

2nd International Workshop on
**Nuclear Emulsion
Techniques**

2002/Mar/7 Nagoya Univ.

Historical Review of Automatic Scanning

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Early History of Nuclear Emulsion

Emulsion as discovery detector

- ▶ 1896 A.H.Becquerel
Discovery of Radioactivity
accidental exposure of photographic film by Uranium ore
- ▶ 1910 S.Kinoshita
individual track of α -ray can be seen under the microscope
- ▶ 1939 C.F.Powell
"Nuclear Emulsion" : sensitive to M.I.P. (= "electron sensitive")
- ▶ 1947 C.F.Powell
Discovery of $\pi \rightarrow \mu$ decay (emulsion pellicle = bubble chamber like)

Discovery of $\pi \rightarrow \mu + \nu_\mu$ (C.F.Powell : 1947)

First observations of the decay of a π -meson



emulsion pellicle = bubble chamber like



no backing structure

homogeneous active target

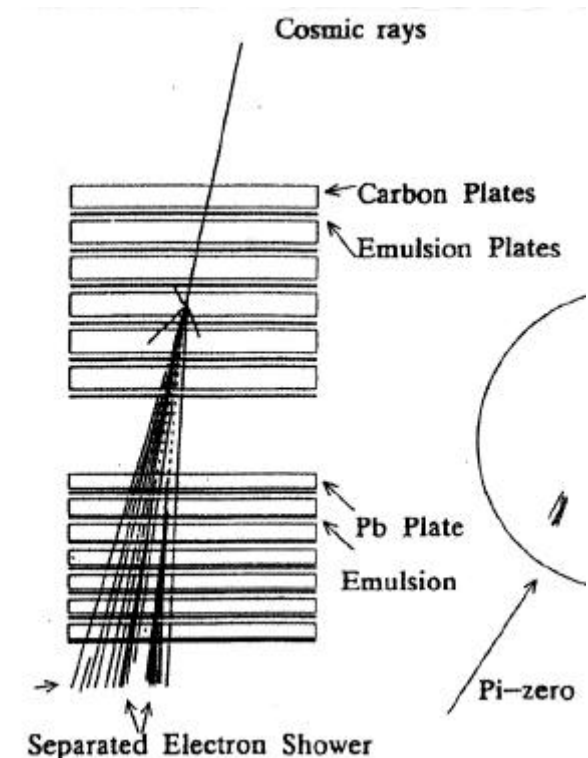


LATTES, MUIRHEAD, OCCHIALINI
and POWELL; Nature 159, 694 (1947).

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"ECC" : sandwich structure with metal plate
= cloud chamber like
→ e-m shower energy measurement,
momentum measurement by m.c.s.



