Event Location efficiency check using Hybrid MC m-files

18-12-2001

N. Saoulidou & G. Tzanakos

Goal

- The purpose of this analysis is to test our Location code and check the location efficiency.
- There are two ways of doing that:
  - **Use located events (Already done)**

    Disadvantage : Re-finding already located events might be due to a "specific" code structure that is able to locate these particular events.
  - **Use MC events**

    Disadvantage : Such a simulation of a real m-file does not exist, so we have to use the "Hybrid" method.

Procedure

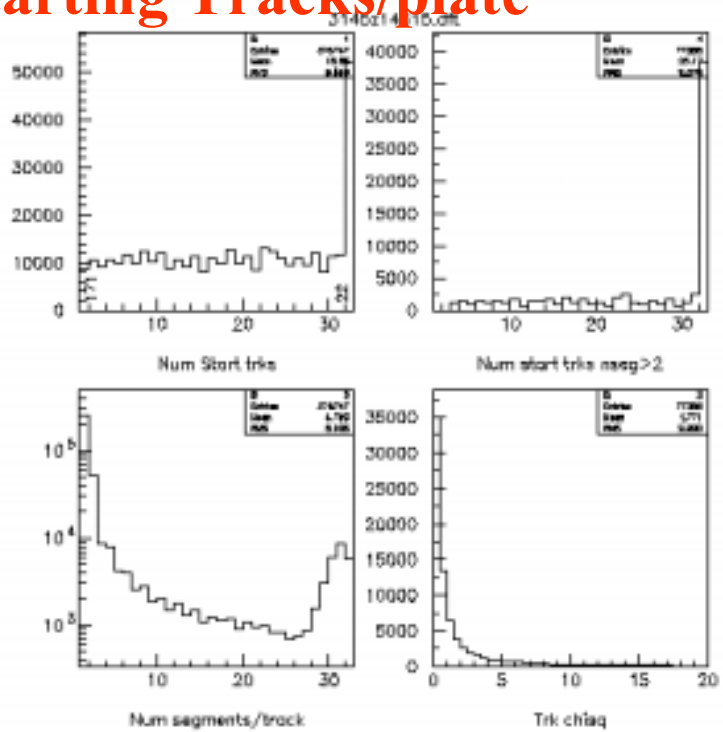
- Choose a **real m-file** and find corresponding **run period**, **module** and characteristics (**scanning volume bounds**, **number of plates**, **plate resolution** in u and v)
- **Modify MC code** in order to create **simulated neutrino interactions** with the desired characteristics (**same scanning volume**, **number of plates**, **plates z-position** and **plate resolution**) and **in specific positions** in the 3D-scanning volume.
- Create **one m-file** which is the **superposition** of the **real** m-file and the **MC** m-file (Hybrid m-file).
- **Process** the **Hybrid events** with the **Location code** and check results

Real Frame 1

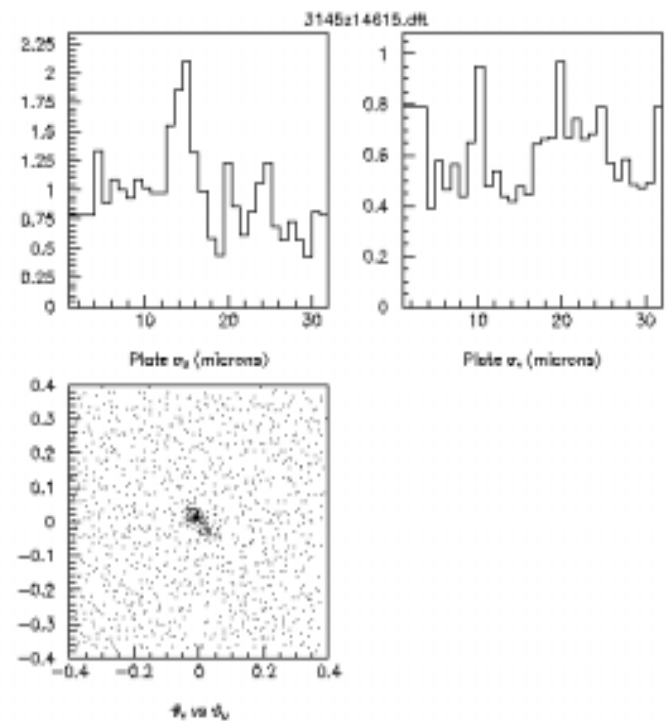
- We have used **two real m-files** of Period 3 with the interaction in the first and second module respectively.

- EVENT 3145_14615 (Characteristics)

