

## *Vertex Finding: VertexReco/VrtxDATFit*

- Last week I reported on a new vertex fitter which uses a method of deterministic annealing to search for vertices.

$$\chi^2 = \sum_{i=1}^{i=N_{track}} w_i r_i^2 \quad (1)$$

where  $r_i$  is the 3-D distance from the trial vertex location to the track  $i$ . The weight,  $w_i$  is calculated according to:

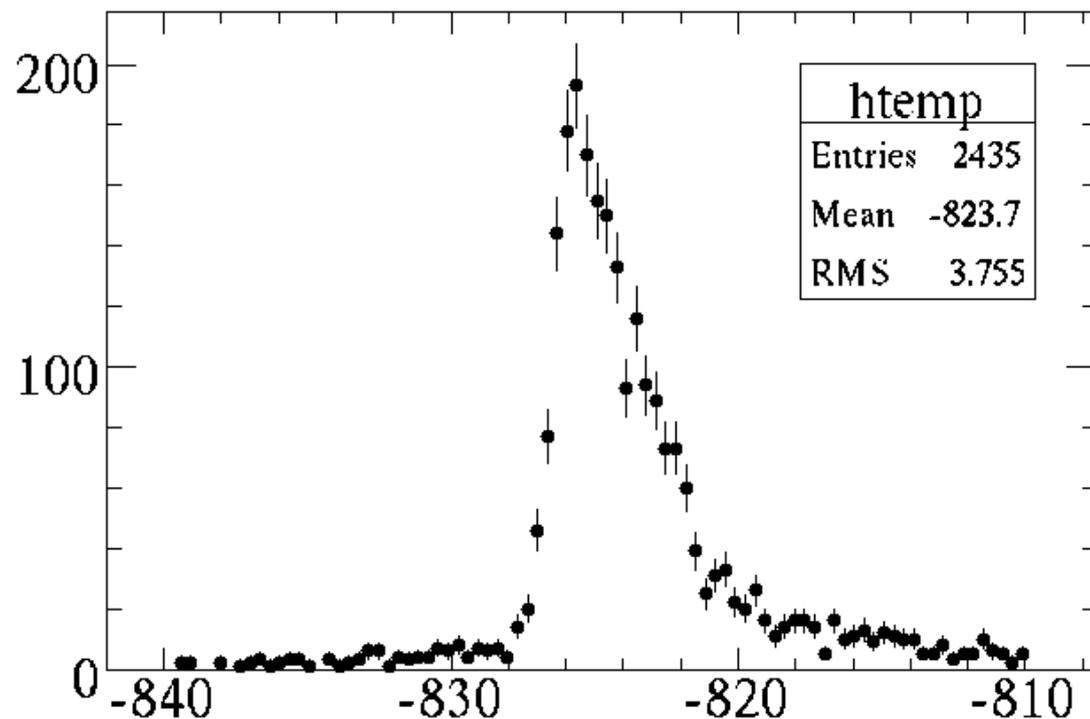
$$w_i = \frac{1}{1 + e^{(r_i^2 - r_c^2)/2T}} \quad (2)$$

where  $r_c$  is critical radius (3.0 cm in my case) and the temperature  $T$  is reduced according to a schedule from iteration to iteration.

