Vertex predictions vs Scanning volume & event 2811_20190

Goals - Procedure

- **GOALS :** Process 56 events supplied by Emily and obtain vertex predictions in order to **check** if they are **inside or outside the scanning volume**(s).

- **PROCEDURE :**
  - Process the 38 located events we have found (with existent location m-files) in order to check our performance on already located events.
  - For obtaining vertex predictions (for the 38 located events & the 56 not yet located) we have gone through the following steps :

  a) Make lines and 3D tracks with the code (no manual intervention)

  b) If no 3D reconstructed tracks or "false" 3D tracks (checked by eye) use existent lines to form tracks <=> (skip the line-making part of the code)

  c) If still no 3D tracks or "false" 3D tracks redo the lines manually (KEYBOARD commands 6 8 10) and use them to form 3D tracks

Results on 38 located events

- In **35 events** the prediction is **IN** the scanning volume.
- In **2 events** there were **no 3D tracks** reconstructed in order to perform the minimization
- In **1 event** the prediction is **OUT** of the scanning volume :

RUN	EVENT	VTXTYP	ZPOS	ZERR	UPOS	UERR	VPOS	VERR	IN
3119	164	1 man	0.28794	0.00043	-0.11210	0.00017	-0.24957	0.00015	0

OUT IN U SCANNING VOLUME ** -0.110582 -0.105378 **

- VTXTYP : **1+** = SF lines & Tracks reconstructed by code
  1- = Use existent SF lines and reconstruct Tracks by code
  1 man= Redo SF lines (Keyboard commands 6-8-10) and reconstruct Tracks by code

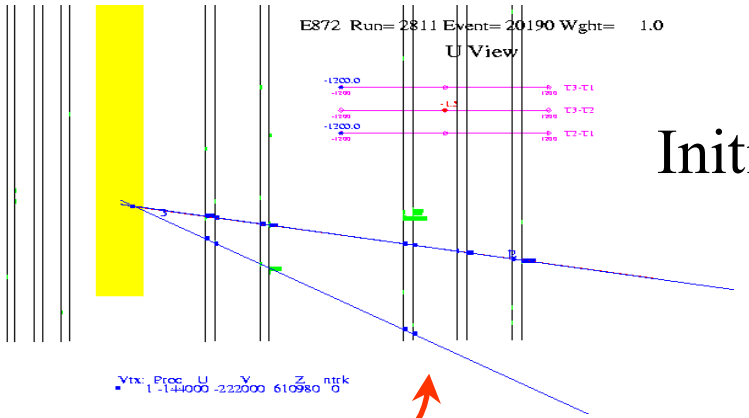
FILE : PREDICTIONS_38_ns.TXT

Results on 56 not located events

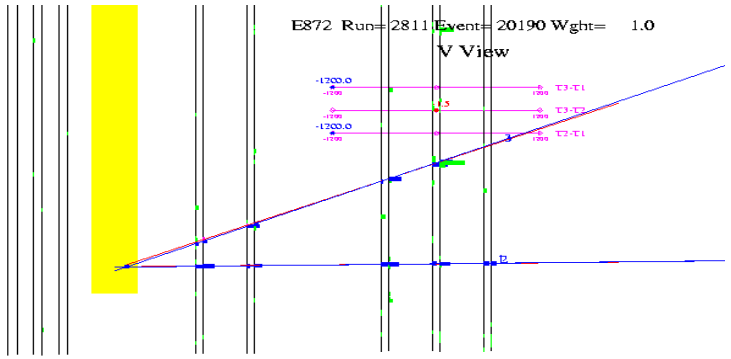
- In **37 events** the prediction is **IN** the scanning volume.
- In **4 events** there were **no 3D tracks** reconstructed in order to perform the minimization.
- In **15 events** the prediction is **OUT** of the scanning volume. (For 5 of the 15 events we are not so sure about the prediction, thus they are marked with a "?" in the following file)
- All the details are in **FILE predictions_56_ns.txt**

