7. Mar. 2002
EW2002@Nagoya

The first application of automatic scanning to vertex location

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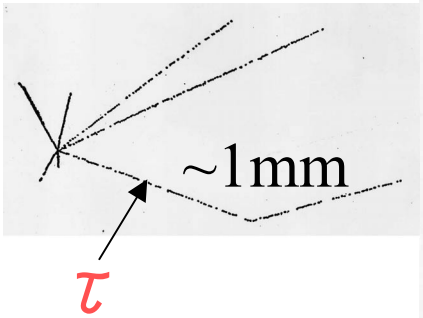
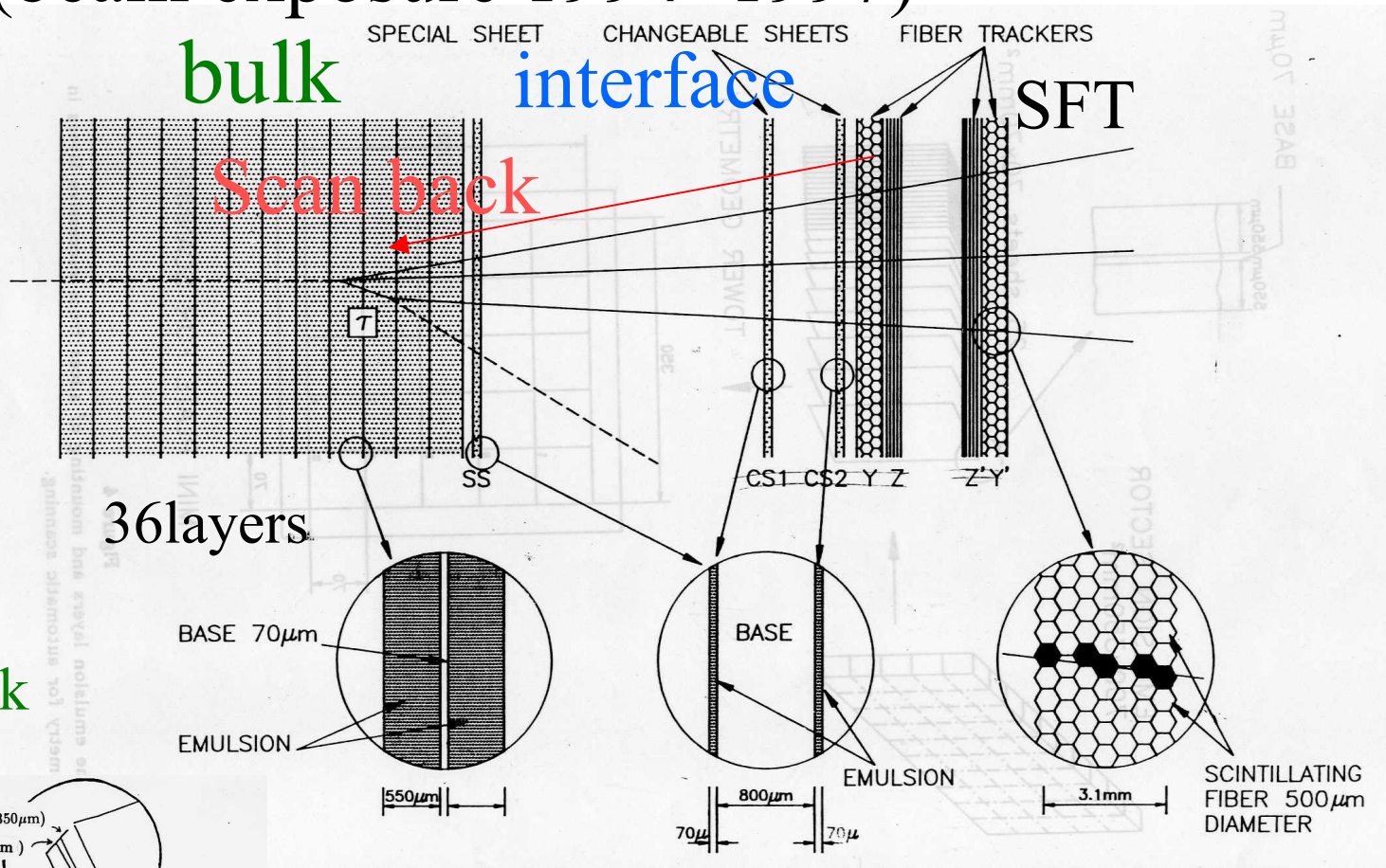
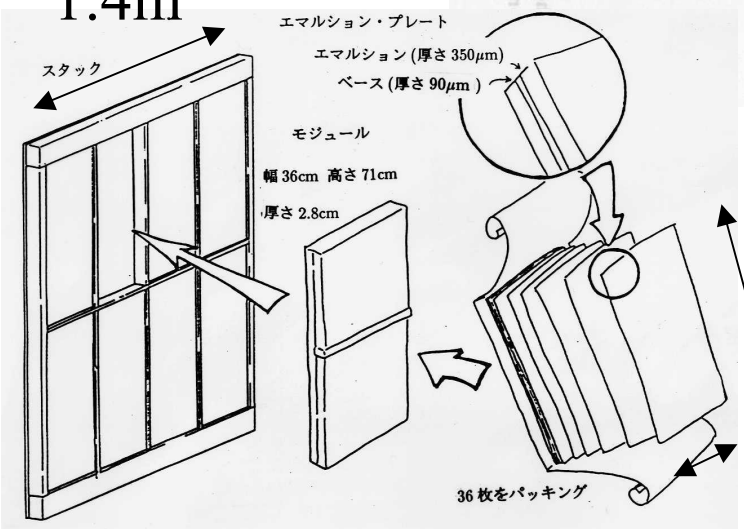
CHORUS (beam exposure 1994~1997)