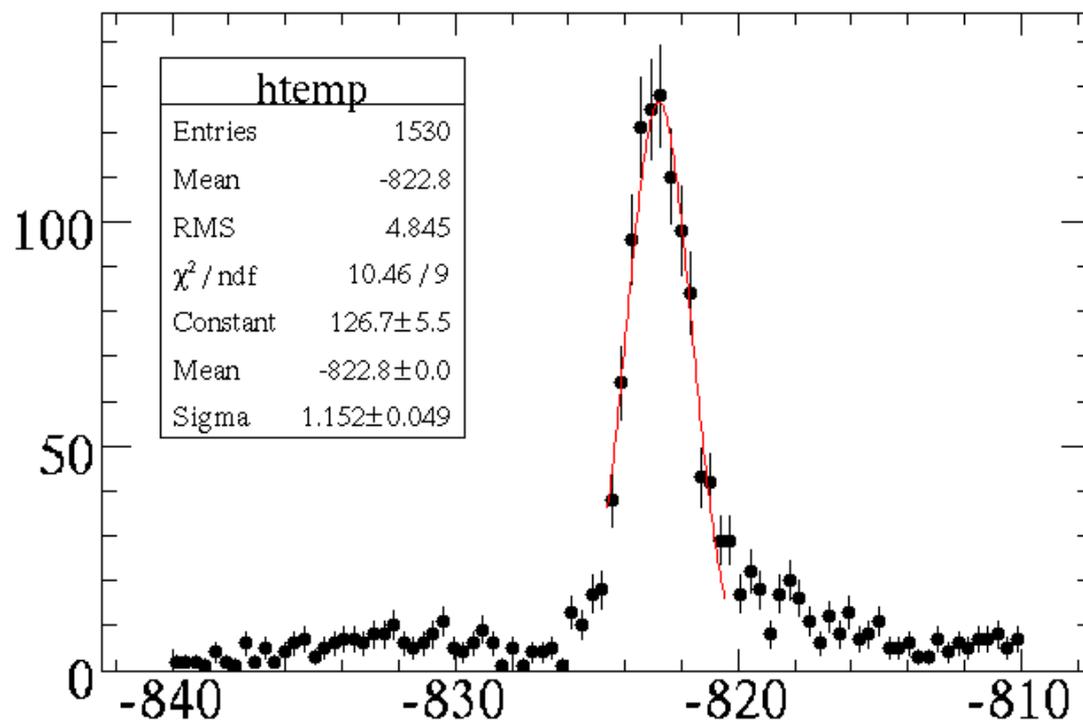
- Once a vertex candidate is found, all tracks with weight higher than 1E-6 (~3.4 cm) are associated to the vertex and removed from list. The procedure continues on the remaining tracks.
- This week I have some results to show...