Starting Tracks/plate

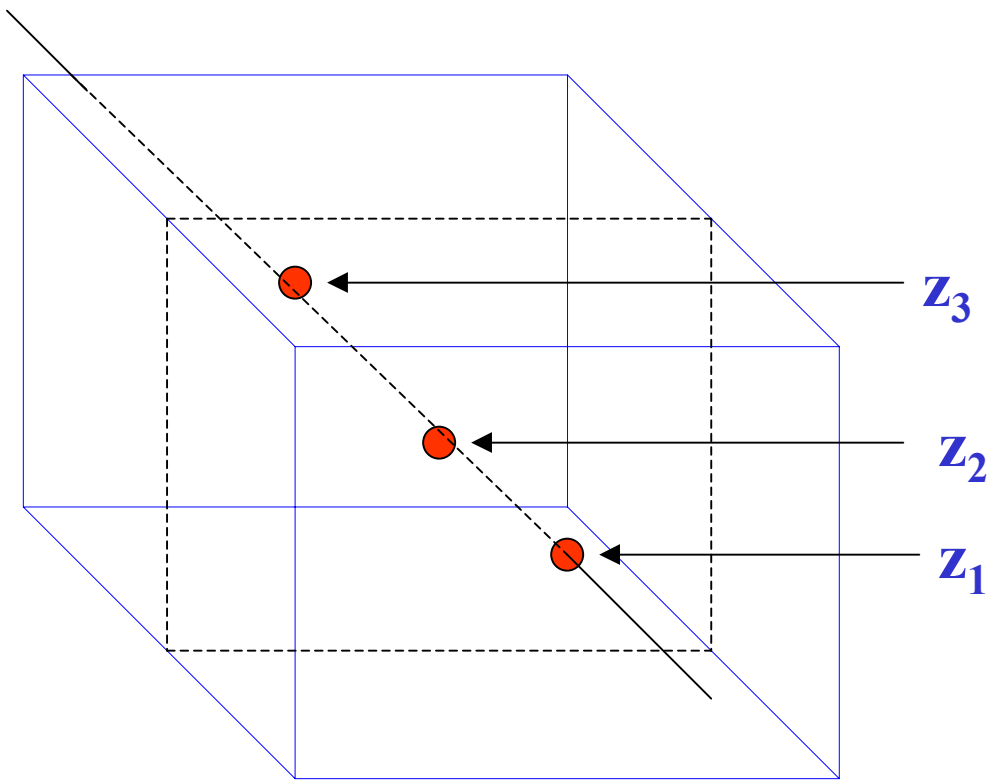


σ_u (μ) **σ_v (μ)**

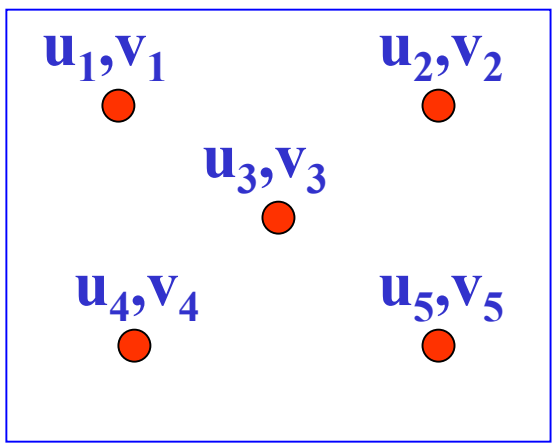


Real Frame 1 cont.

- For this real frame we created **15 neutrino interactions** in various points in the scanning volume.



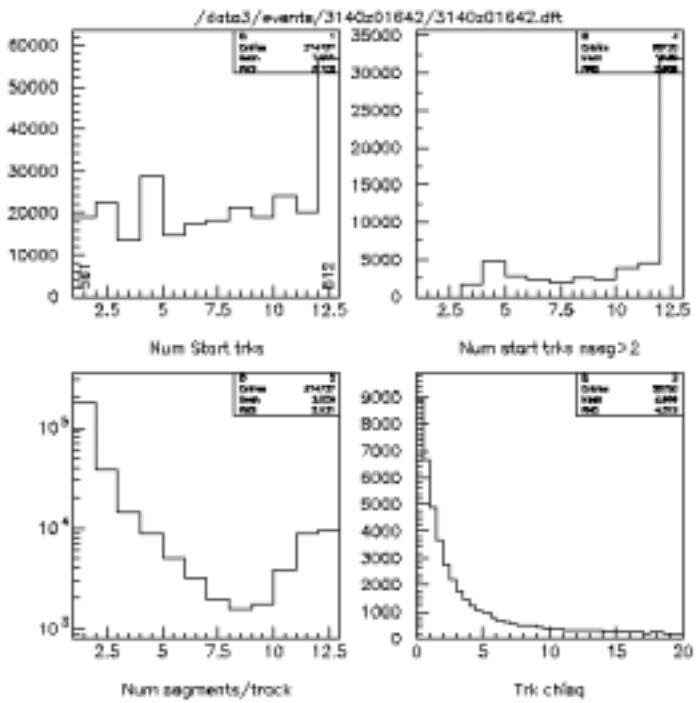
● ≡ **Interaction point**



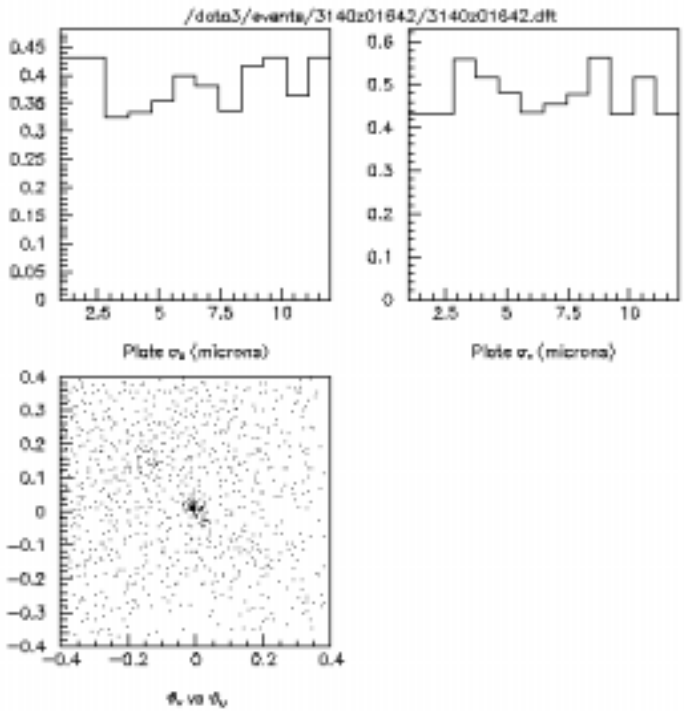
Real Frame 2

- EVENT 3140_01462 (Characteristics)

