TB 2003 Software and Analysis Updates Oct. 2004

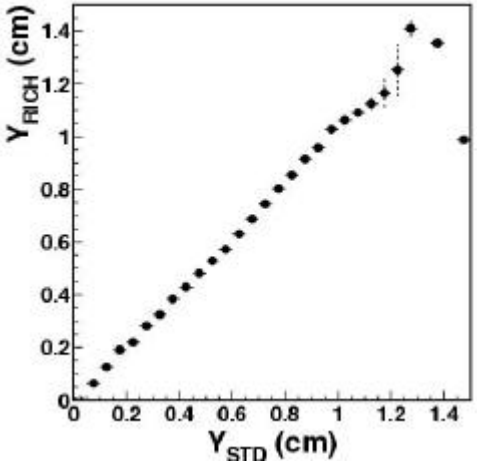
CERN 08/10/2004

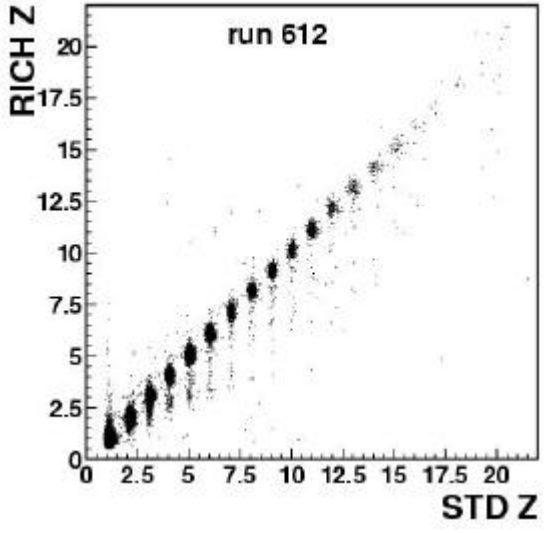
Software

- STD data:
  - Charge and track
- Using the STD track
  - New radiator parameters
  - Improved the agreement between data and MC for beta resolution
- Scintillator calibration for all runs
- PMT calibration monitored and tuned run per run
- Mirror geometry implemented
- LIP reconstruction implemented

STD data: external charge and track parameters

- STD data are included in more than 30 processed runs
- STD track extrapolated to the RICH allows a more precise reconstruction with better agreement between data and MC





Comparison with external data gives new inputs for the analysis

Radiator parameters: old fits vs. new ones

- Old fits: use fill vertex as track determination in both data and MC.

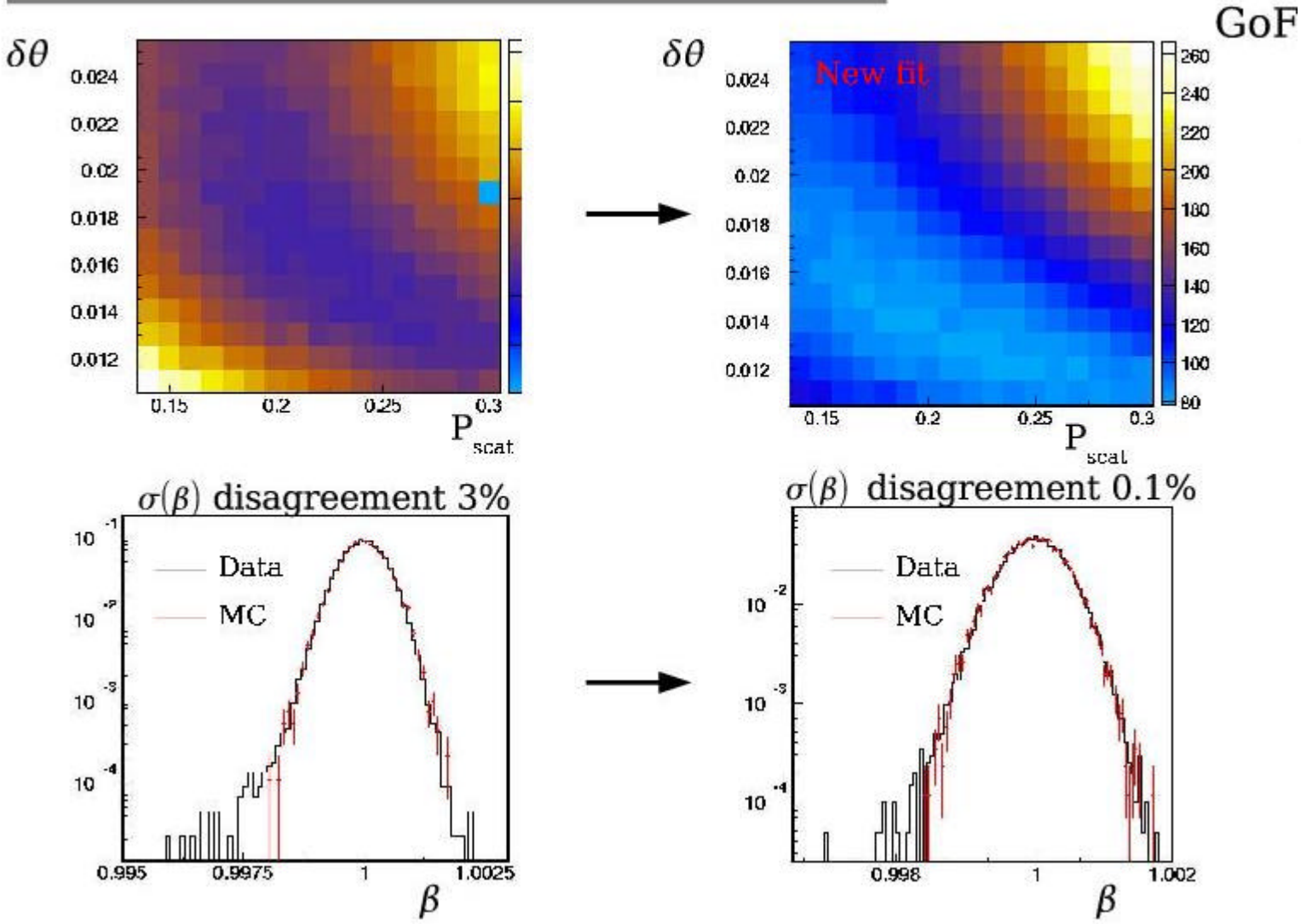
Run	Radiator	Clarity	P_{scat}	$\delta\theta$
525	Mat 1.03	0.0064	0.23	0.016
538	Nov 1.03	0.0057	0.22	0.016
548	Nov 1.05	0.0051	0.25	0.017

