

DONUT Collaboration meeting

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Event Location

N. Saoulidou and G. Tzanakos

**University of Athens, Department of Physics,
Div. Of Nuclear & Particle Physics
15771 Athens , Greece**

OUTLINE

ñ **Event location**

- **New slightly different approach**
- **Attempted events**
- **Results - Status**

ñ **Conclusion - Ongoing work**

Event Location : Goal - Method

ñ Our goal is to be able to successfully **locate neutrino interactions** in order to :

- **Locate the period 3 new events.**
- **Contribute to overall event location.**

ñ The **method** we have investigated and modified in certain points is **Bruce's** code for event location.

ñ We have used **38 located events** with **existent location m-files** (unfortunately no more location m-files of located events exist) to **check our performance.**

Event Location : Logic

ñ Set track selection criteria :

← .. Change

- Starting Tracks
- Tracks with 2 or more segments
- **Tracks with good χ^2 (< 6)** ←

ñ Set two-track vertex selection criteria:

- Vertex IP $< 5 \text{ } \mu\text{m}$
- **At least one long vertex track (? 3 segments)** ←
- Vertex no more than 2 plates upstream of the vertex track plates
- **At least one emulsion track match with a spectrometer track** ←

ñ Add more tracks to the vertex that have IP $< 10 \text{ } \mu\text{m}$:

ñ Check if vertex tracks connect upstream.

ñ Match emulsion vertex tracks to spectrometer tracks and visually scan candidate vertices to select the best.

Event Location : Changes

ñ The result of the changes in the logic is that :

- **Greater number of two - track vertices** are formed in the first step.
- More **emphasis** is given on the **matching of emulsion tracks with spectrometer tracks** which finally reduces the number of formed vertices but keeps those **more related to the actual event.**

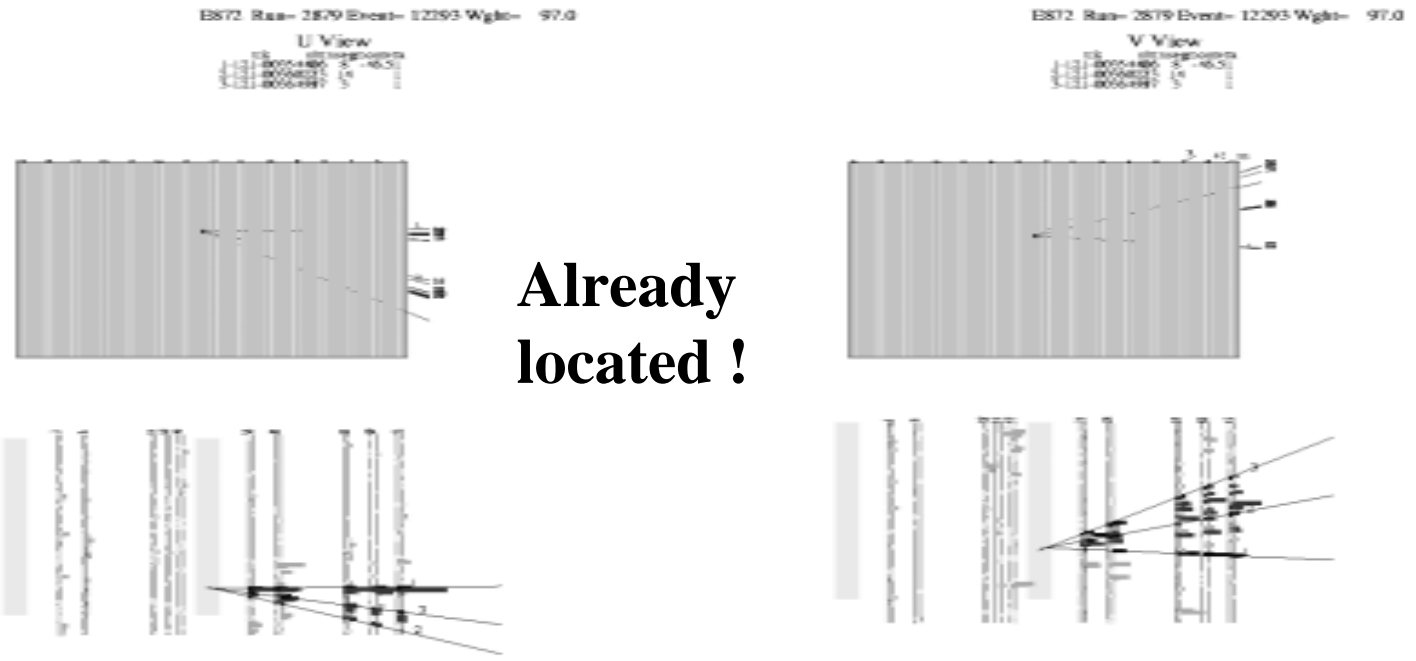
Results on 38 Located Events

EVENTS	38
LOCATED (OUR VERSION)	33
NOT LOCATED (OUR VERSION)	5
LOCATED (BRUCE'S CODE)	28
NOT LOCATED (BRUCE'S CODE)	10

ñ The reasons for not locating the 5 events are :