Structure of bulk

1.4m



70cm

35cm

In proposal

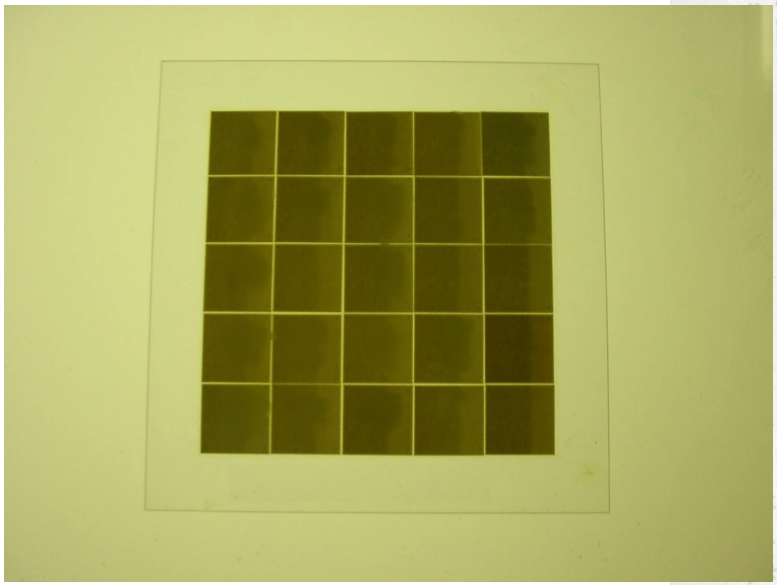
Interface emulsions are scanned by TS Full-automatic

Bulk emulsions are scanned by manual. Semi-automatic

Mini-plate for semi-automatic scanning

7cm × 7cm

= 1/50 of one module



Convenient for changing plates for scanners.