2811_20190 vertex prediction

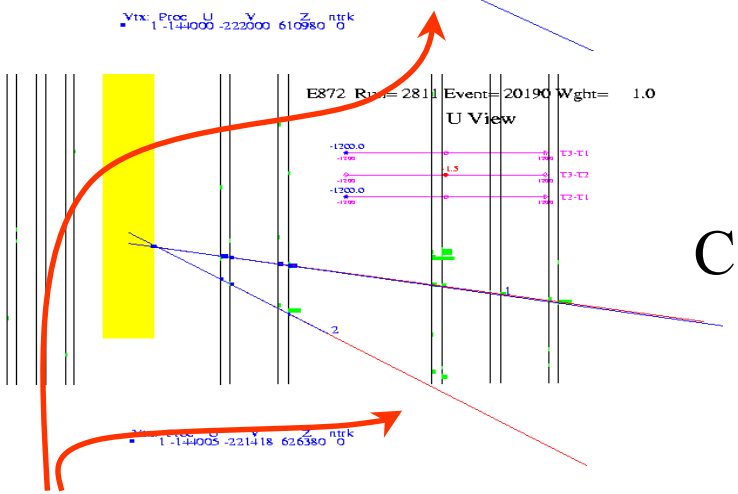
U view



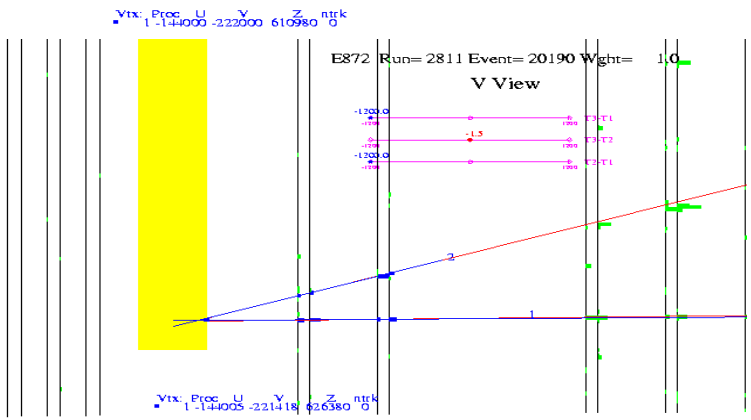
V view



Initial tracks



Code tracks



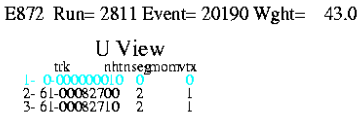
• One of the 2 tracks has the possibility to be formed in the U view in 2 ways. The most "obvious" way (initial manual tracks) gives a **Z of 0.61656** The other way (code reconstructed lines & tracks) in which the formed track has a better χ^2 but uses hits with lower pulse height gives a **Z of 0.62638** and it is **outside the scanning volume**.

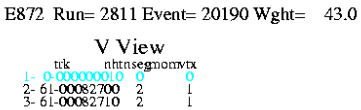
Z SCANNING VOLUME ** 0.602825 0.624190 **

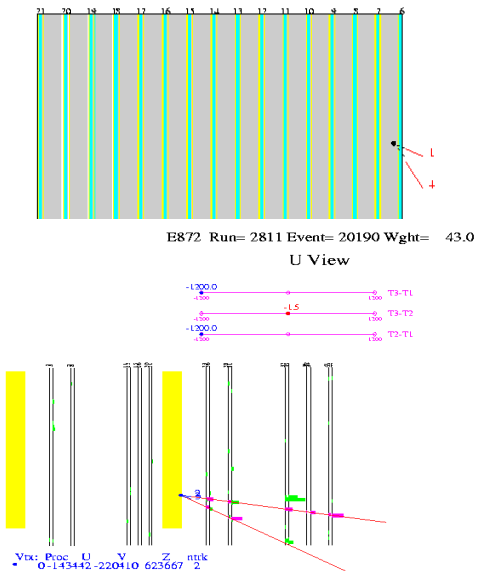
2811_20190 Results with Bruce's modified code for event location