# *120 GeV on 2% C*

Target in



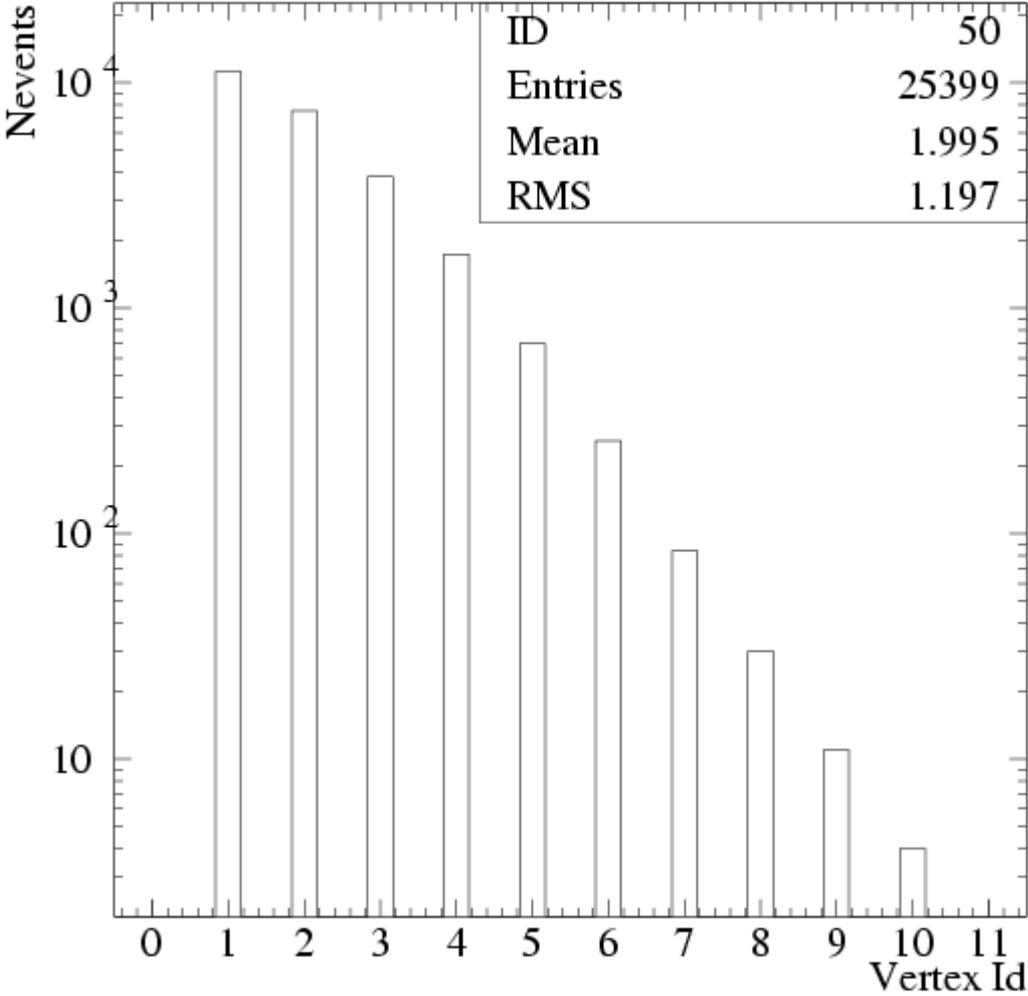
Target out



Target out shows ~12 mm resolution in z

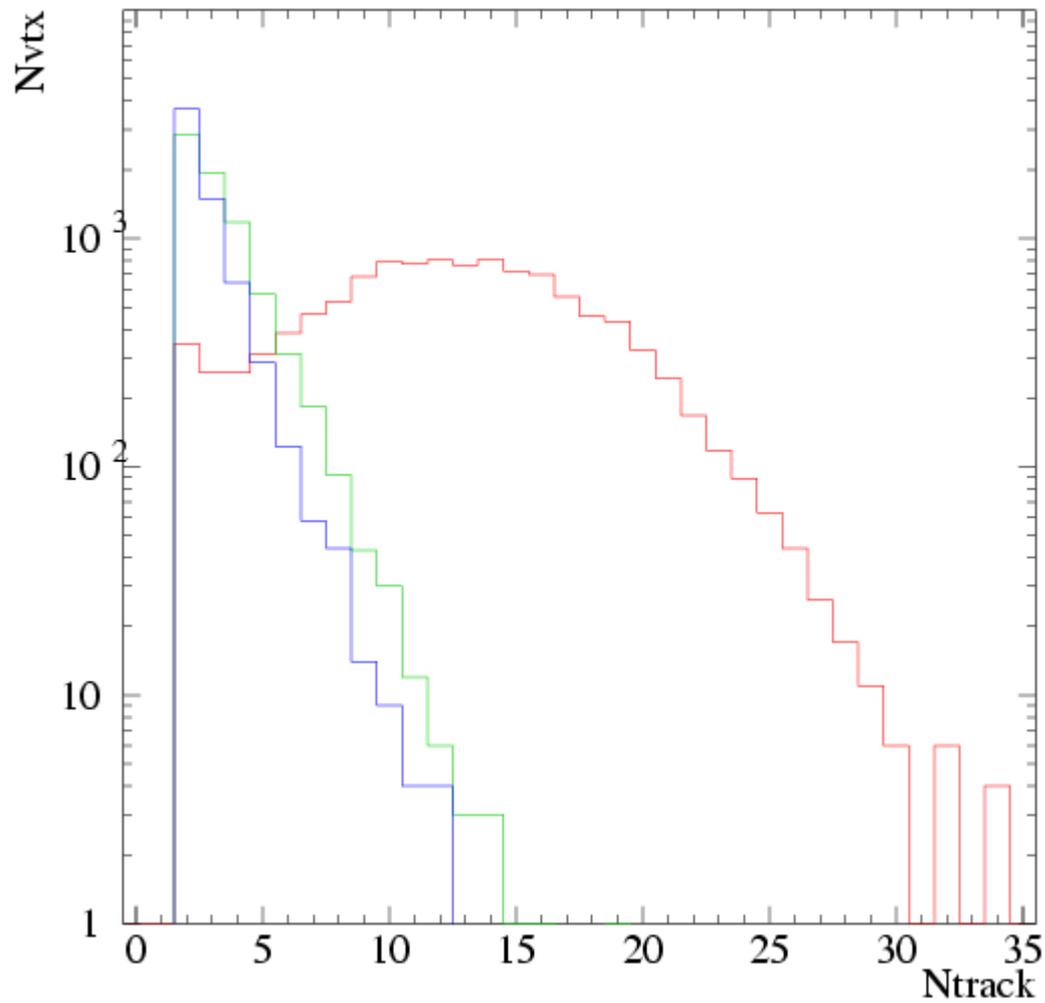
In x and y I estimate about a 3 mm resolution (looking at width of NuMI target)