In proposal

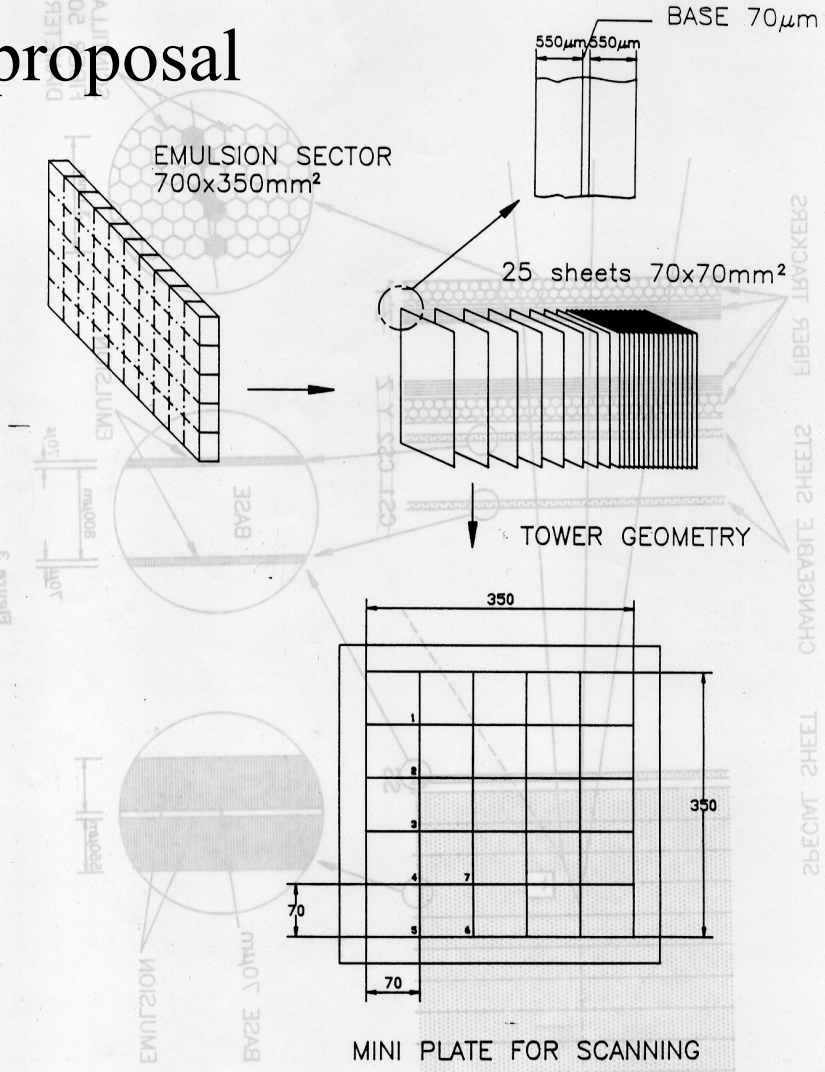


Figure 4

Slicing of the emulsion layers and mounting of slices from successive layers in a tower geometry for automatic scanning.

In proposal

~20 scanners are required for semi-automatic scanning.

~40K events

Event by event
scan back location

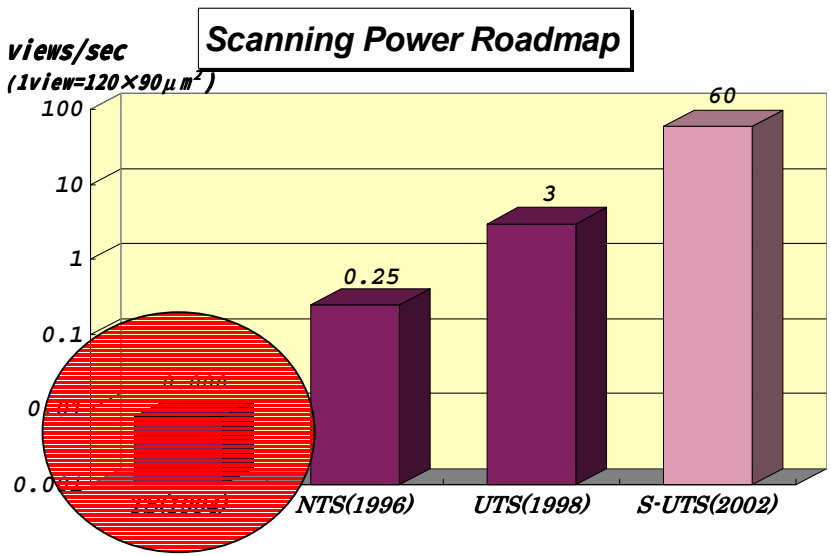
Nagoya F. lab.

Automatic scanning of interface emulsion was going well at Nagoya 1994~

Trial for the automatic scanning of bulk emulsion for vertex location started in middle of 1994.

To locate much more events for much more sensitivity to neutrino oscillation!

In 1994 scanning power of TS was only about 1/400 of current working system.



