Preparation for the next 2KM mass production

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- What we need
- G4 updates

Requirements

Using the 'official' 04b vectors on the web page :
events were generated in a 400cmX400cm square and we only used a 175cm-radius circle => 0.3 yrs statistics (for ν_{∞})

volume	numus/1year
56t	~150,000
100t	~268,000
56t+1m = 185t	~496,000
100t+1m = 275t	~736,000

I request 10yrs stats in 56t+1m --> 5 million ν_{μ} with R<225cm

Will not be ready for the proposal but **need to start soon (within ~ one month)**

Requirements

Need more vectors (ie ν interactions) from Hayato-san
NEUT = 50k interactions/day/CPU ...

Do we need more 4-vectors from Ichikawa-san ? Otherwise we apparently reuse the same n 4-vector many times.
How long does that take ?

Modifications to G4

Changes to G4 2KMdetsim before the next mass production :

- Variable trigger t0 (#hits(t0-200,t0)=25)->skdetsim/dshigh.F
- Add integration gates :

  nhit(i)= {sum of hits / t_{hit}<min(~950ns, t_{hit}(0)+300ns) }

-----> removes delayed Ch. Light (dcy e- for example, etc.)

we used to rely on reconstruction t. cuts to do that...

- Save more secondaries & better

+ Work on global geometry & MRD & lAr

Improve reflections/scattering

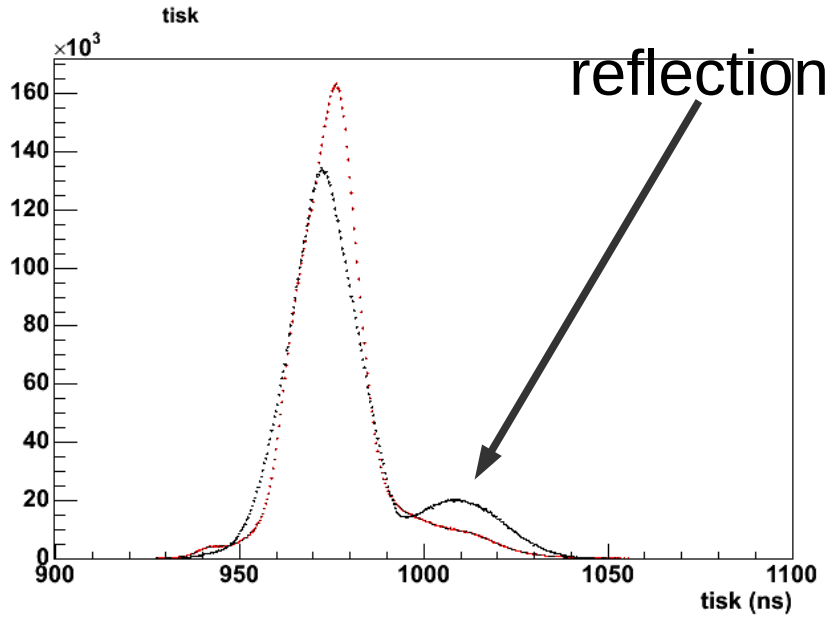
In the version of G4 used for the T2K meeting in march, reflections are the main source of indirect light -> large reflection peak which is absent from the data

-> Reduced Rayleigh scattering lenghts (by factor of 2)
-> improved the reflection model
==> better agreement with through-going muons

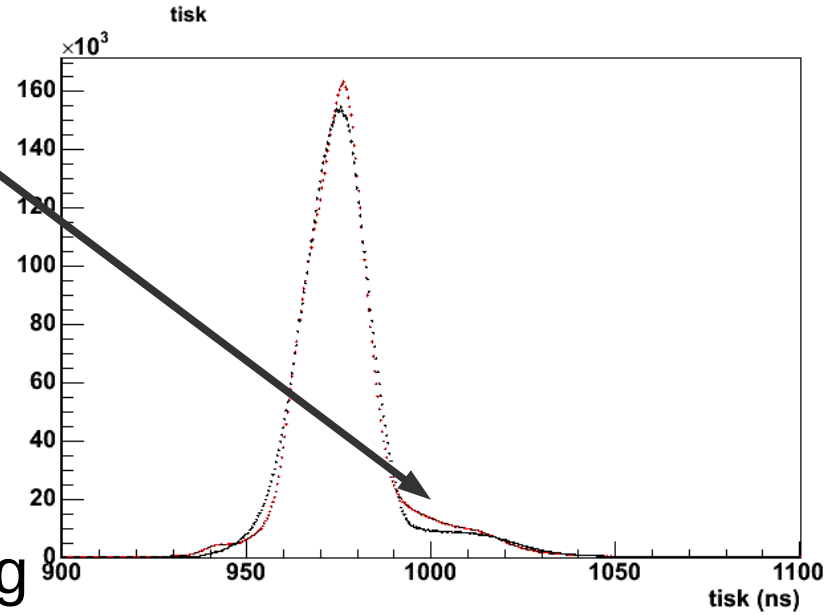
Caveat : may not agree with other optical data

