

Estimate of the visual scanning efficiency

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Short report
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Outline

- Problem
- Method
 - ν_μ CC event extraction
- Result
 - event selection for period 4
 - number of events for all periods
- Plots
 - Number of events per module in period 4
 - Visual scanning efficiency
- Conclusions

Two Problems

- The visual scanning efficiency is not known
- One proposal is to use the MC to obtain the efficiency
 - takes a lot of work
 - how do we simulate background and noise?
- We need a good, clean ν_{μ} CC sample
 - neutrino beam composition, energy
 - in my thesis:
 - flux normalization
 - check cuts

ν_{μ} CC event extraction

- Muons are “easy” to find in the nustrip files
 - muon ID
 - one track with >3 MID hits and no other track with >2 MID hits
 - vertex location cut by track projection
 - $|U_{\text{track}}| < 0.4\text{m}$, $|V_{\text{track}}| < 0.4\text{m}$
 - manual refitting to find the vertex
 - remove events without a vertex (about 50%)
 - precise vertex location cut
 - $|U_{\text{vertex}}| < 0.24\text{m}$, $|V_{\text{vertex}}| < 0.24\text{m}$
- Apply the same method to cat3 and int files
 - sent to Japan and visual scanning
- MC result: this method finds 50% of all ν_{μ} CC events

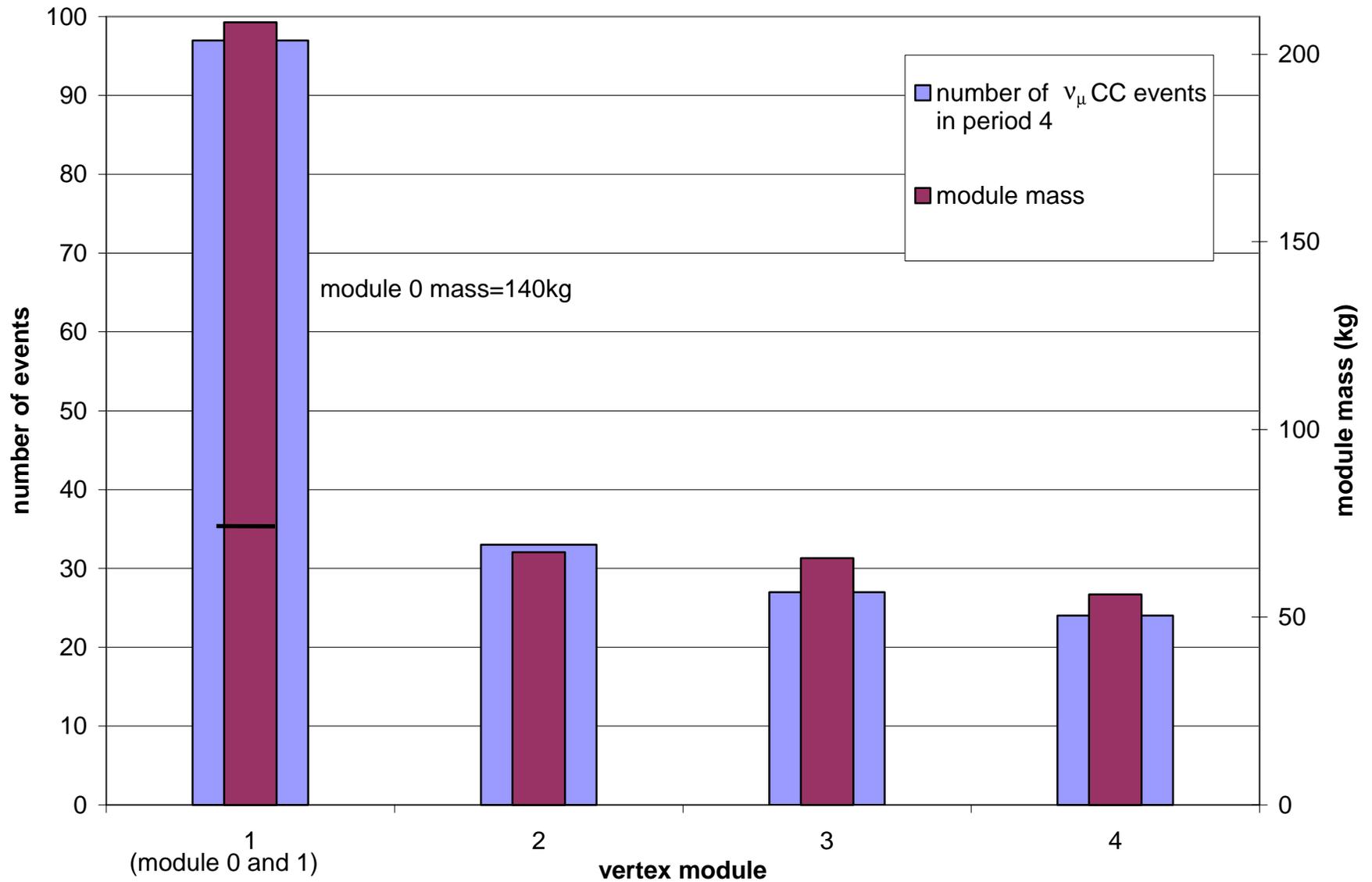
Result (period 4)