By T.Nakano

Demonstration of automatic vertex location by scan back

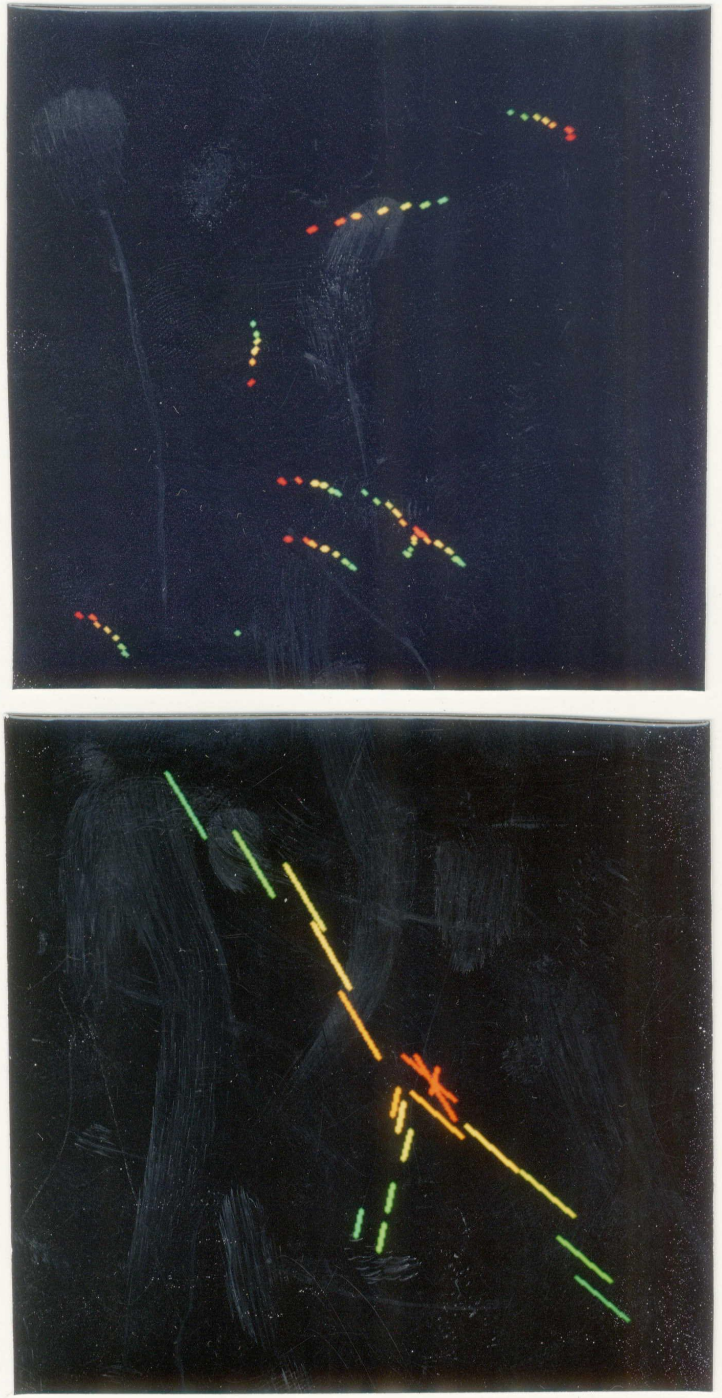
Oct. 1994

Fermilab. E531 neutrino int.

Accuracy of plate by plate alignment was ~50 μ m.

Reliability of plate by plate tracking in the emulsion was not good.

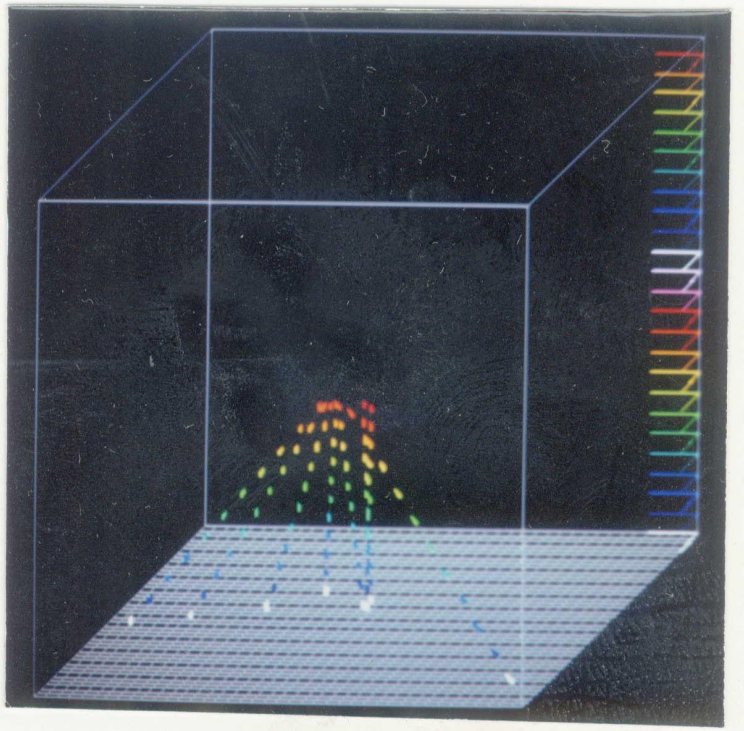
We certainly believed automatic scan back location is possible!