Old (march05)

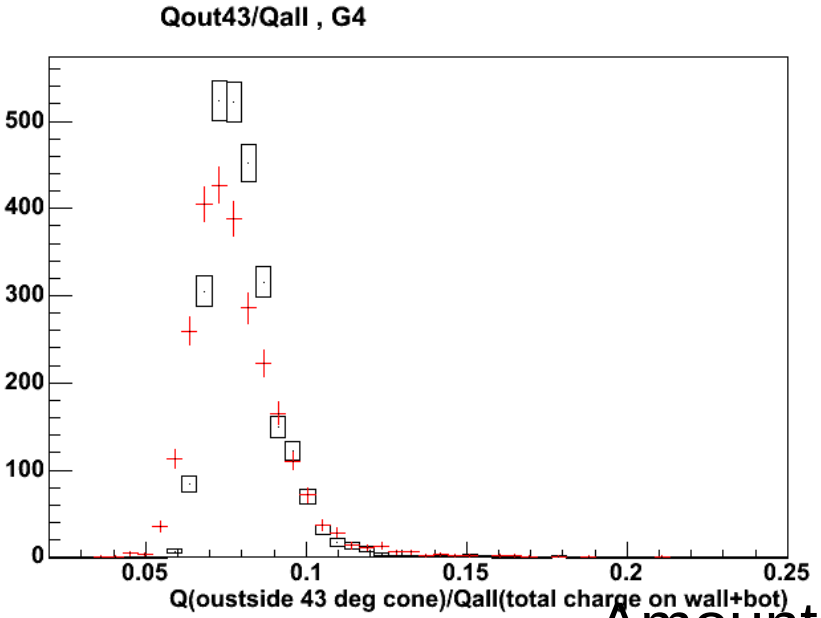
New (for the next mass production)