# *NuMI Target*



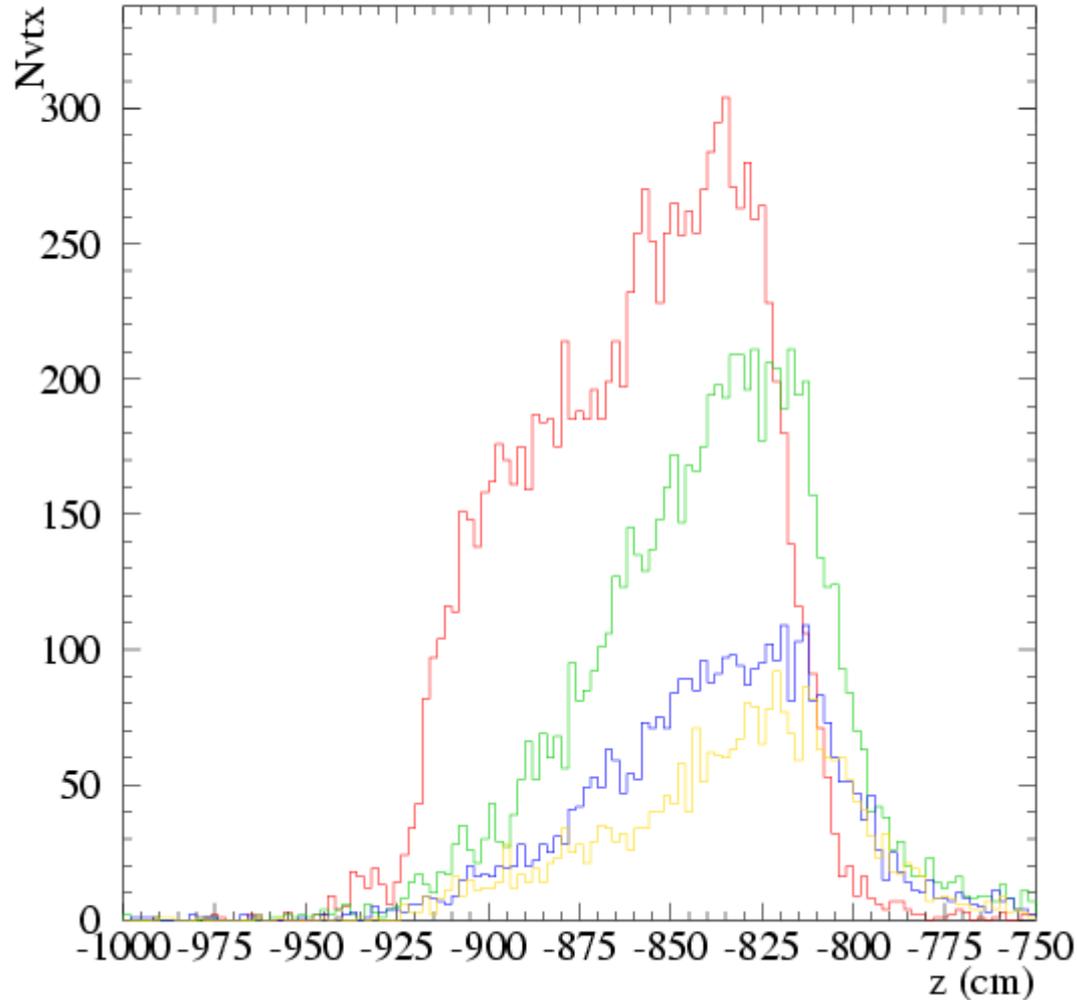
Number of vertices found per event

# *NuMI Target: Numbers of tracks vs. id#*

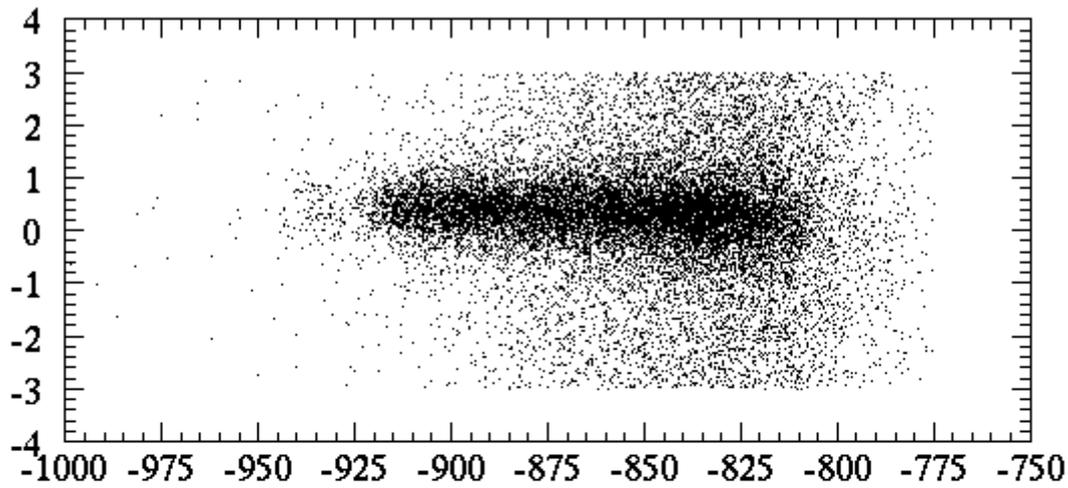


red: id=1  
green: id=2  
blue: id>2

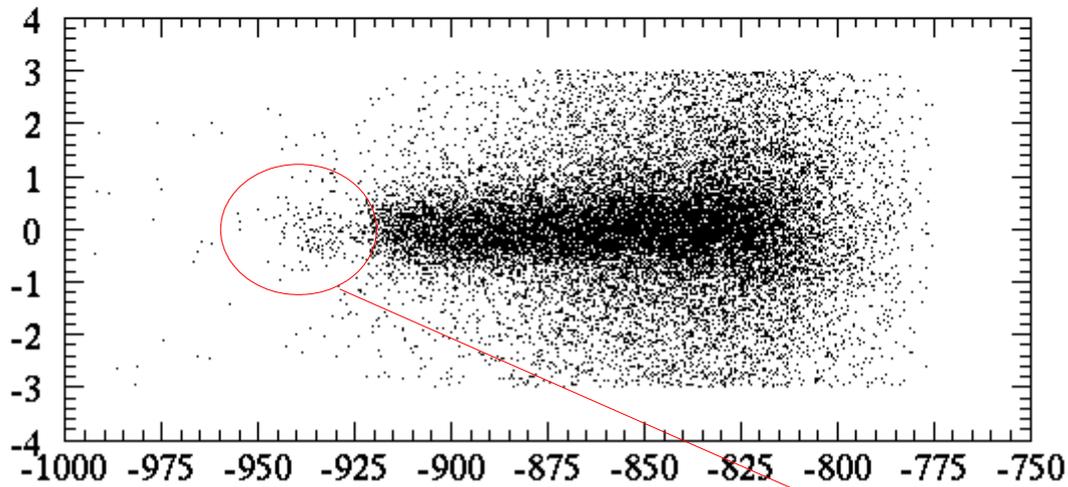