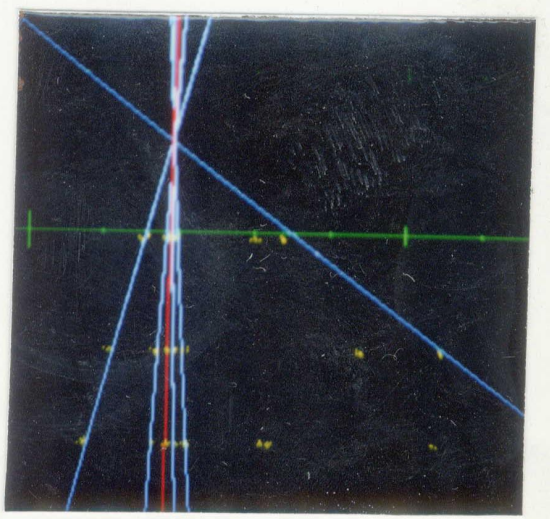
The first located event in CHORUS

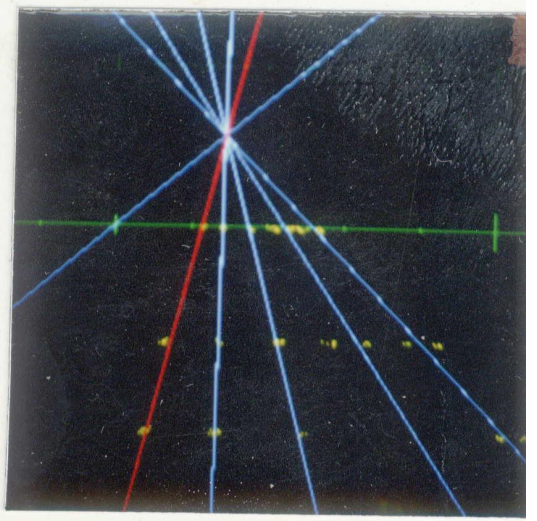
Dec. 30th 1994

run1111 event 1494
stack4 module1 plate11



5mm



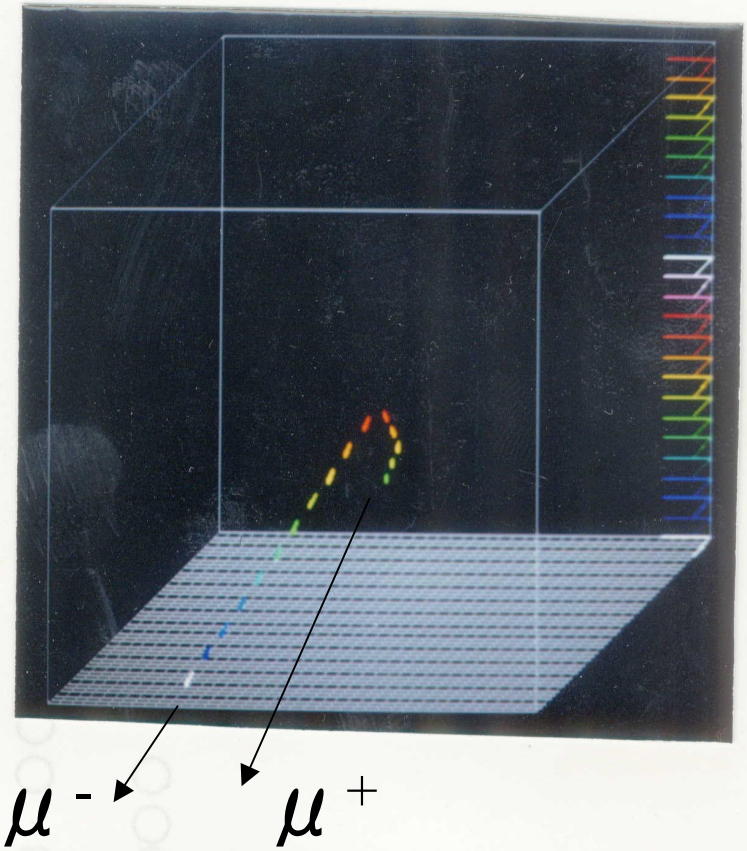


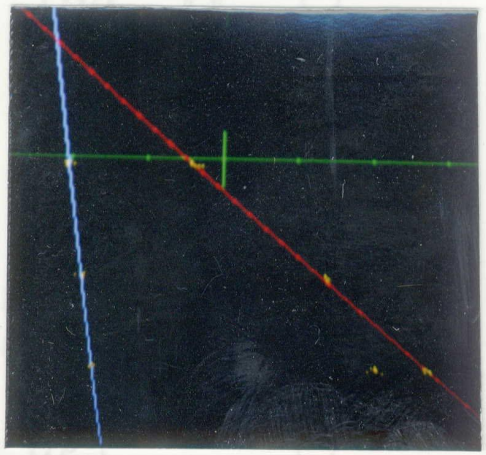
The first charm event in CHORUS

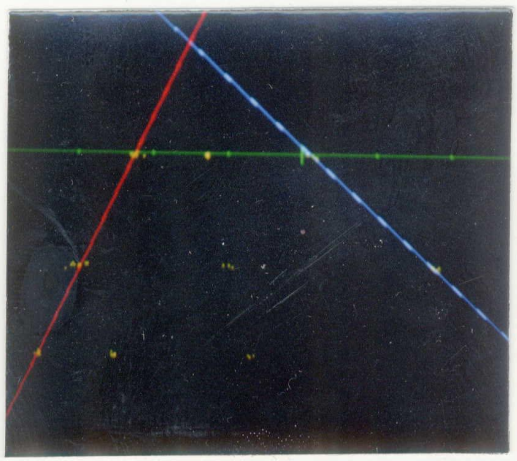
Feb. 1995

run1052 event 3181
stack4 module1 plate31