- 2 events had **large IP** of tracks from vertex $\sim > 10-15$ microns (Bruce's code could not locate them either)
- 2 events had **primary tracks** with very **large** ² (Bruce's code located them)
- In 1 event located by Carolyn we **could not find** one of the 2 **primary tracks** in the **daft file** (Bruce's code did not locate it either)

Event 2879_12293

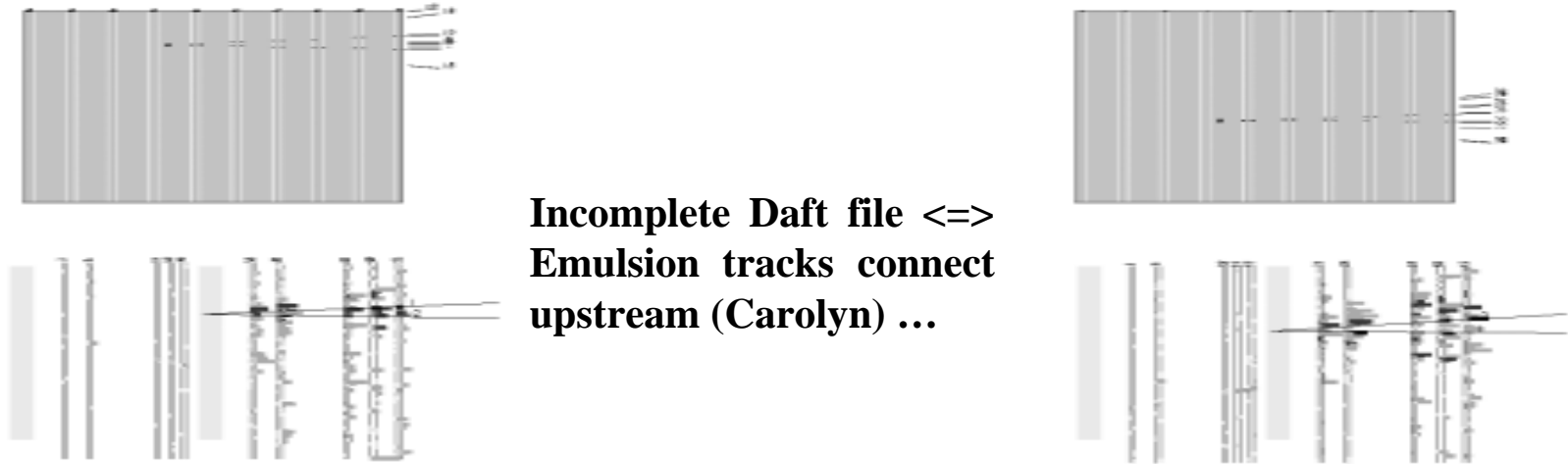


Reconstructed Vertices in 2879_12293
ivx= 1 vtx= -174028.91 -104231.44 614721.31 chi= 0.14
Errors 0.60 0.60 1.52 micron

		IP	vtx	spect	trk	trk	dthet	dthet	thet	thet
trk	nseg	micron	chi	nht	chis	mom	U	V	U	V
1-121-0035440	8	0.30	0.20	26	2.9	46.5	-0.004	0.001	0.007	-0.040
2-121-0036022	14	1.35	4.18	13	3.3	0.0	0.000	-0.001	-0.214	0.171
3-121-0036499	3	0.83	1.39	17	1.7	0.0	-0.001	-0.005	-0.118	0.362

Event 2884_14149

56.0



ivx= 1 vtx= 112680.38 63582.50 570966.75 chi= 0.01
Errors 0.60 0.60 1.52 micron

	IP	vtx	spect	trk	trk	dthet	dthet	thet	thet		
	trk	nseg	micron	chi	nht	chis	mom	U	V	U	V
1-441-0022686	11	0.08	0.01	20	4.9	5.0	-0.001	-0.011	0.036	-0.005	
2-441-0022887	12	0.09	0.01	12	3.2	0.0	0.004	0.008	-0.012	0.055	

Event Location : Ongoing work

- ñ Using this method we are **attempting event location** of not-located events.
- ñ We are also using our procedure for obtaining vertex predictions to **examine** whether the **scan volume** for these events is the correct one.
- ñ We are working on **ideas (as we gain experience)** on **possible improvements** on the **event location procedure**.

Conclusions

- ñ We have **became familiar** and **slightly modified Bruce's code** for **event location**.
- ñ We have **tested** our **performance** on **38** already **located** events with **satisfactory results**.
- ñ We are now **attempting** **location** of **not-located events**.