# of events	Cat 3	nustrip
Nustrip files	100000	100000
Visual scanning	407	
Muon selection	101	525
Refit selection	101	238
Vtx cut	80	187

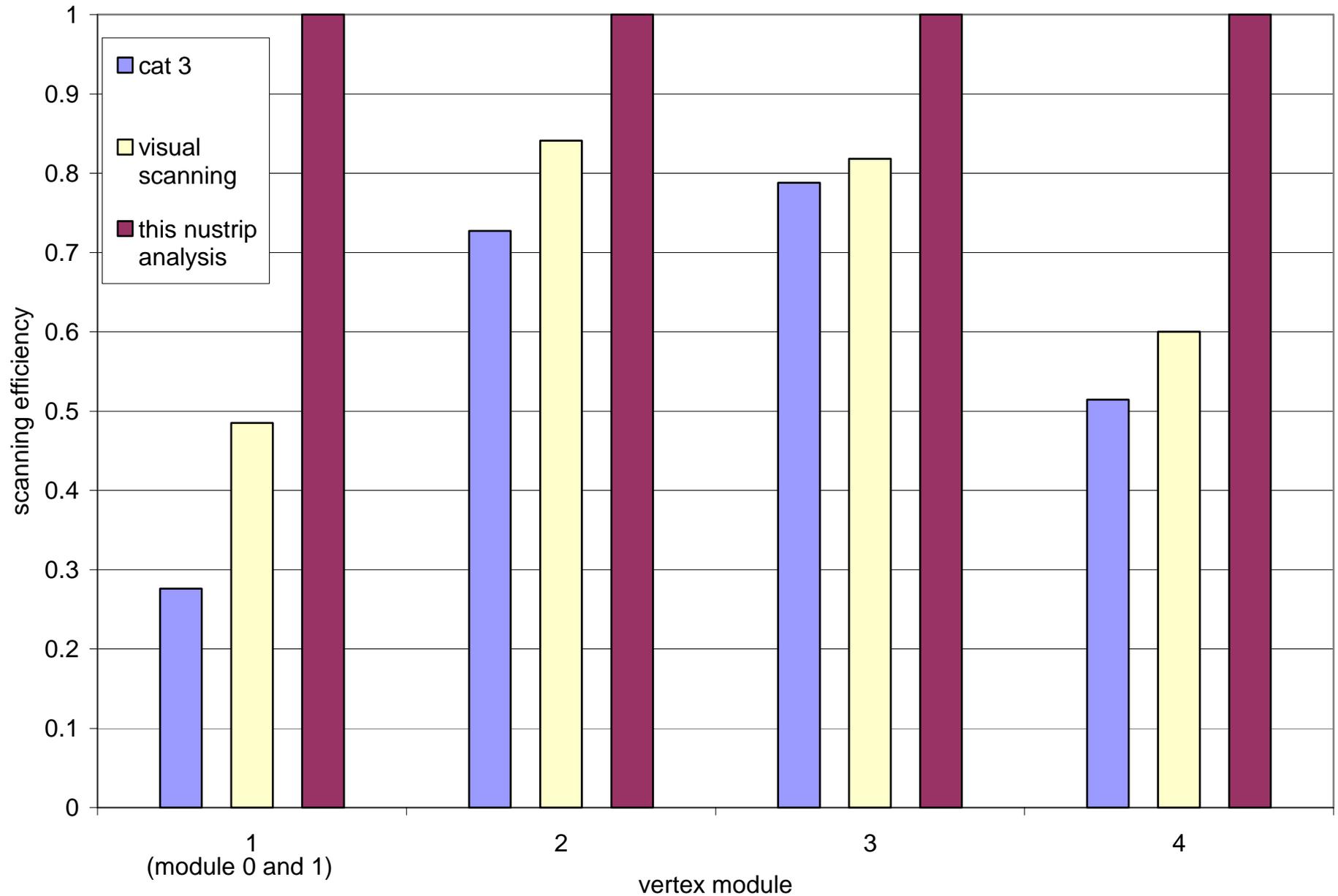
Result (by period)

period	# of events in cat 3 files	# of events in .int files	# of events in nustrip files
1	14		(not all available)
2	17	18	29
3	74		(not all available)
3 (runs 3137-3202)	33	34	59
4	80	115	187