Starting Tracks/plate

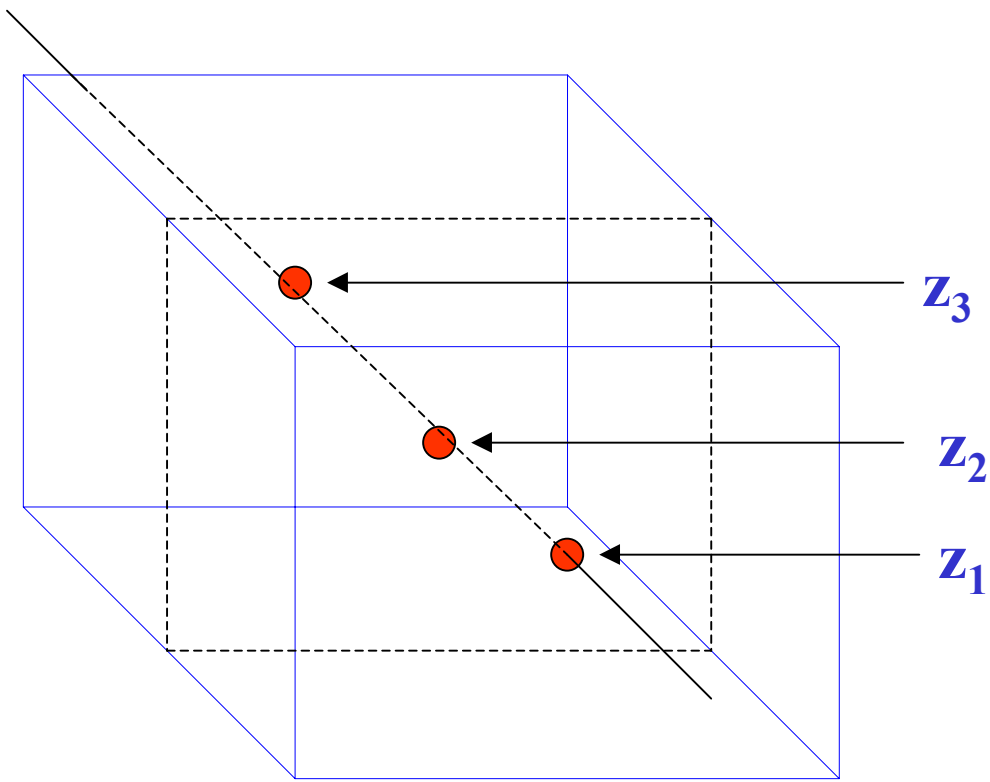


σ_u (μ) σ_v (μ)



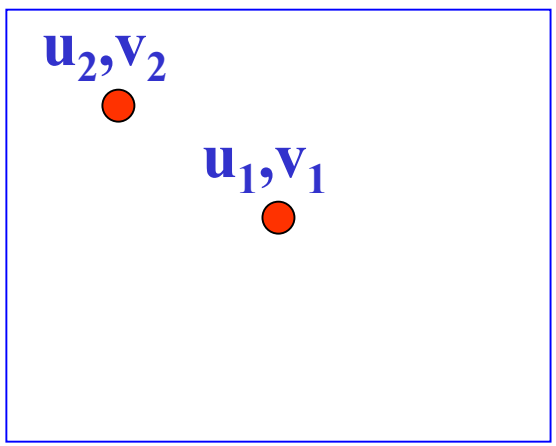
Real Frame 2 cont.

- For this real frame we created **6 neutrino interactions** in various points in the scanning volume.



● ≡ **Interaction point**

One NC interaction had only one emulsion track so it is not considered



Results

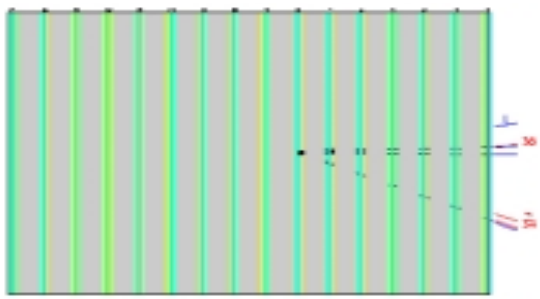
- We processed the **20 Hybrid interactions** with the Location code and:

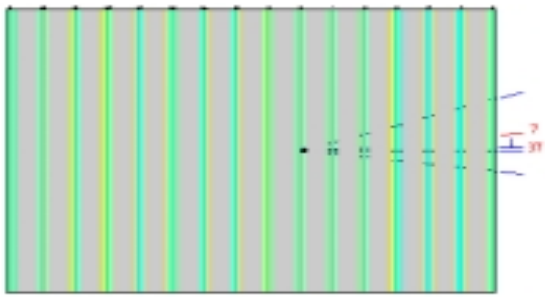
19 out of 20 Located

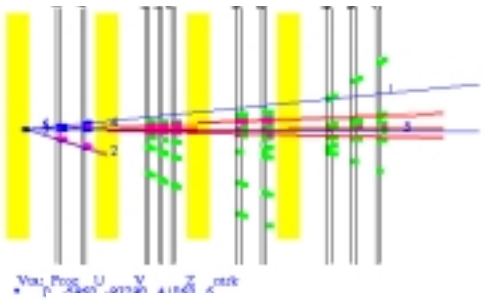
- We missed one event which was in our candidate vertex list, but with very low weight due to large IP of primary tracks from the interaction vertex.

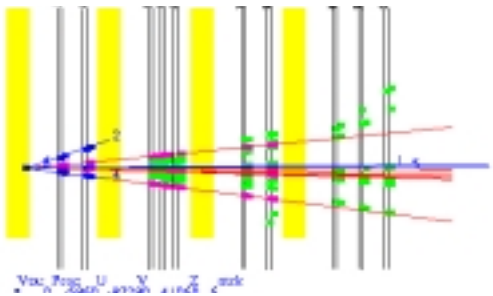
Results (Frame 3144_14615)

U **V**









>>>>>>>>>>>>>>>>>> Reconstructed Vertices in 3072_00003 <<<<<<<<<<<<<<<<<<<<

ivx= 1 vtx= -5960.47 -97290.34 41060.49 chi= 0.27

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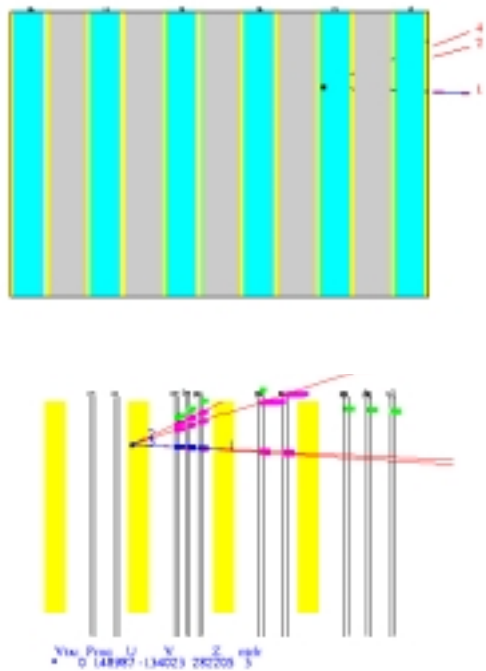
trk	nseg	IP micron	vtx chi	spect nht	trk chis	trk mom	dthet U	dthet V	thet U	thet V
1- 82-0000001	3	0.88	0.79	14	0.2	1.0	-0.020	-0.008	0.088	0.015
2- 82-0000004	13	0.83	1.24	6	2.4	0.0	0.008	0.014	-0.232	0.221
3- 82-0000005	3	1.46	2.81	0	0.0	0.0	0.000	0.000	-0.230	-0.019
4- 82-0000003	13	1.12	0.87	8	0.8	0.0	0.000	0.002	0.021	-0.090
5- 82-0000007	13	0.37	0.08	12	0.6	2.2	0.002	0.001	-0.005	0.000
6- 82-0000008	5	0.62	0.51	0	0.0	0.0	0.000	0.000	0.039	0.032

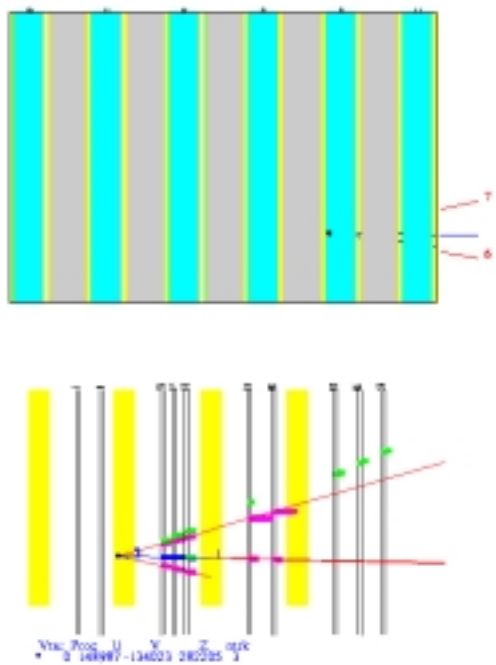
Seg wght 22 Mat wght 14 Vtx wght 100 Total = 136.