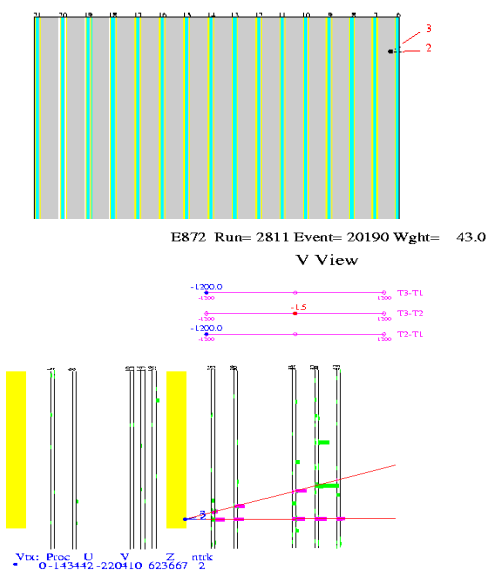
- We run the modified code for event location for this event which resulted in 6 candidate vertices
- All emulsion vertex tracks match with none or one of the two spectrometer tracks (the one that is uniquely reconstructed)
- **None of these vertices seems to be the correct one**.
- We present the results in case anyone wants to check them or use them in any way.

2811_20190 Results with Bruce's modified code for event location (Vertex1)









>>>>>>>>>>>>>>>>>> Reconstructed Vertices in 2811_20190 <<<<<<<<<<<<<<<<<<<<

ivx= 1 vtx= -143442.31 -220410.23 623667.12 chi= 0.00

Errors 0.60 0.60 1.52 micron

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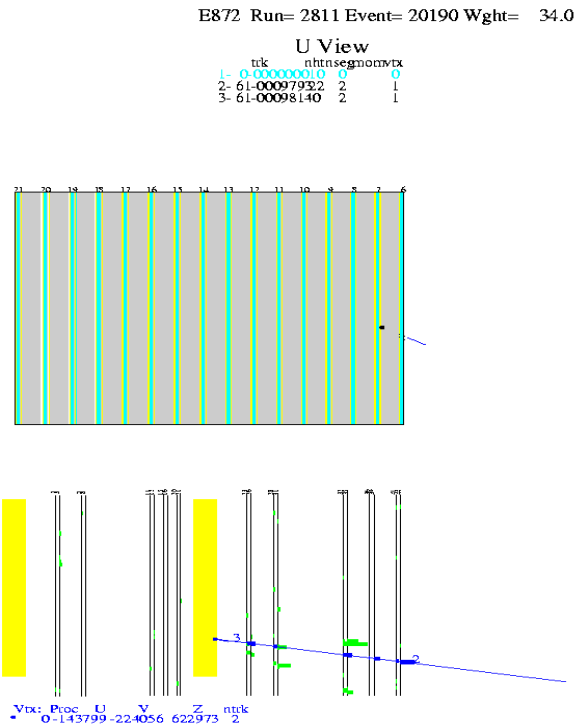
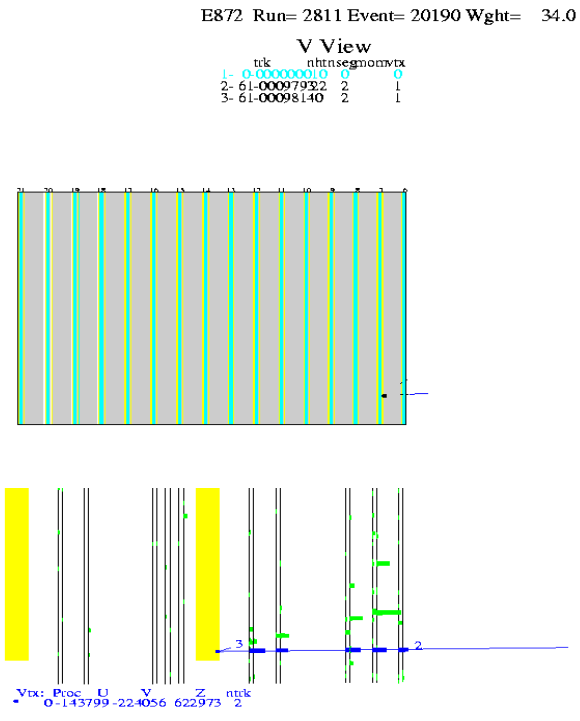
trk	nseg	IP micron	vtx chi	spect nht	trk chis	mom	dthet U	dthet V	thet U	thet V
2- 61-0008270	2	0.04	0.00	0	0.0	0.0	0.000	0.000	-0.119	-0.023
3- 61-0008271	2	0.17	0.07	0	0.0	0.0	0.000	0.000	-0.319	0.149

Seg wght 4 Mat wght 0 Vtx wght 39 Total = 43.