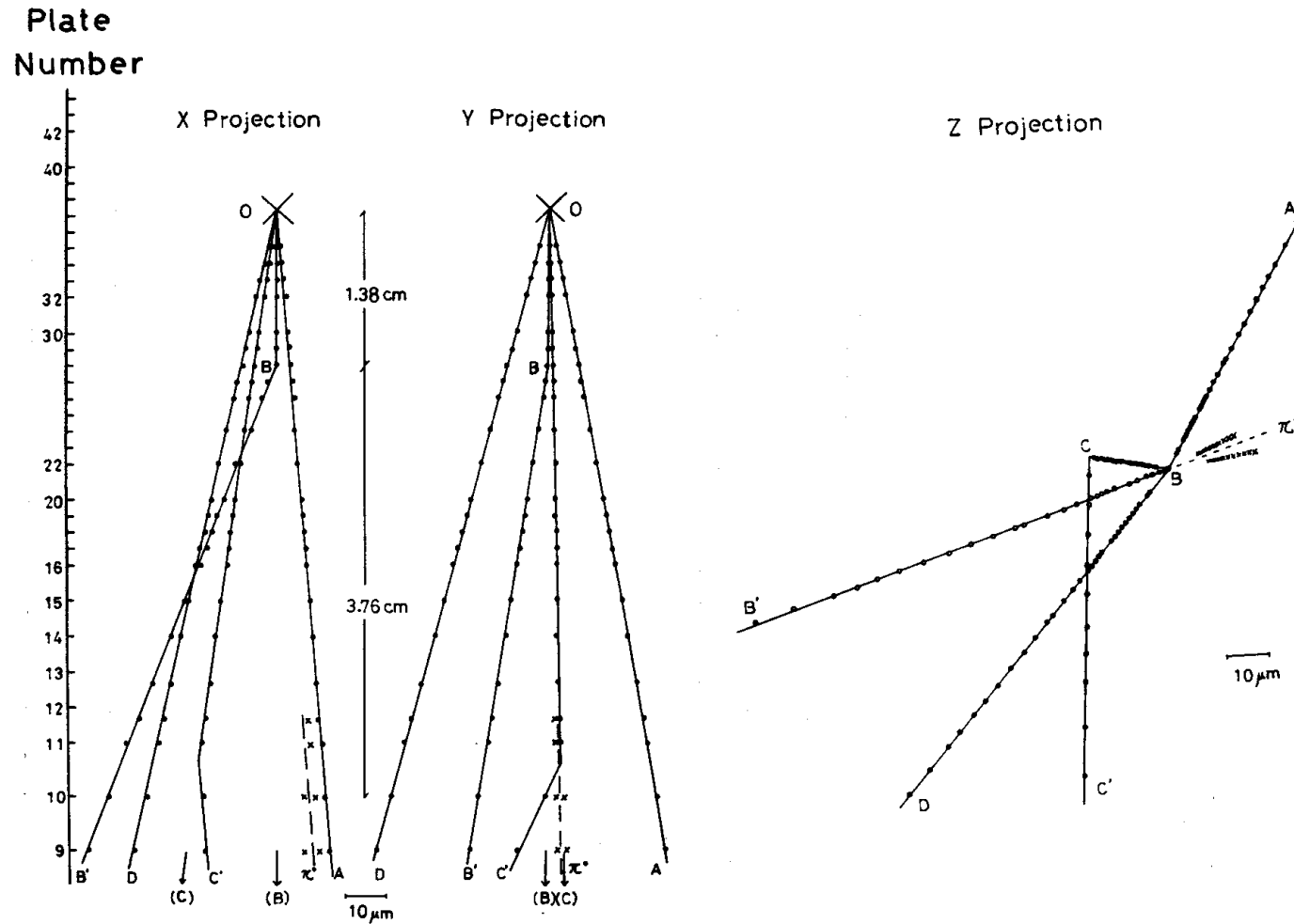
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- ▶ 1971 K.Niu
Discovery of X-particle (open charm)

Discovery of X-particle (K.Niu : 1971)

- ECC : higher density
 - compact e-m shower development
 - π^0 reconstruction
 - X-particle reconstruction



Fully Automated Analysis System



Coherently Controlled

Mechanics + Optics + Video Signal Process + Digital Signal Process

History of Automatic Scanning

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DOMS interface (μ -processor based N.C. system)
DOMS was continuously improved and modified by ...
M.Nakamura & N.Torii → E531
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Fully Automated Analysis System

camera tube

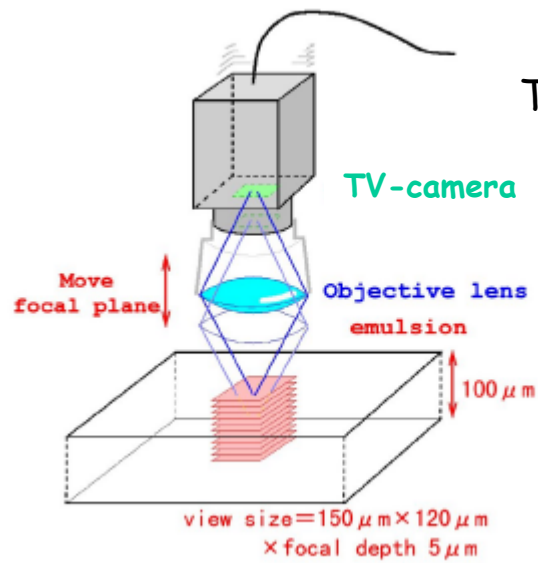


Host Computer

Stage Controller
(DOMS)

