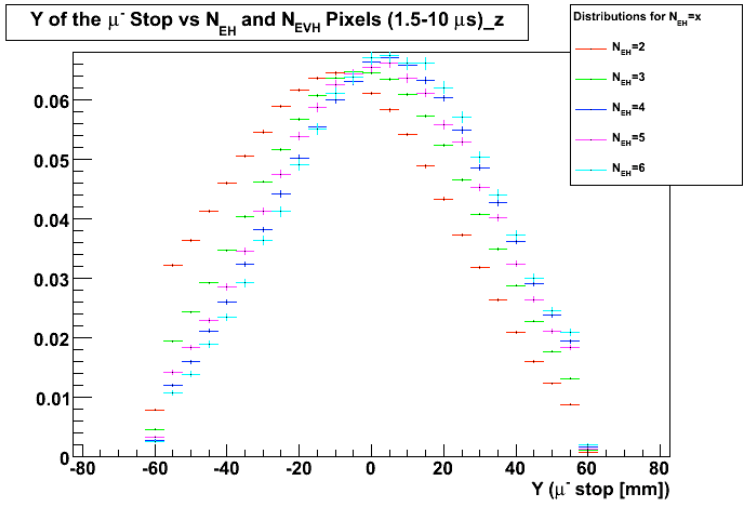
• The capture signal of events occuring in the Y>45 mm top of the TPC have a systematically different topology.

• There is a statistically significant excess of recoil events with larger numbers of pixels among the lost events.

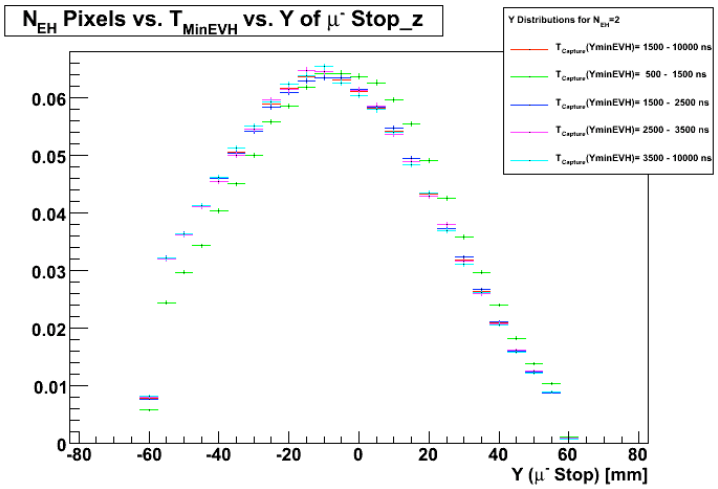


This discrepancy is real and significant… which will be shown with…

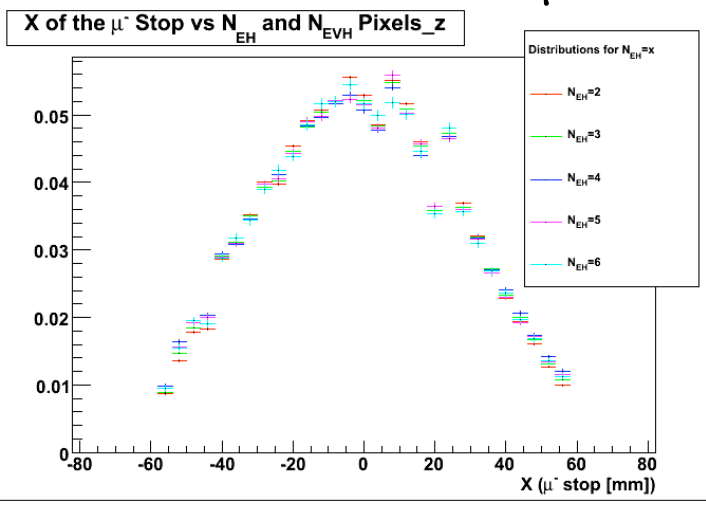
The Y distribution varies more strongly with N_{EH}…



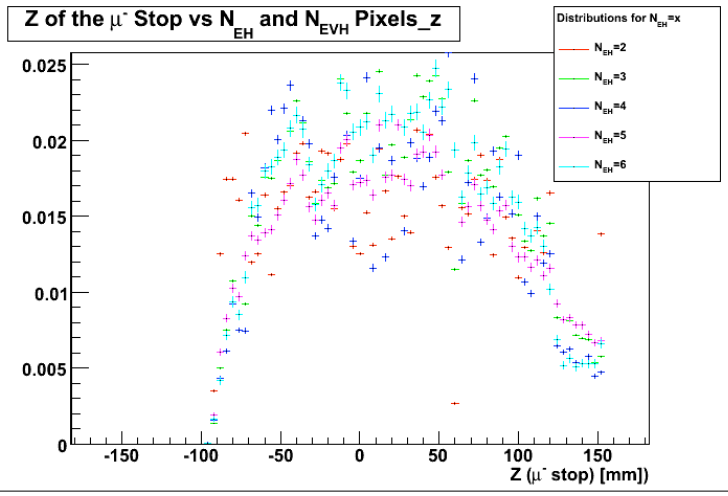
… than with the time of capture. (T_{capt}(YminEVH))