2811_20190 Results with Bruce's modified code for event location (Vertex2)





>>>>>>>>>>>>>>>>>> Reconstructed Vertices in 2811_20190 <<<<<<<<<<<<<<<<<<<<

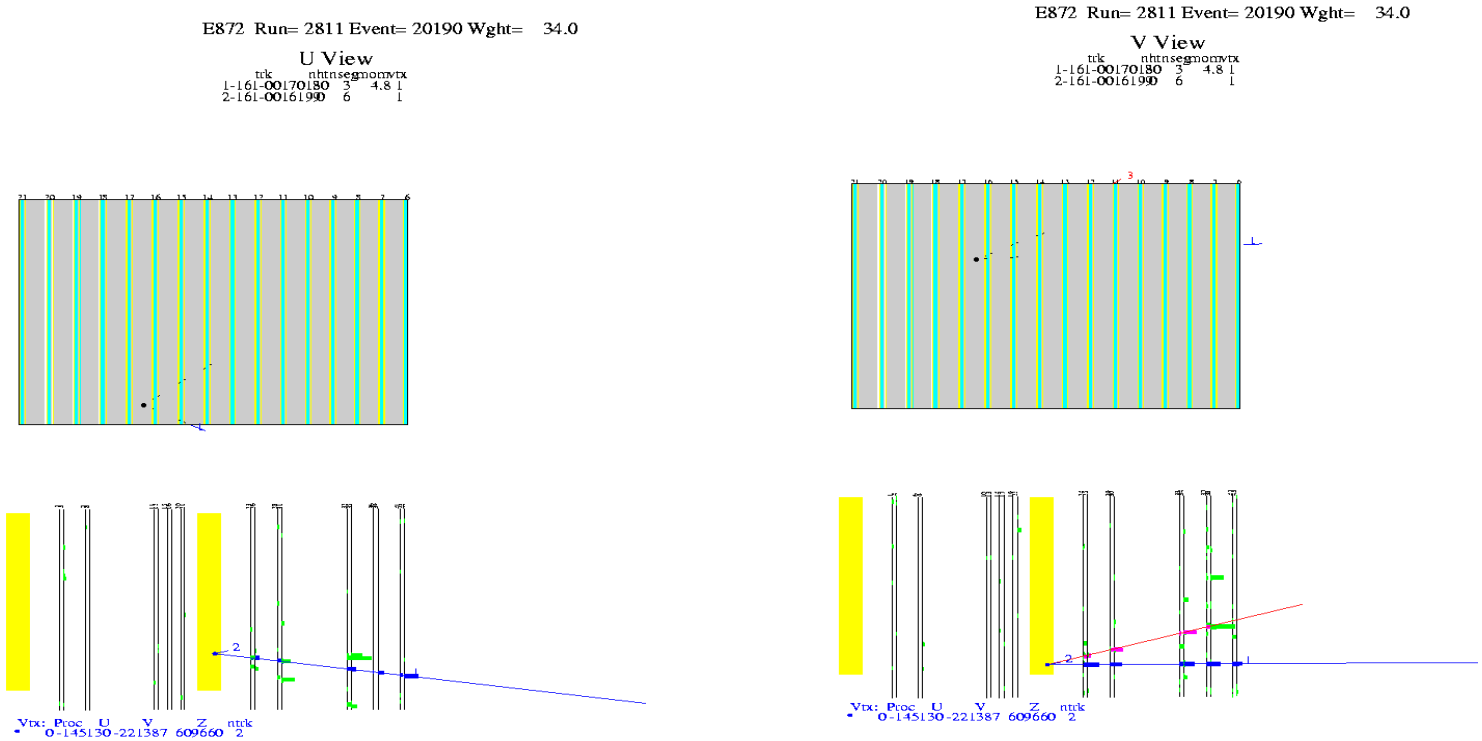
ivx= 1 vtx= -143799.09 -224055.92 622973.44 chi= 0.00

Errors 0.60 0.60 1.52 micron

trk	nseg	IP micron	vtx chi	spect nht	trk chis	trk mom	dthet U	dthet V	thet U	thet V
2- 61-0009793	2	0.58	0.71	22	6.1	0.0	0.011	-0.012	-0.125	0.023
3- 61-0009814	2	2.06	9.06	0	0.0	0.0	0.000	0.000	-0.178	0.277

Seg wght 4 Mat wght 0 Vtx wght 30 Total = 34.