Kink angle 154mrad
Pt = 300MeV/c







Development of parallel scan back

1995~1996

Parallel scan back location by automatic system.

Thousands of events in one module

No mini-plate

Dedicated software to handle scanning data was developed

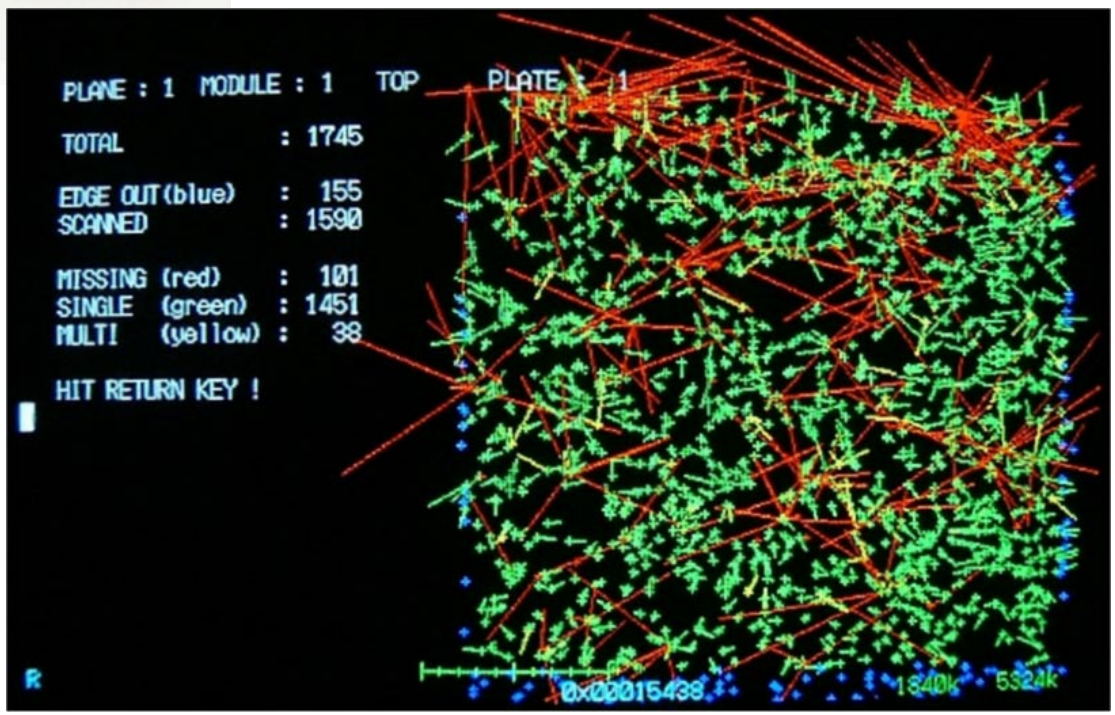
Plate by plate calibration for alignment
Making prediction for the next plate
Determination of vertex plate
Monitors