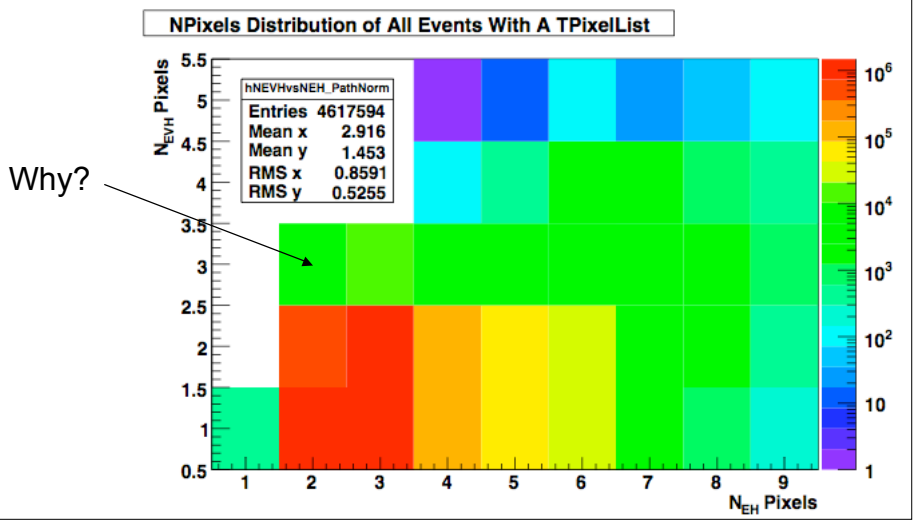
The X coordinate distribution of μ^- stops shows little variation after 1.5 μs



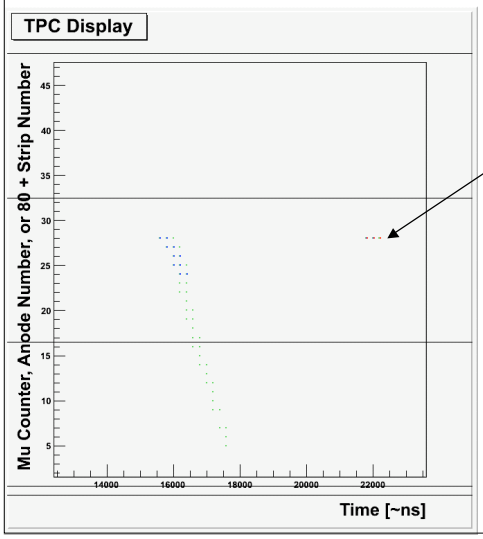
The Z (ie. Anode) distribution shows the efficiency variation.



Part 2: The $N_{EVH} > N_{EH}$ Mystery (Separate from the Y distribution issue, and better understood now.)



Event Display Demonstrating the (EVH && !EH) Pathology



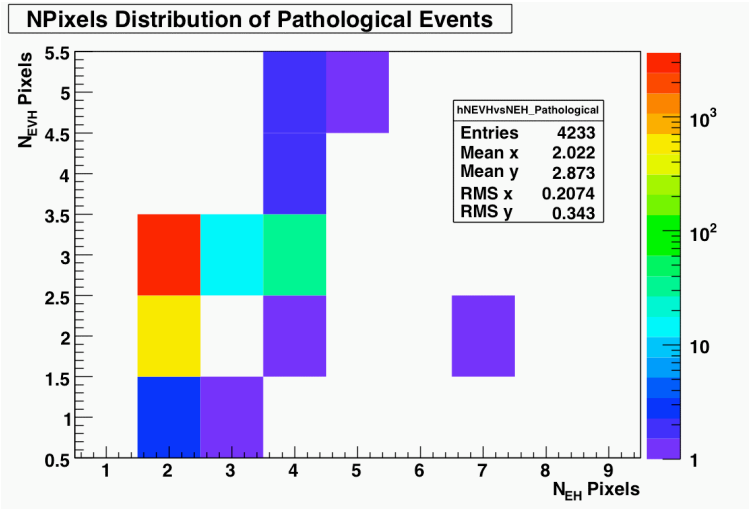
Close up of an event with 3 EVH Pixels, the last of which has no corresponding EH.

Used the TTpcPixelList to search for Events showing a pathology for any of the pixels

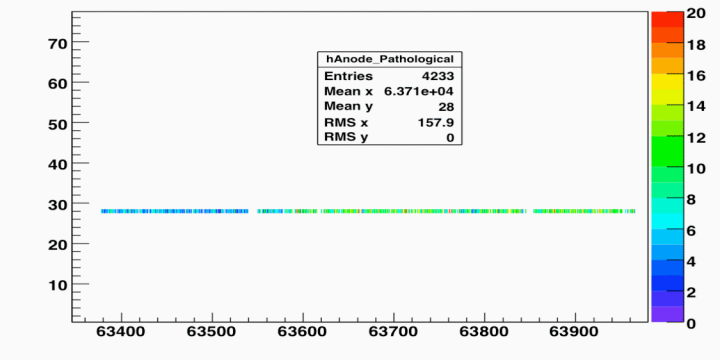
- **Three examples were searched for in the pixel lists of the events..**
  - **EVH && !EH**
  - **EVH&& !EL**
  - **!EVH && EH && !EL**
- **Only one pathology, EVH && !EH, was found, and it appears it only happens once in the capture island.**

- **The majority of these events show the tell tale $N_{EVH}>N_{EH}$, but not all. (≈3600 compared to ≈4200 total)**

The distribution of events with one Pathological pixel in N_{EVH}, and N_{EH}.



Anode Number of Pathological EVH Pixel vs. Run Number



The pixles which show the EVH && ! EH Pathology Seem to the associated with the same anode, #28. Conclusion, probably due to a faulty EVH threshold discriminator.