2811_20190 Results with Bruce's modified code for event location (Vertex3)



>>>>>>>>>>>>>>>>>> Reconstructed Vertices in 2811_20190 <<<<<<<<<<<<<<<<<<<<

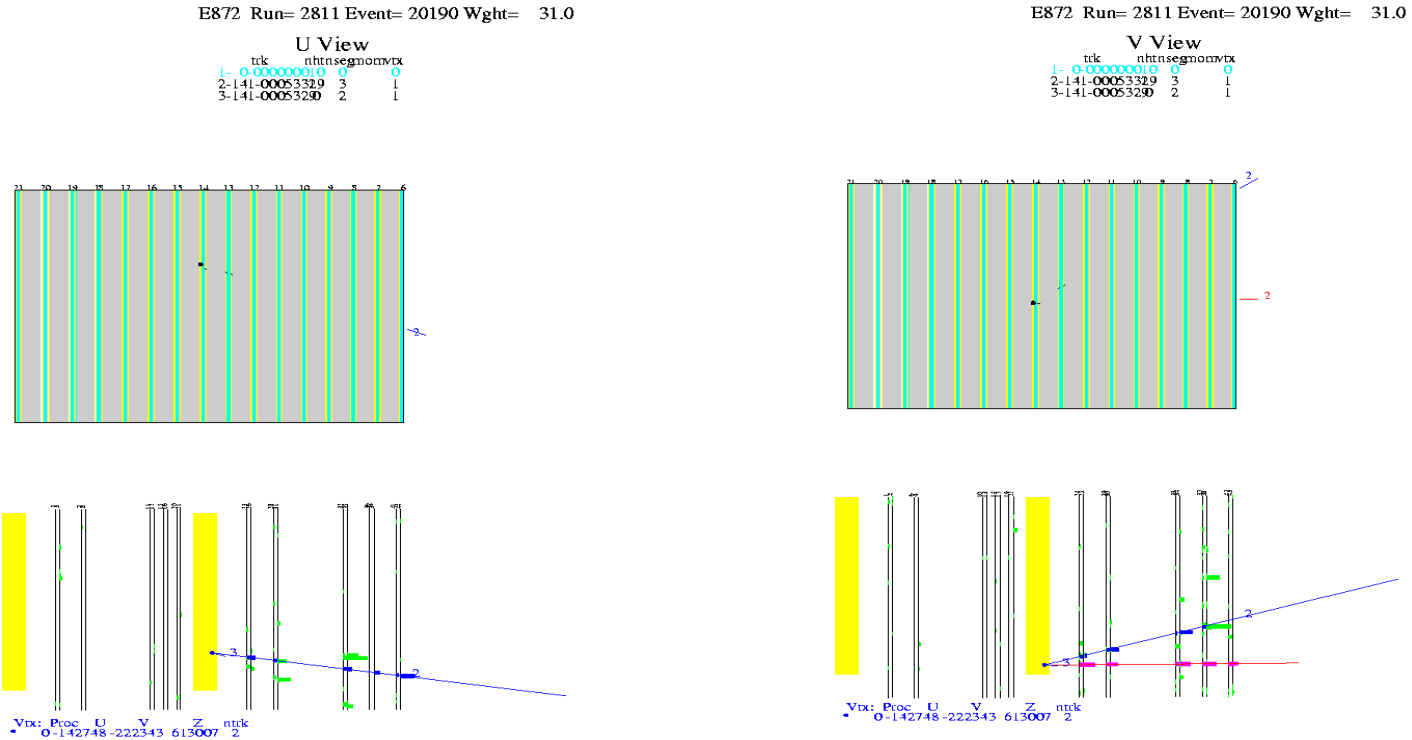
ivx= 1 vtx= -145129.64 -221386.66 609659.62 chi= 0.00

Errors 0.60 0.60 1.52 micron

trk	nseg	IP micron	vtx chi	spect nht	trk chis	dthet mom	thet U	thet V	U	V
1-161-0017018	3	0.14	0.04	30	3.3	4.8	0.027	-0.017	-0.135	0.022
2-161-0016199	6	0.34	0.26	0	0.0	0.0	0.000	0.000	0.204	0.164

Seg wght 7 Mat wght -11 Vtx wght 38 Total = 34.