Image Processor
(Track Selector)

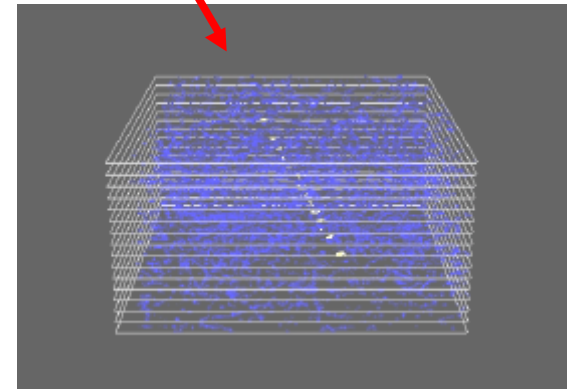
Track Recognition by Track Selector



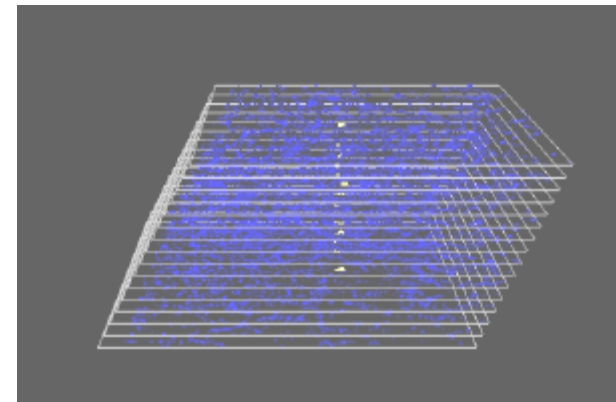
Tomographic
16 Images



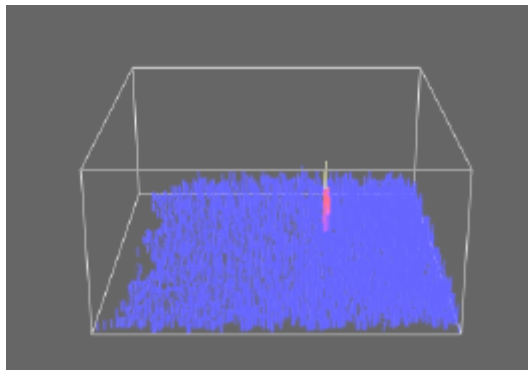
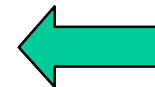
Penetrating Track