# *NuMI Target: z positions of vertices*



red: id=1  
green: id=2  
blue: id=3  
gold: id>3

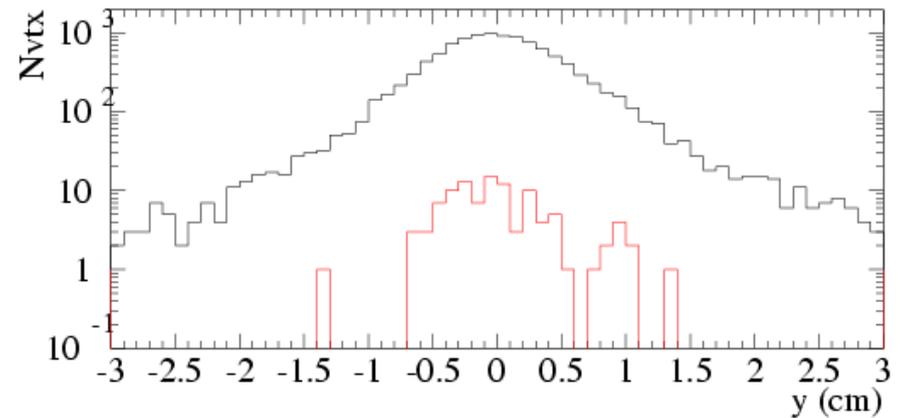
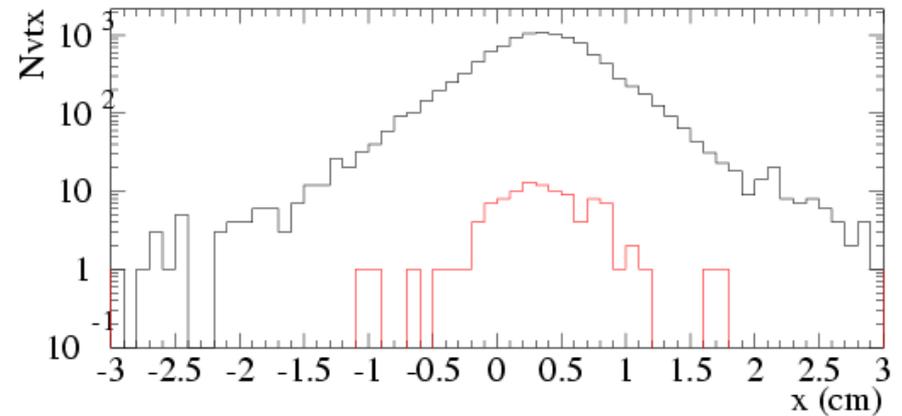


x VS. z



y VS. z

Zoom in on location of horizontal fin: on beam left as it should be!



*NuMI Target: Location distributions*