2811_20190 Results with Bruce's modified code for event location (Vertex4)



ivx= 1 vtx= -142747.61 -222342.80 613006.75 chi= 0.00
Errors 0.60 0.60 1.52 micron

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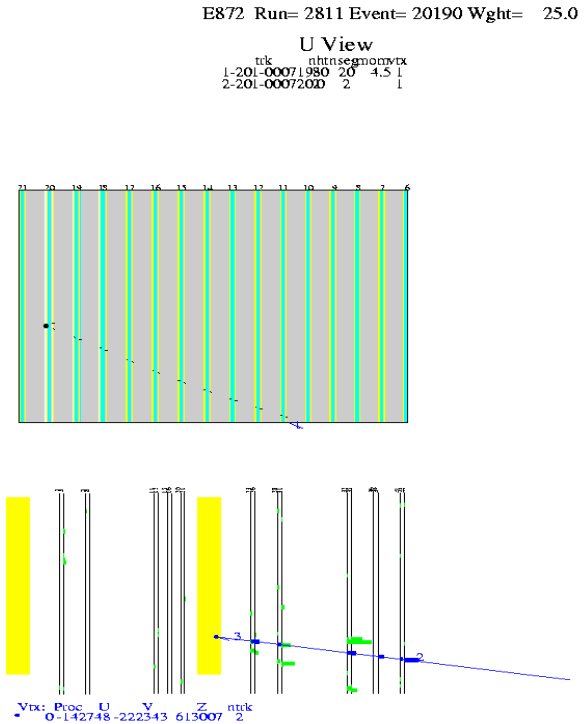
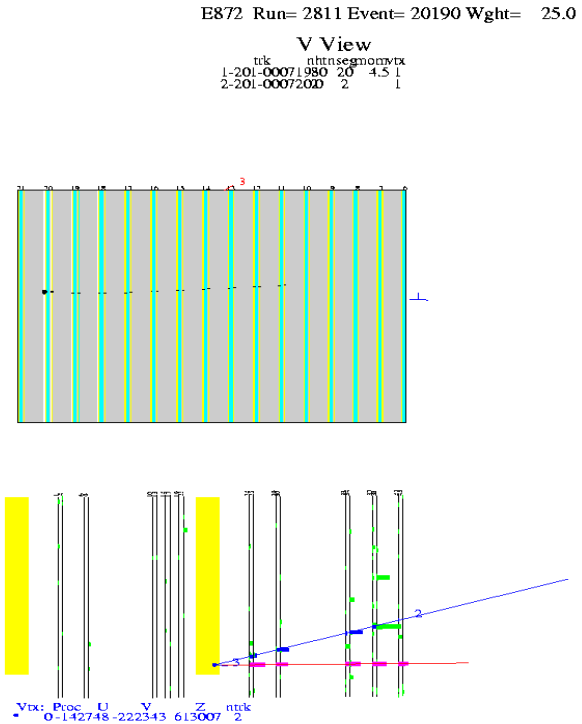
trk	nseg	IP micron	vtx chi	spect nht	trk chis	dthet mom	thet U	thet V	U	V
2-141-0005332	3	1.62	6.05	19	3.8	0.0	-0.015	0.005	-0.098	0.221
3-141-0005329	2	1.90	8.21	0	0.0	0.0	0.000	0.000	-0.261	-0.061

Seg wght 5 Mat wght 0 Vtx wght 26 Total = 31.