Results (Frame 3140_01642)

U



V



>>>>>>>>>>>>>>>>>> Reconstructed Vertices in 3072_00001 <<<<<<<<<<<<<<<<<<<<

ivx= 1 vtx= 148986.77 -134023.16 282204.81 chi= 0.21

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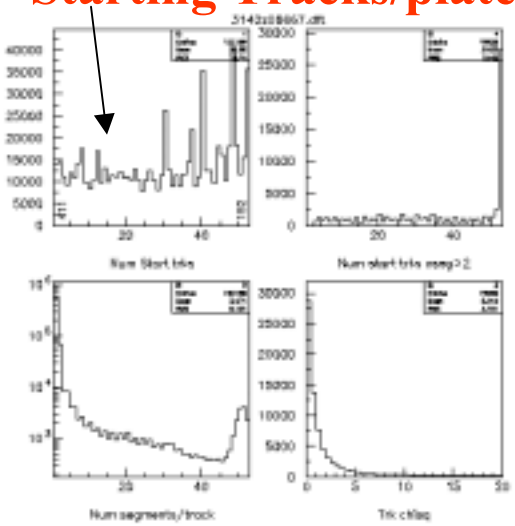
trk	nseg	IP micron	vtx chi	spect nht	trk chis	trk mom	dthet U	dthet V	thet U	thet V
1-522-0000002	3	0.87	1.30	12	0.5	0.0	0.001	0.001	-0.035	-0.018
2-522-0000003	3	0.59	0.42	0	0.0	0.0	0.000	0.000	0.379	-0.119
3-522-0000006	3	0.85	1.25	0	0.0	0.0	0.000	0.000	-0.033	-0.016

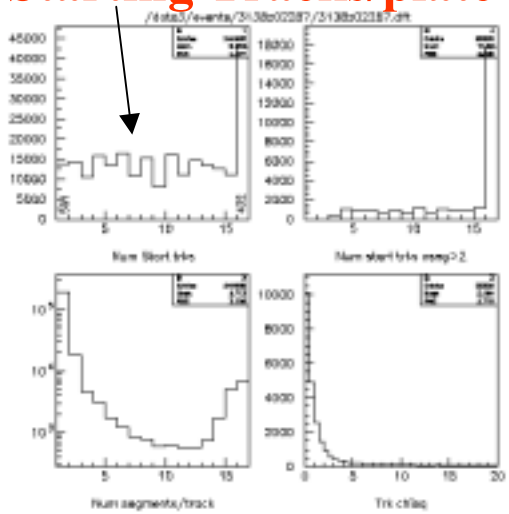
Seg wght 9 Mat wght 9 Vtx wght 52 Total = 70.

Characteristics of new period 3 m-files

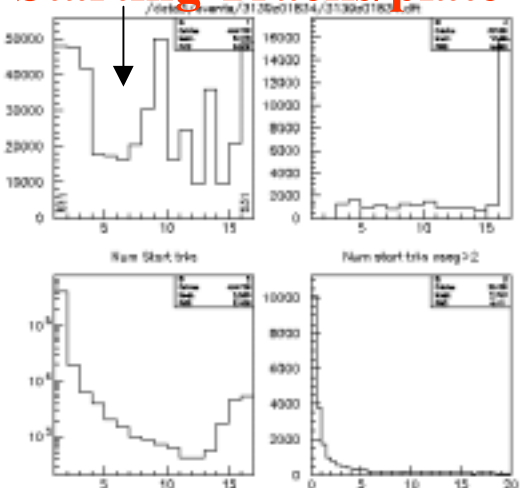
Starting Tracks/plate



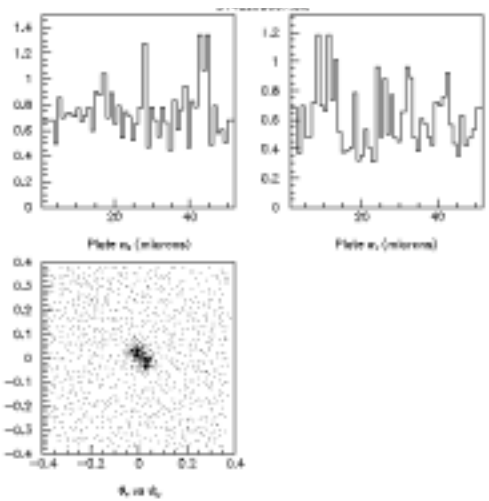
Starting Tracks/plate



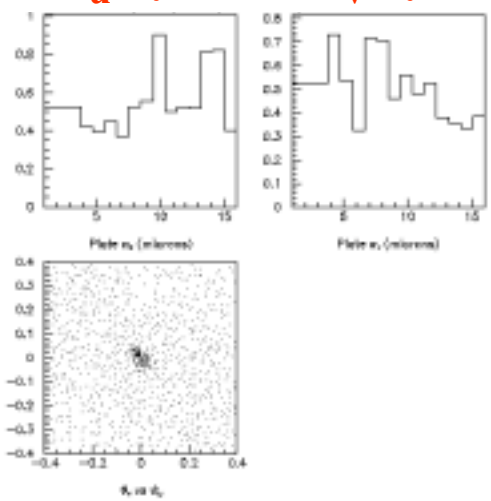
Starting Tracks/plate



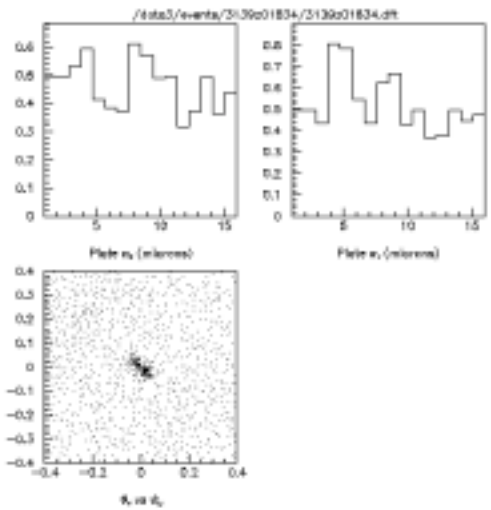
σ_u (μ) σ_v (μ)