Give counter shift



Sum and
Discriminate

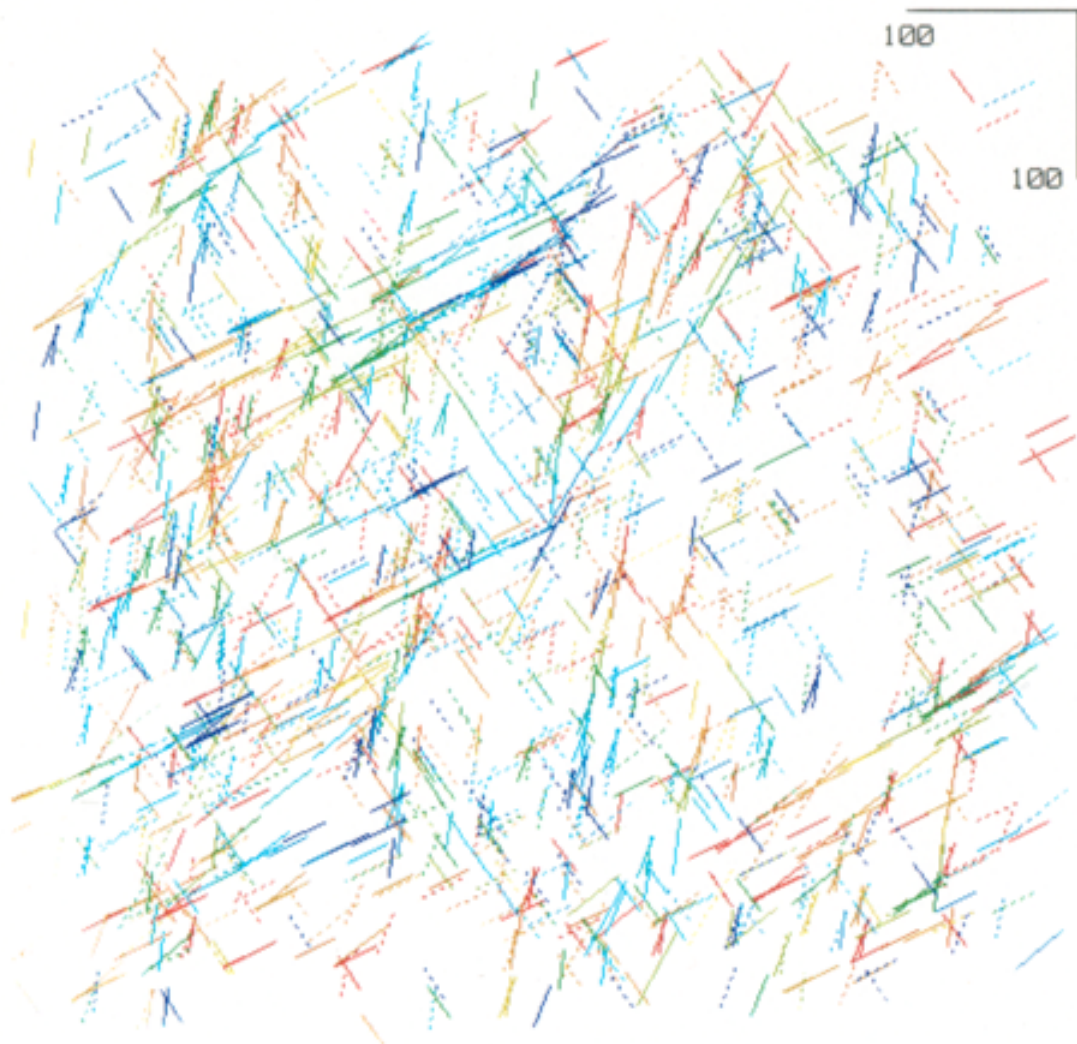




NTS.mpg

Vertex Location Trial in WA75 (1985)