and so on

1997

Plate setting @ Nagoya
CHORUS RUN1

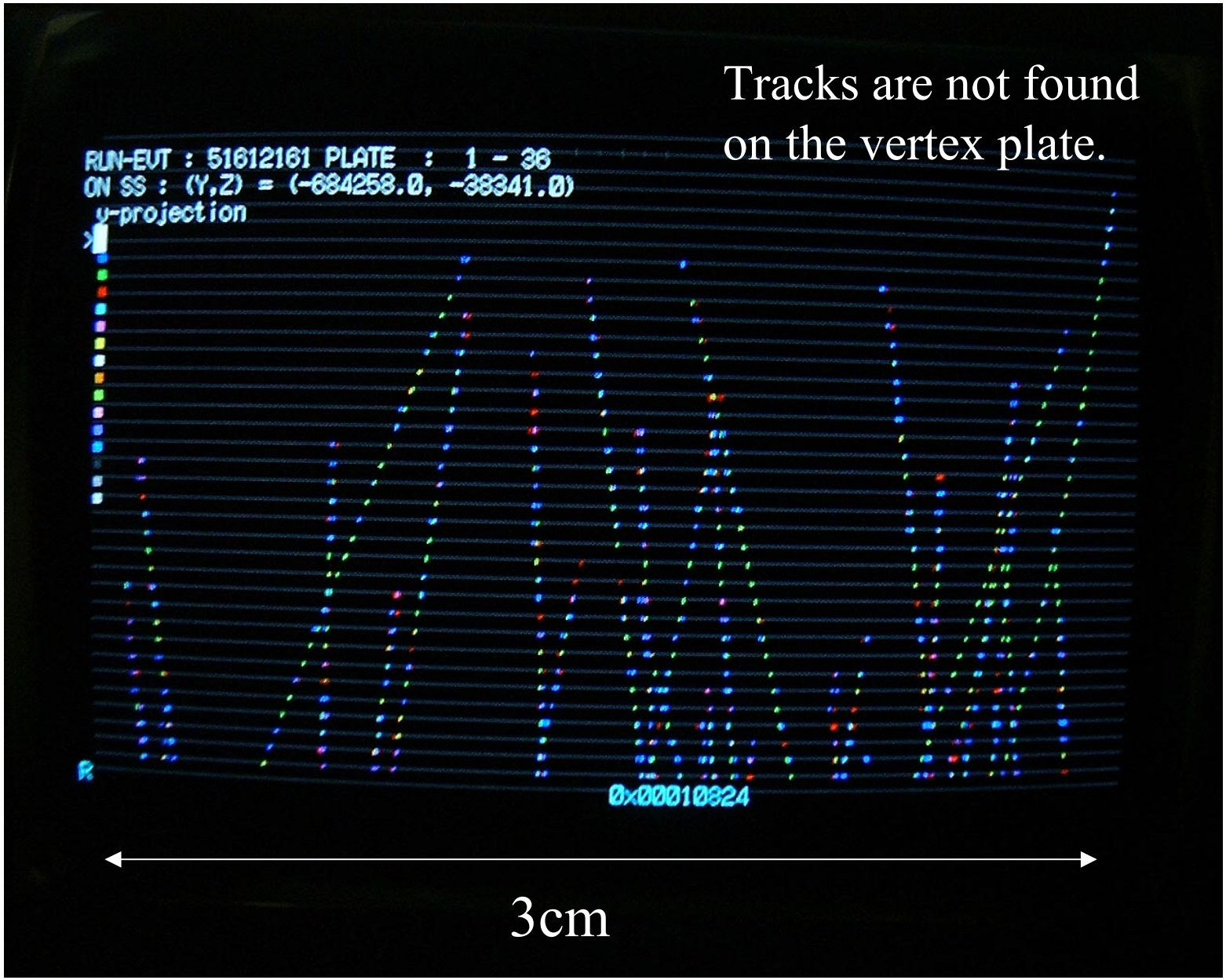
Thousands of tracks are followed in parallel.