σ_u (μ) σ_v (μ)



σ_u (μ) σ_v (μ)



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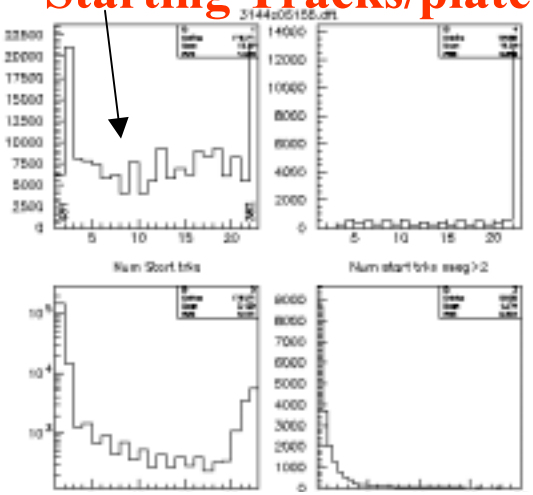

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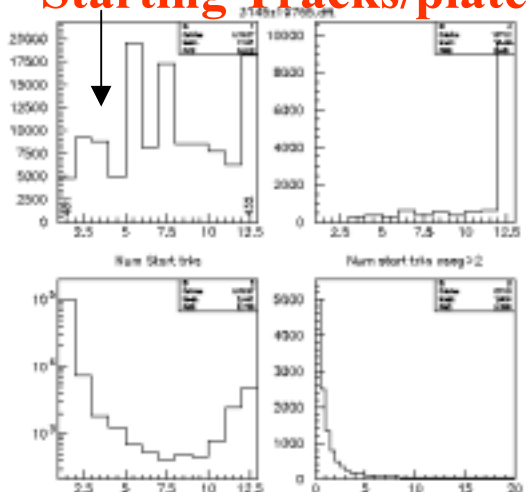

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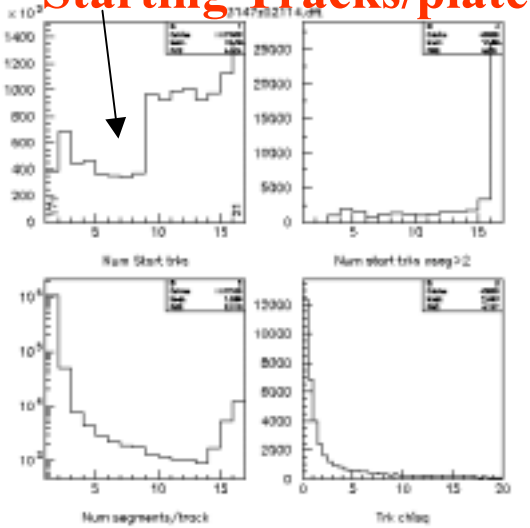
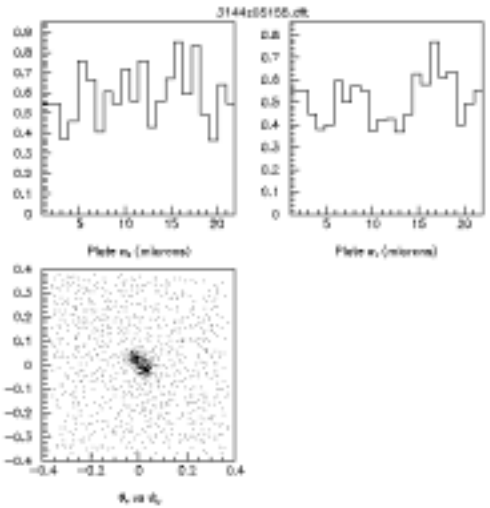
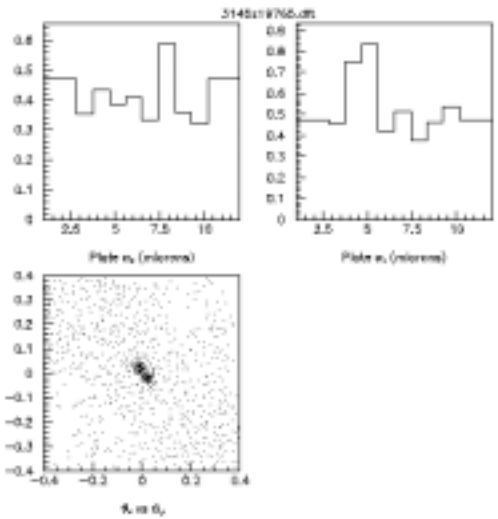


