

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

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A Nuclear Emulsion Analysis Tool

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Emulsion analysis flow-chart

- Location of the event
 - Usually with electronic detectors aid (prediction)
 - Scanback or general scanning
 - very fast
- On-line and off-line automatic topology check
 - Vertex or kink alarm during scanning
 - Netscan
 - fast
- Manual check
 - Interesting events **MUST** be checked manually
 - slow

During data taking detailed 3D information is acquired for each view
(a set of CCD pictures at different depths is called VideoImage)

These pictures are discarded soon after tracks have been found but
their information content is not always completely exploited

Saving all of them is unpractical since huge disk space would be
required

Nevertheless, in many cases a VideoImage could save an enormous
amount of time

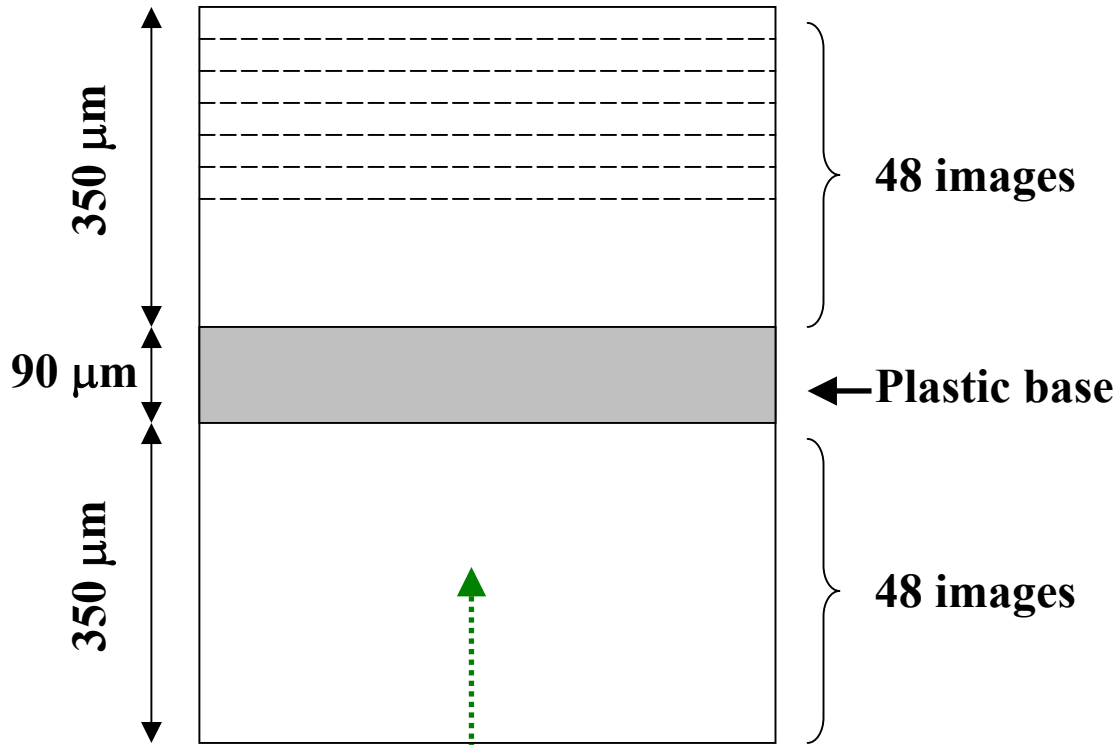
The NEAT program

Complete use of VideoImages information:

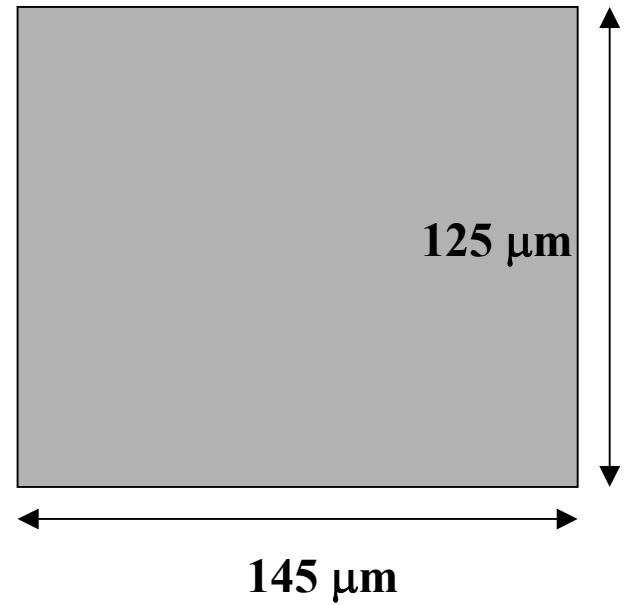
- Microscope simulation
- Image analysis (filtering and clustering)
- Track finding
- Vertex finding
- 3D analysis