2811_20190 Results with Bruce's modified code for event location (Vertex5)





>>>>>>>>>>>>>>>>>> Reconstructed Vertices in 2811_20190 <<<<<<<<<<<<<<<<<<<<

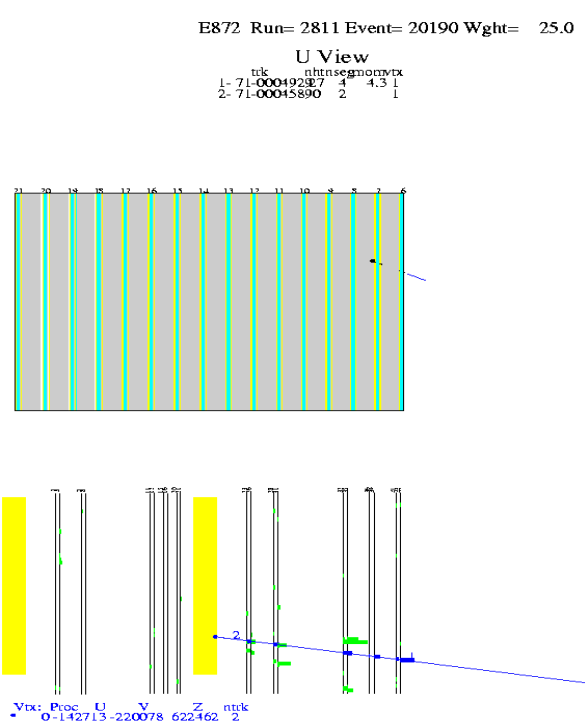
ivx= 1 vtx= -143808.03 -221891.58 604282.81 chi= 0.00

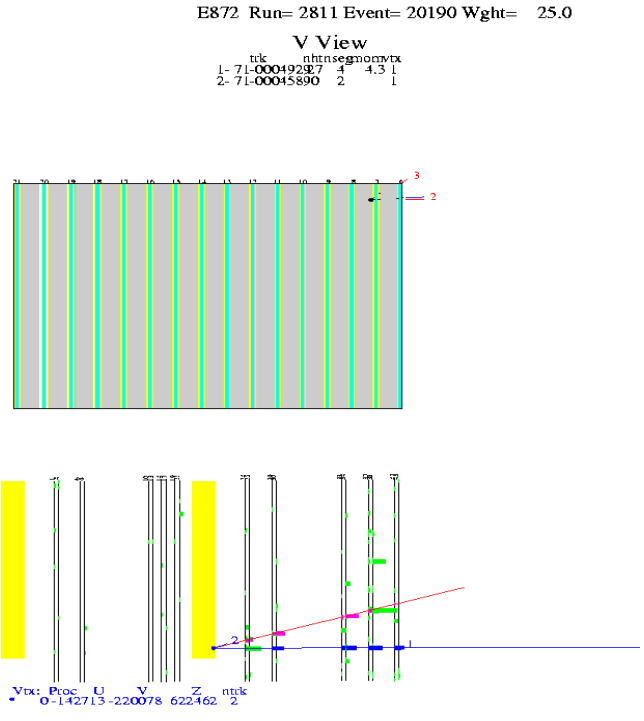
Errors 0.60 0.60 1.52 micron

trk	nseg	IP micron	vtx chi	spect nht	trk chis	trk mom	dthet U	dthet V	thet U	thet V
1-201-0007198	20	2.26	11.00	30	1.6	4.5	0.016	0.013	-0.125	-0.008
2-201-0007202	2	2.15	10.00	0	0.0	0.0	0.000	0.000	0.114	0.035

Seg wght 6 Mat wght -3 Vtx wght 22 Total = 25.

2811_20190 Results with Bruce's modified code for event location (Vertex6)





>>>>>>>>>>>>>>>>>> Reconstructed Vertices in 2811_20190 <<<<<<<<<<<<<<<<<<<<

ivx= 1 vtx= -142713.06 -220078.42 622461.56 chi= 0.00

Errors 0.60 0.60 1.52 micron

trk	nseg	IP micron	vtx chi	spect nht	trk chis	trk mom	dthet U	dthet V	thet U	thet V
1- 71-0004929	4	0.90	1.95	27	4.4	4.3	0.007	-0.019	-0.123	0.021
2- 71-0004589	2	3.53	29.22	0	0.0	0.0	0.000	0.000	-0.139	0.298

Seg wght 6 Mat wght -3 Vtx wght 22 Total = 25.

Conclusions

- The performance of our procedure for obtaining vertex predictions and examining if they are inside the existent scanning volume gives satisfactory (reasonable) results on the 38 located events.

- This indicates that at least some of the 15 / 56 events that have a prediction outside the scanning volume should be reconsidered. (maybe all)

- We could not locate event 2811_20190 and there is a possibility that the vertex might be outside the scanning volume for that event.