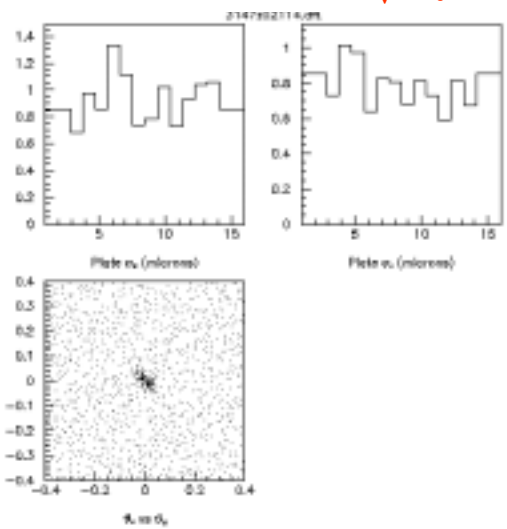
σ_u (μ) **σ_v (μ)**



σ_u (μ) **σ_v (μ)**



σ_u (μ) **σ_v (μ)**



Characteristics of new period 3 m-files

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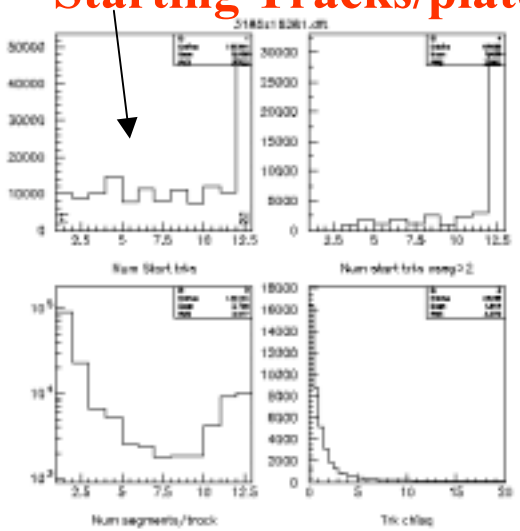
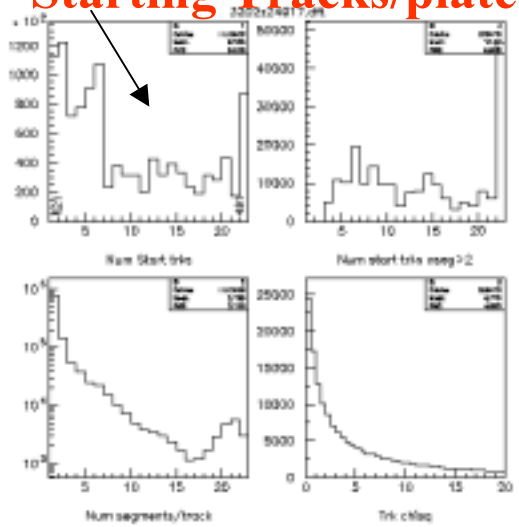
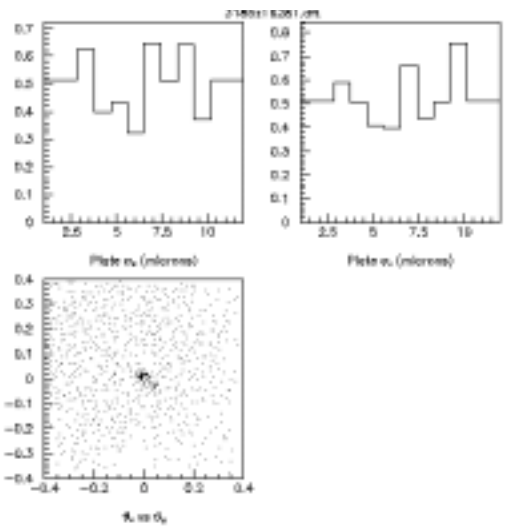