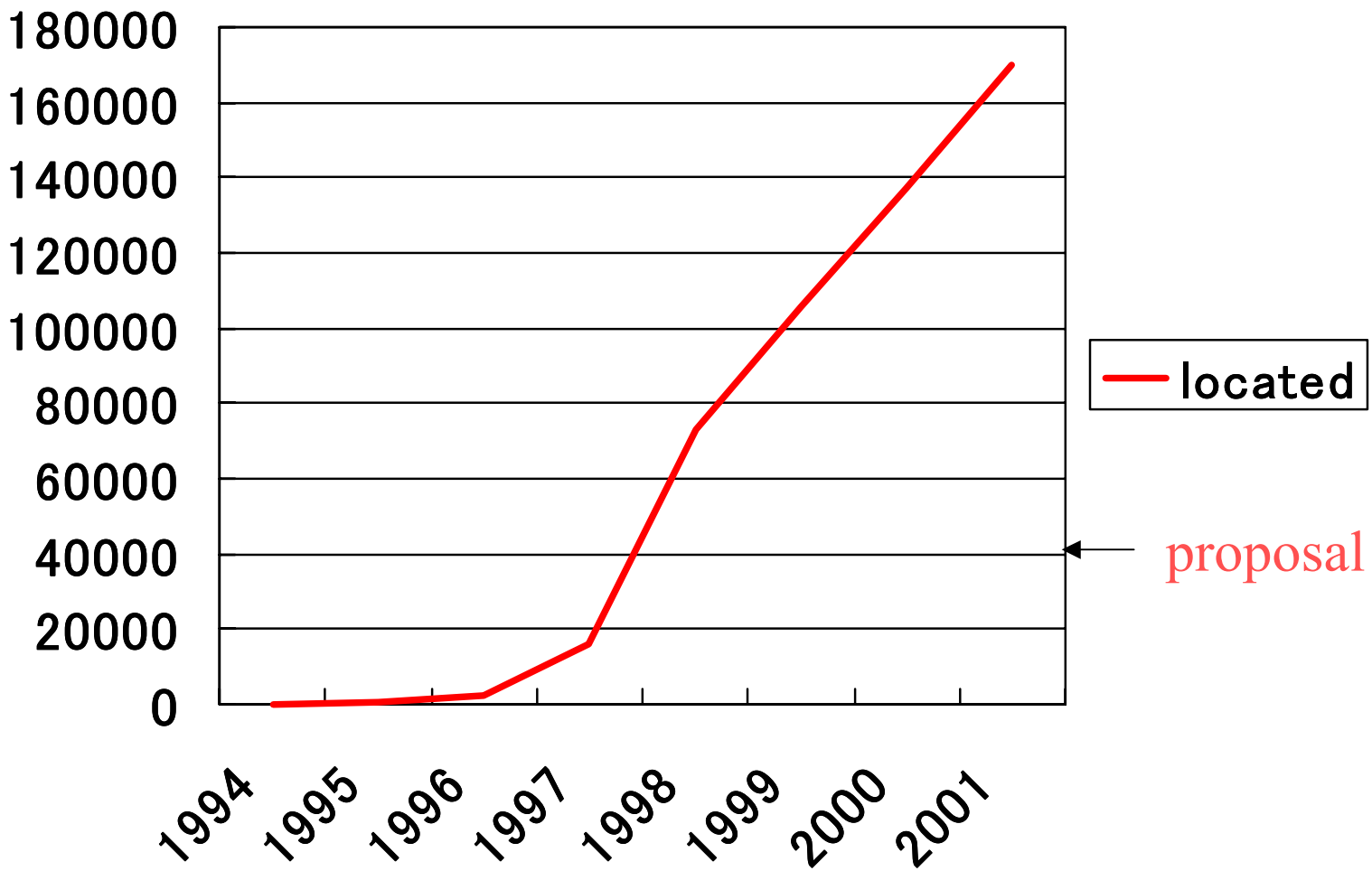
Monitor for parallel scan back after one plate scanning.

~1hour

Monitor for parallel scan back after one module scanning.



Integrated located events in CHORUS



Summary

- The first full-scale application of automatic scanning to vertex location is done in CHORUS.
- It is realized as parallel scan back.
- We have located ~200K neutrino interactions so far.