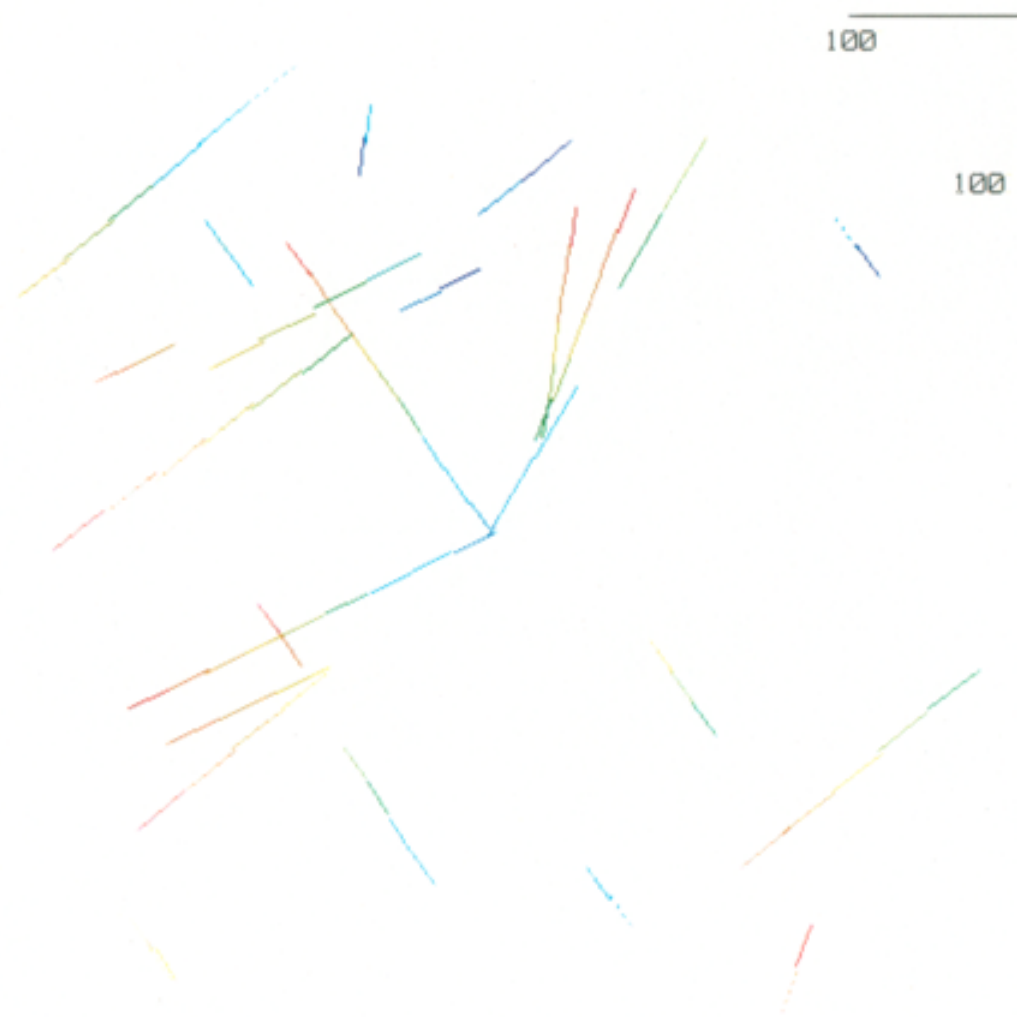
PLATE	HIT	TRK
1	220	220
2	171	171
3	198	198
4	112	112
5	156	156
6	178	178
7	128	128
8	199	199
9	161	161
10	165	165
11	-1	-1
12	-1	-1
13	-1	-1
14	-1	-1
15	-1	-1
16	-1	-1
17	-1	-1
18	-1	-1
19	-1	-1
20	-1	-1
21	-1	-1
22	-1	-1
23	-1	-1
24	-1	-1
25	-1	-1



All tracks scanned based on the angle predicted by SSD

Vertex Location Trial in WA75 (1985)