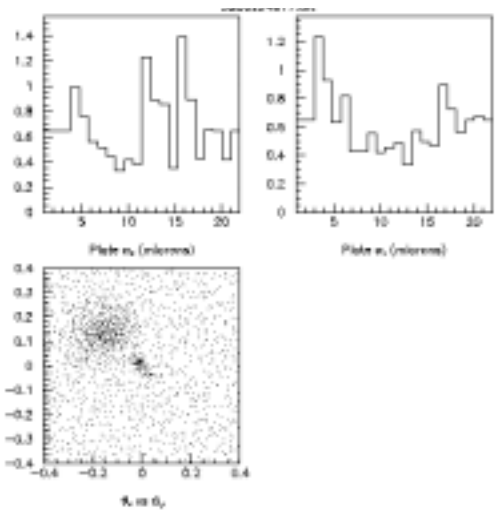
Starting Tracks/plate



σ_u (μ) **σ_v (μ)**

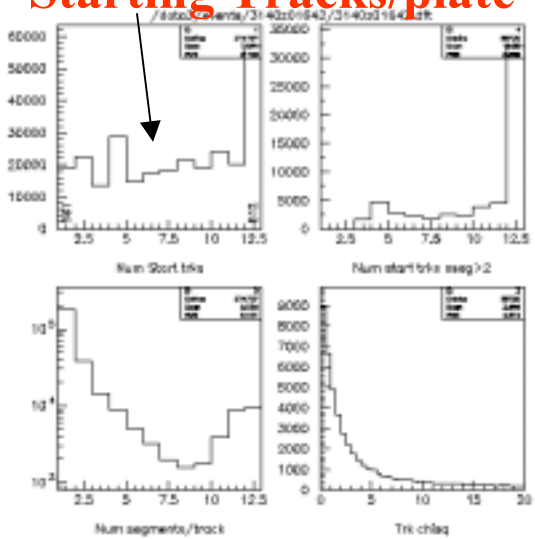


σ_u (μ) **σ_v (μ)**

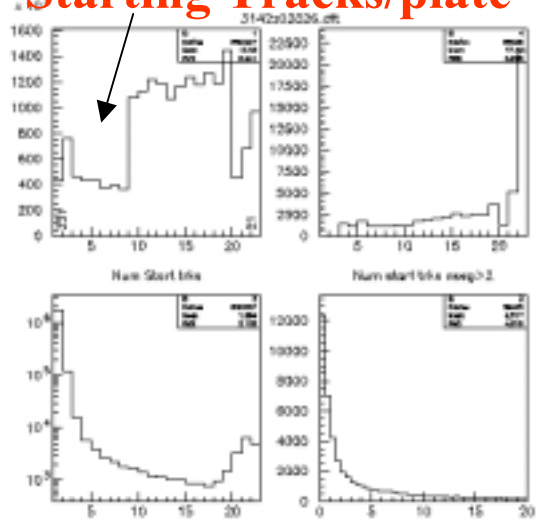


Characteristics of new period 3 m-files

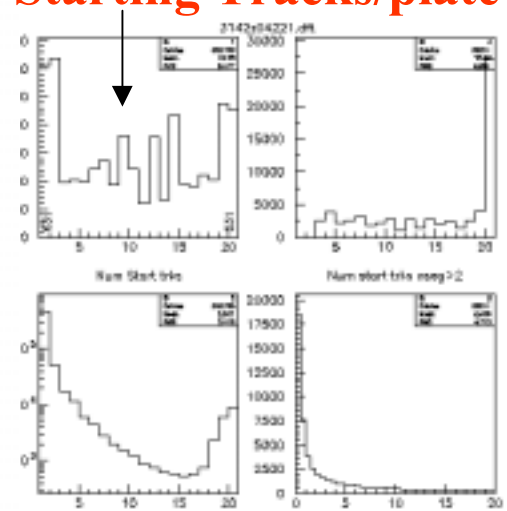
Starting Tracks/plate



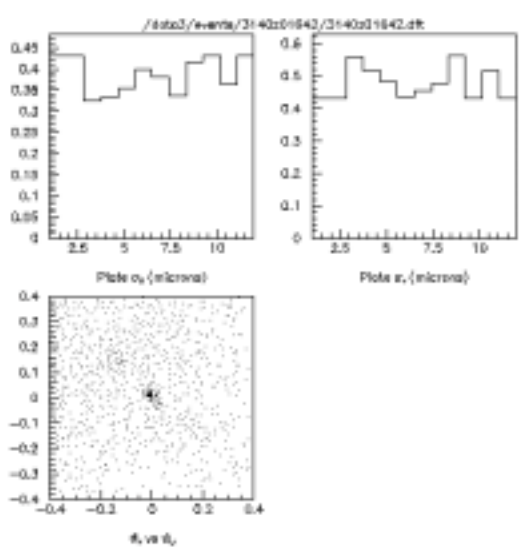
Starting Tracks/plate



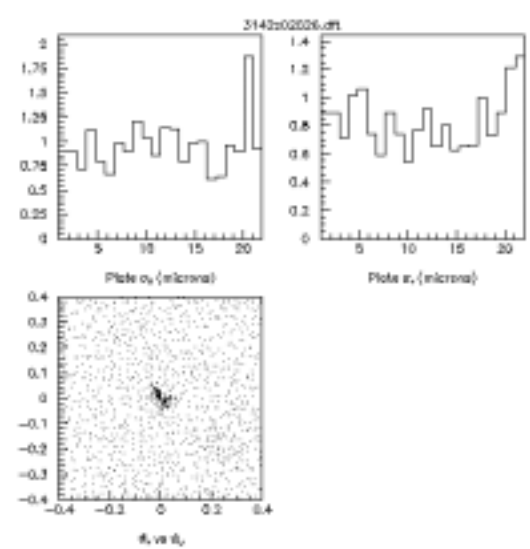
Starting Tracks/plate



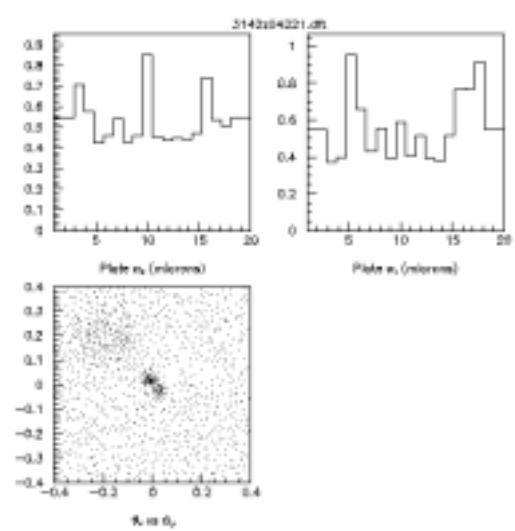
σ_u (μ) **σ_v (μ)**



σ_u (μ) **σ_v (μ)**



σ_u (μ) **σ_v (μ)**



Conclusions - Ongoing work

- The **performance** of the **Location Code** on the 20 **Hybrid** MC **events** is **quite satisfactory** and consistent with **~ 95 % location efficiency** (***if we can make such a statement given the low statistics***)

- Maybe we should **test** a **greater number** of Hybrid MC **events** to obtain a more **reliable picture** (***as far as statistics is concerned).***

- We are ready to **start proccesing** the new **13 period 3 events** and **attempt** their **location.**