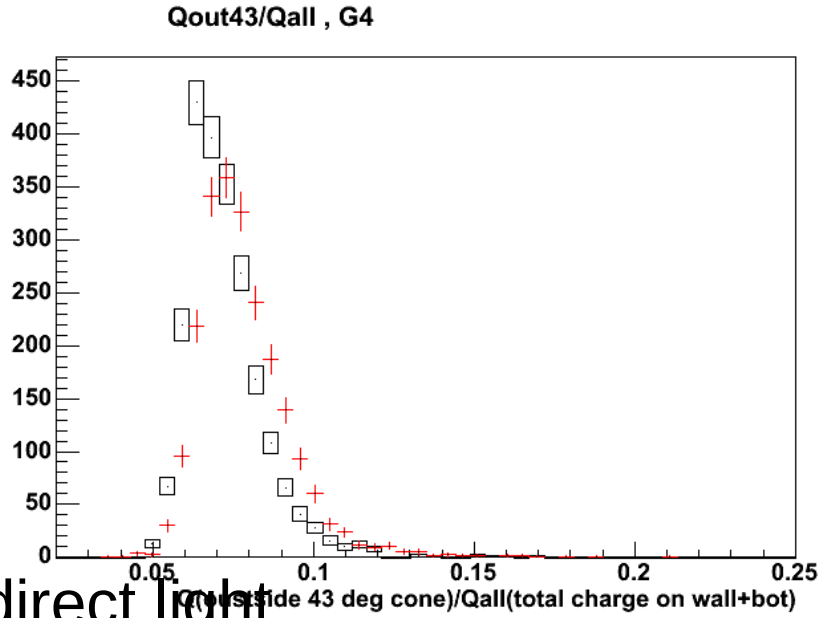


reflections



timing

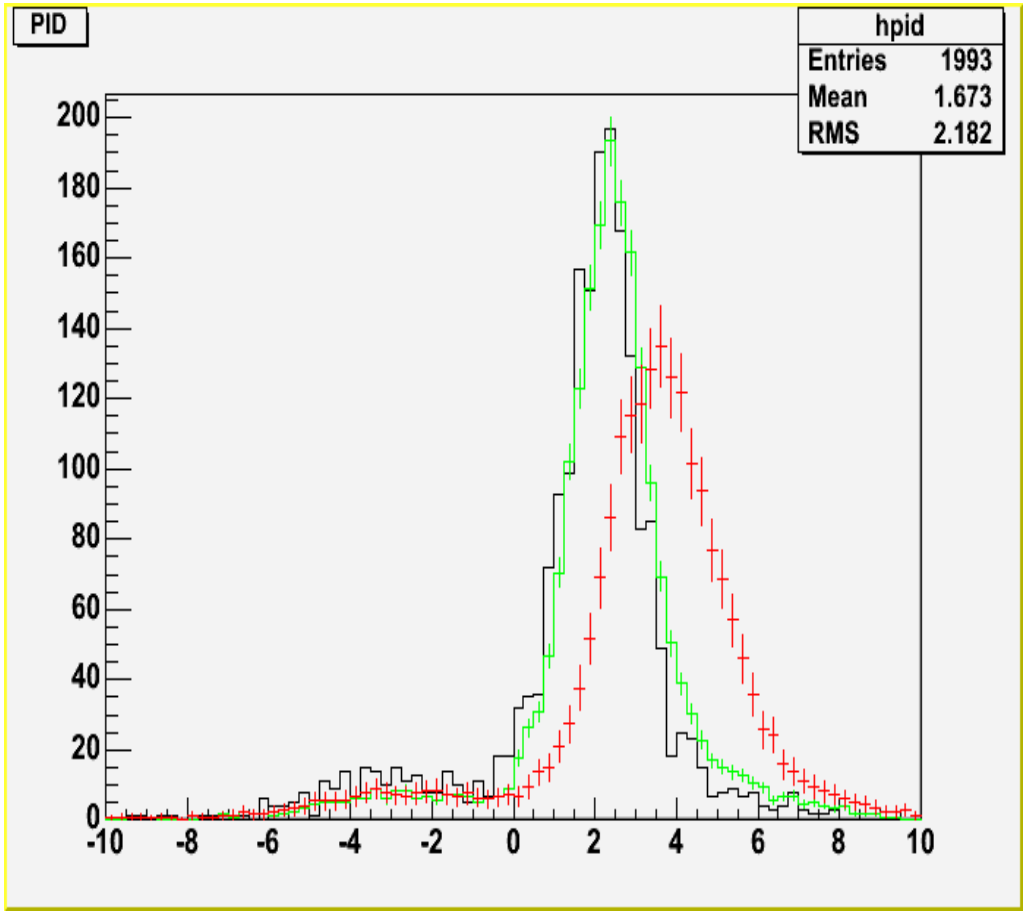




Amount of indirect light

Does this improve PID ?

Quick check using neutrino K2K data again (old 02a not newly processed 05)



G4 march 05

New G4

Data 2003/02a

Same problems

The discrepancy probably does not come from indirect light

The level of agreement is about the same as in march

Charge profile investigation

Compare **G4 charge profile** with **'spexppe.F' (expected charge for PID) profiles**.