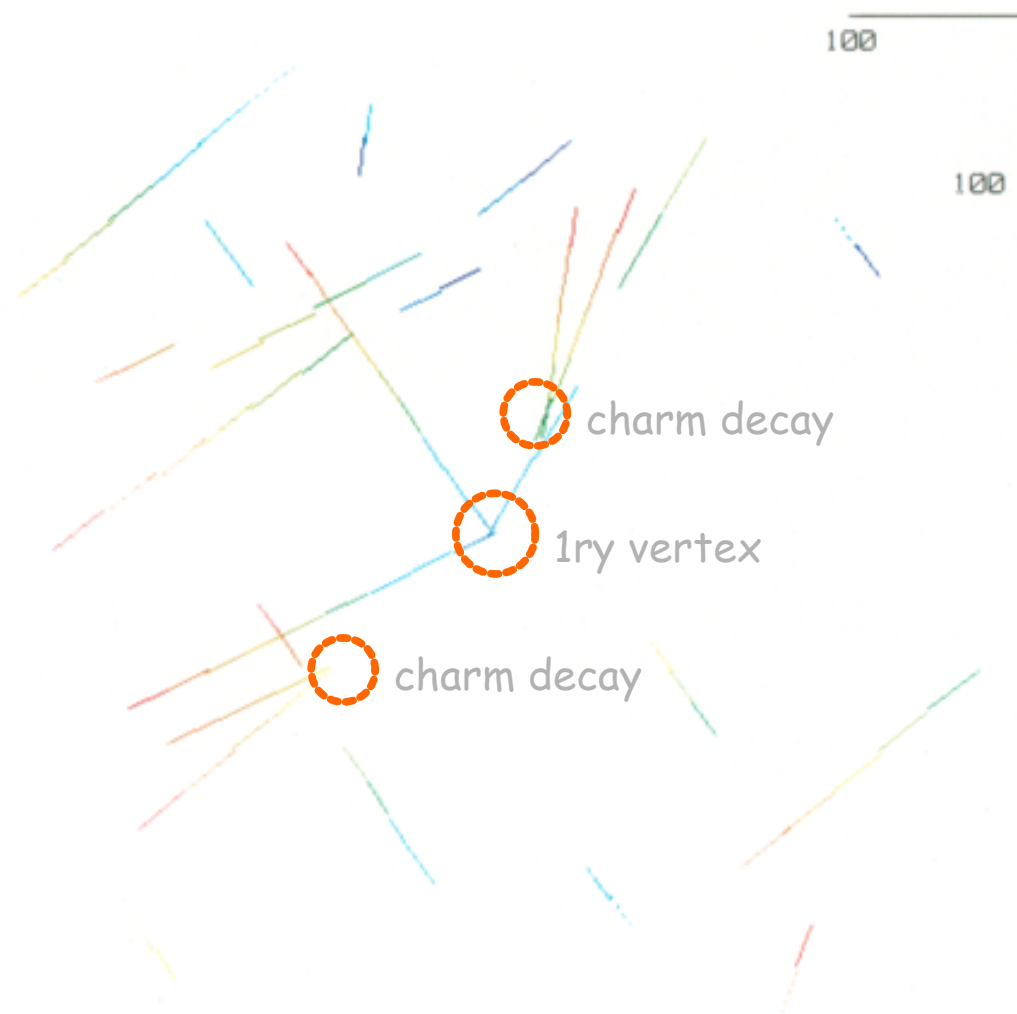
PLATE	HIT	TRK
1	220	8
2	171	11
3	198	10
4	112	13
5	156	11
6	178	11
7	128	6
8	199	7
9	161	9
10	165	4
11	-1	-1
12	-1	-1
13	-1	-1
14	-1	-1
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only tracks ≥ 2 plate segments connected

Vertex Location Trial in WA75 (1985)