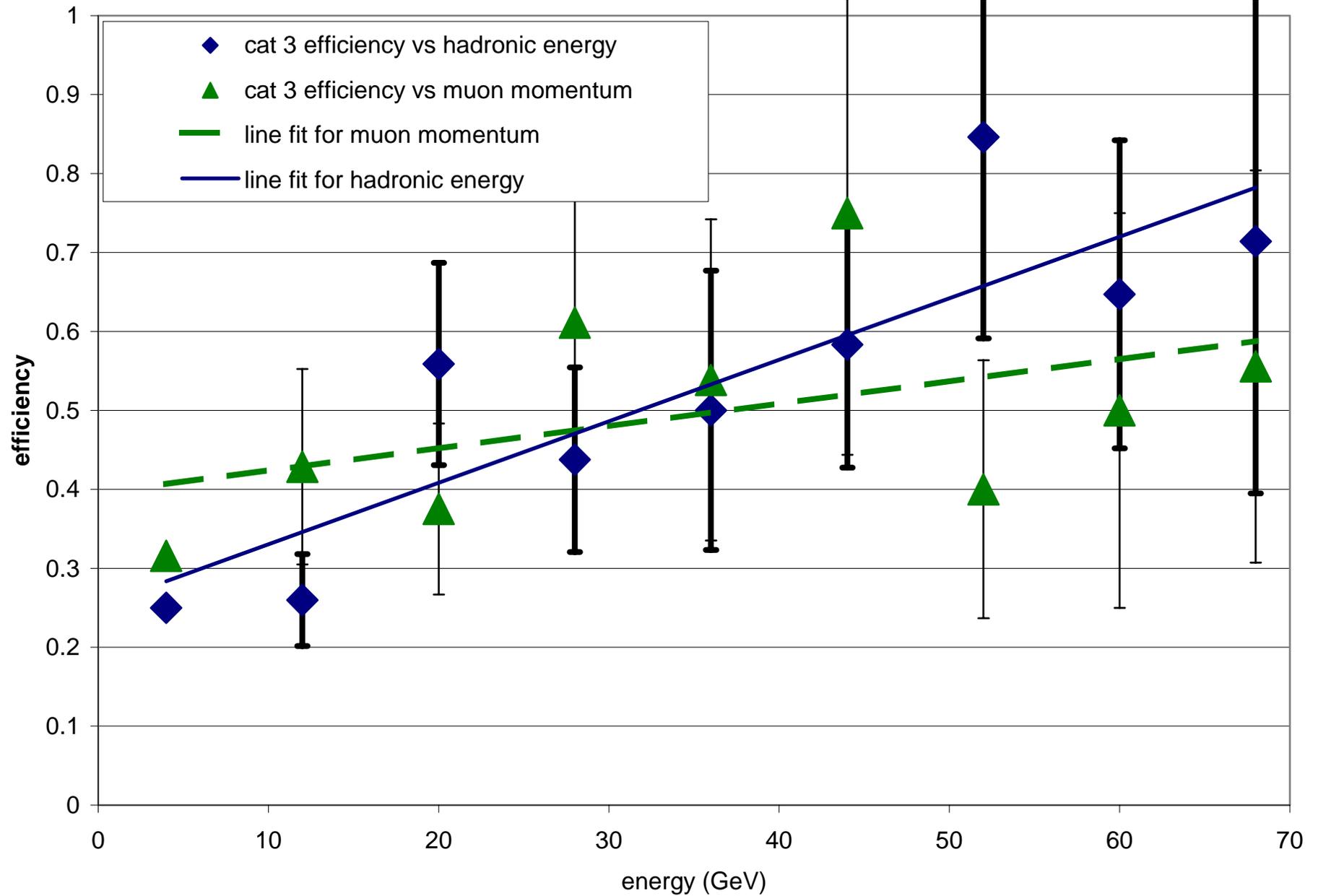
of period 4 events by module



Visual Scanning Efficiency



Efficiency vs energy



Conclusions

- The visual scanning efficiency is around 65% for events with a muon
 - depends on hadronic energy
- The number of ν_{μ} CC events has been tripled
 - doubled if module 1 is not considered
- Some of the nustrip files are missing
 - period 1, beginning of period 3