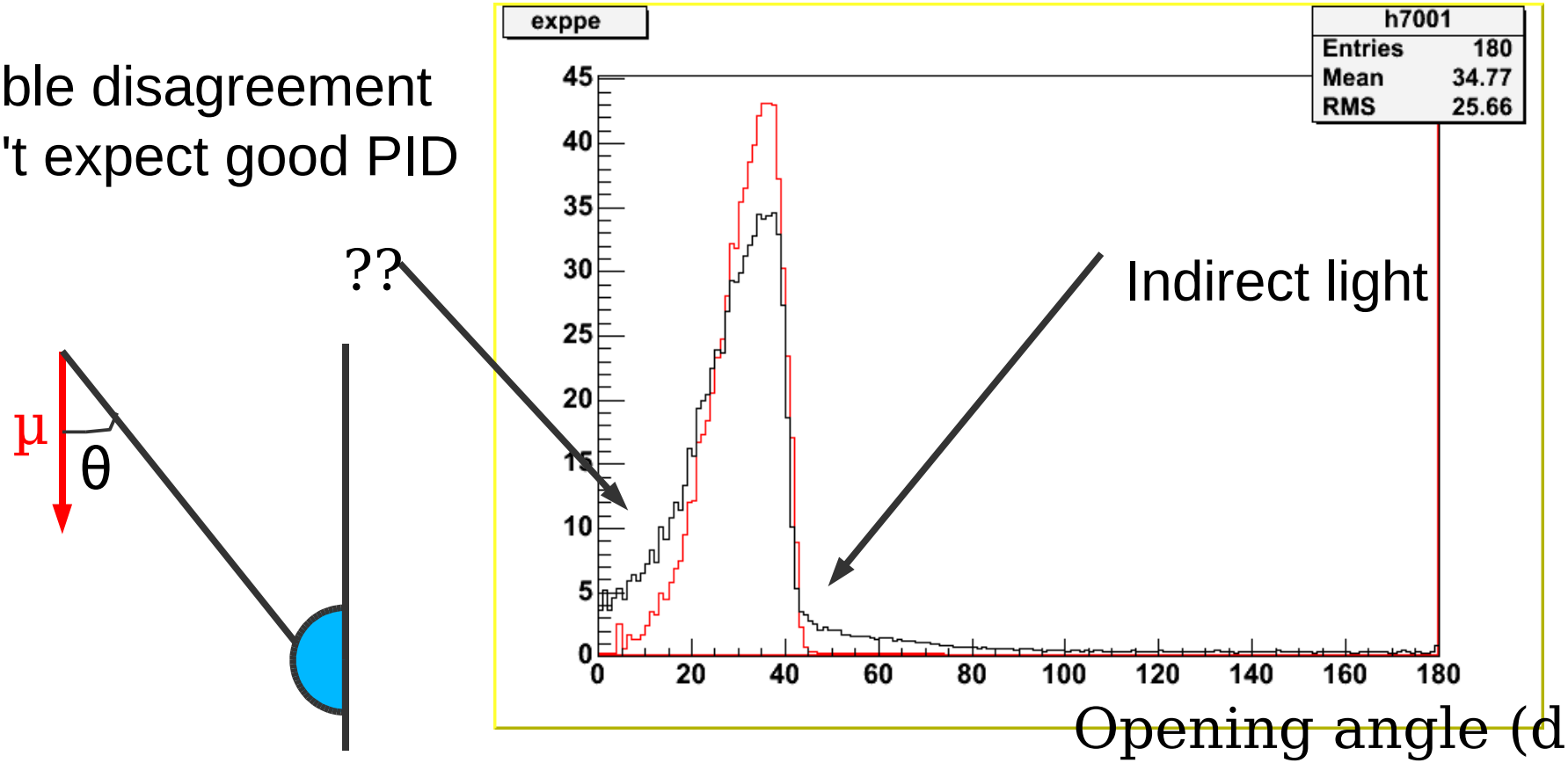
For 500 MeV 'stable' muons (no decay e-)

Using MC true vertex and direction

Near the center ('centered 25t volume')

Visible disagreement

can't expect good PID



Related to PMT acceptance ?

In G4 we use perfectly hemispherical PMTs (radius=25cm)

The 'coseffsk' routine = relative effective area as a function of the light incidence angle is not correct for hemispheres ?

Could it be easily determined for hemispheres ?

PID patterns not correct for G4 ?

Any suggestions from the experts ?

Conclusion

Contacted Hayato-san
Need to contact Ichikawa-san for more 4-vectors ?

Modifications to G4 :

- Added integration gates
- Modified reflections and scattering
  leading to better agreement with cosmic ray data
  Does not improve μ PID though ...
- Other MRD & lAr modifs

I need to start generation in about 3 weeks or so
in order to finish the study during the summer