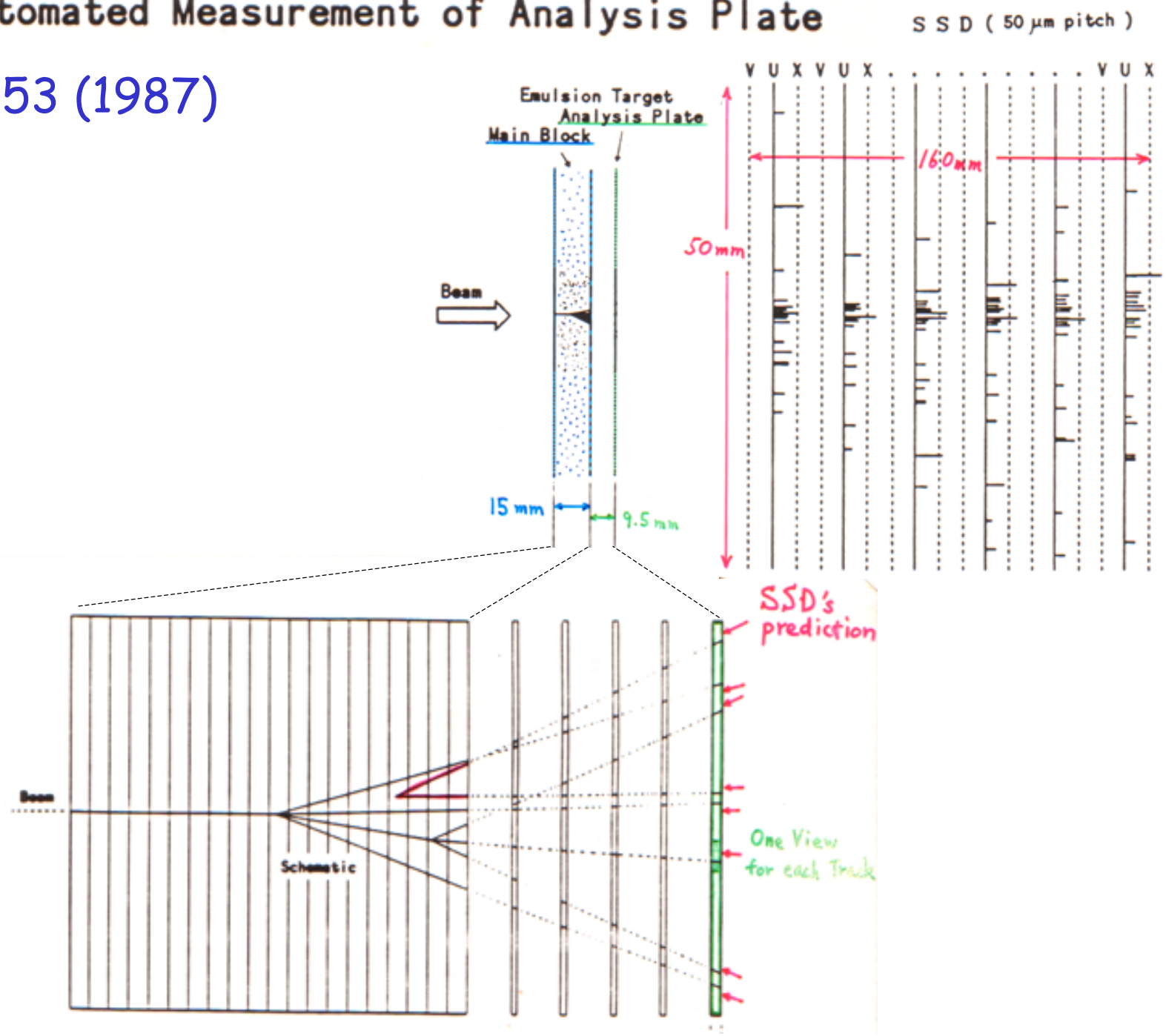
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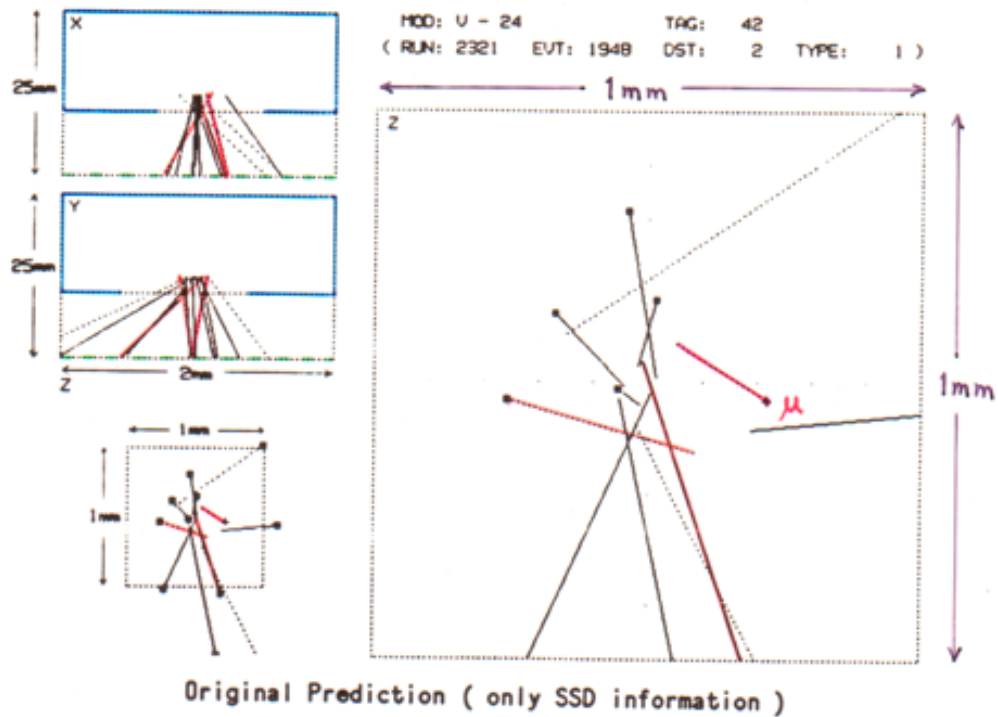
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Fully Automated Measurement of Analysis Plate