CHORUS VideoImages

side view



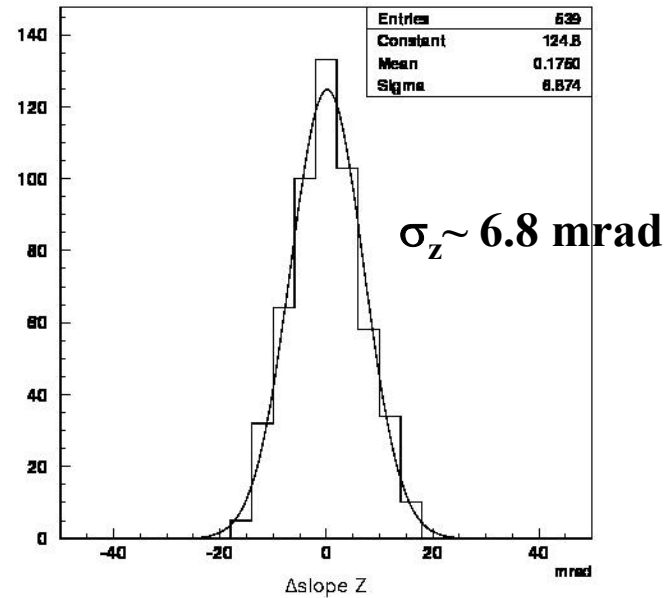
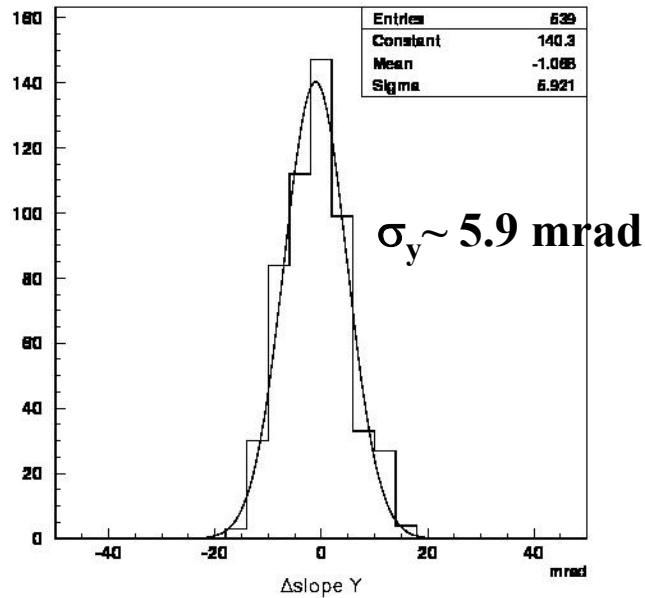
top view



neutrino beam direction

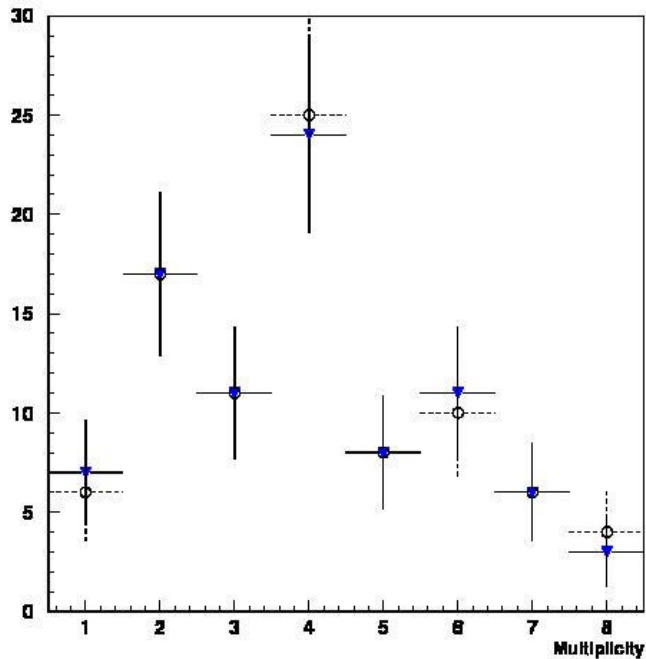
Performances

Angular resolution achieved by the NEAT program

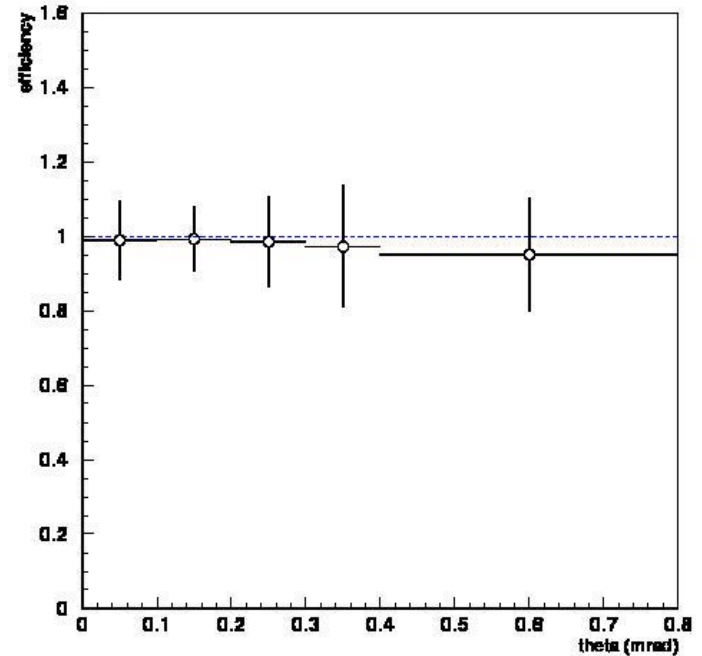


angle difference is evaluated wrt emulsion tracker (SS)

Performances



Charged track multiplicity
in neutrino interactions



Track finding efficiency

Implementation

- C++ Object Oriented under UNIX
- X11R6 raw libraries with shared memory extensions
30 ÷ 50 fps with 3000 pixel/picture
- ROOT interface available

Conclusions

- An interactive analysis tool to display and analyze nuclear emulsion data recorded during automatic scanning procedure was developed
- Successfully used in order to:
 - reduce manual scanning load (CHORUS)
 - check automatic system performances (OPERA)
- Forthcoming applications:
 - large-scale neutrino interaction topology studies
 - rare event search