in E653 (1987)

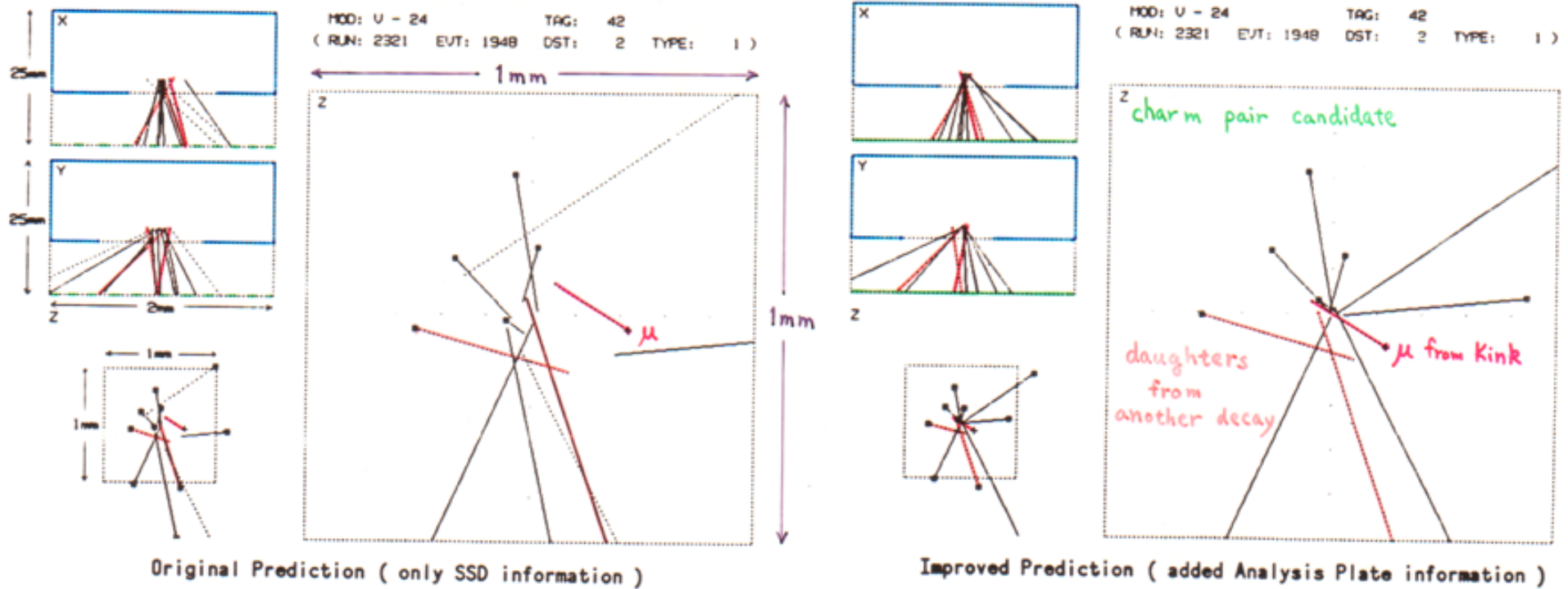


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