- New fits: use STD track in data and a fill vertex generation in MC.

Run	Radiator	Clarity	P_{scat}	$\delta\theta$
525	Mat 1.03	0.0061	0.17	0.018
538	Nov 1.03	0.0054	0.14	0.019
548	Nov 1.05	0.0055	0.19	0.014

- With new fits MC/data agreement is better than 1% level for resolution and number of hits.
- It was at the ~3% with the old fits.

Radiator parameters: old fits vs. new ones



Radiator parameters: old fits vs. new ones

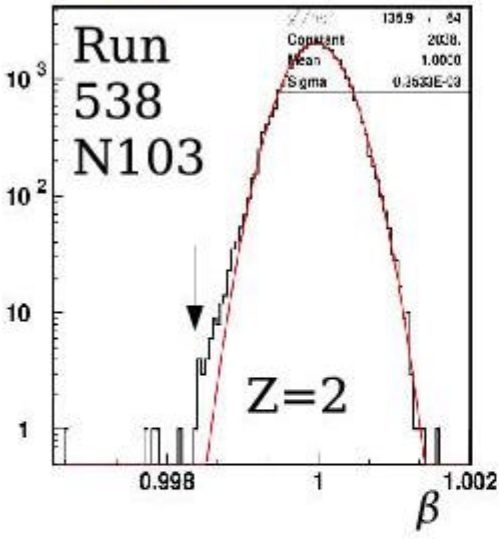
Data vs MC comparison after fit

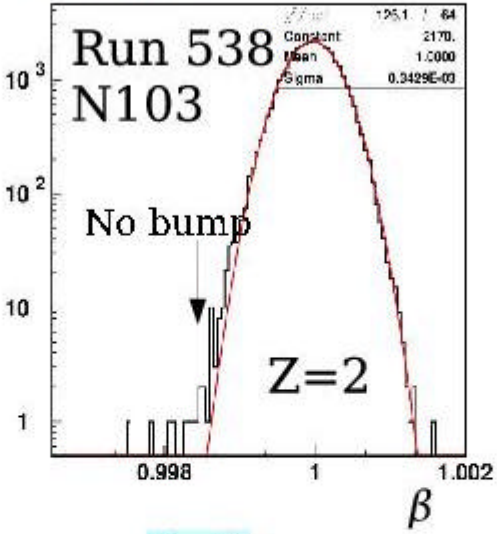
	Run	$\sigma(\beta)$ MC/data-1	N_{hits} MC/data-1
Mat 1.03	525	-0.002	0.004
Nov 1.03	538	0.0004	0.001
Nov 1.05	548	-0.001	-0.002

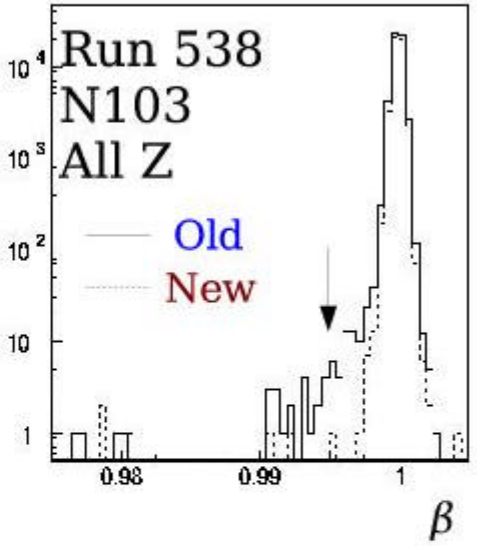
- After STD track, radiator parameters improve.
- The fit performs is nearly the same for the three fitted radiators.
- N103 clarity is slighty better than MNN103.
- Forward scattering parameters are close for all radiators: maybe we are seeing prototype effects.

New beta resolution.

- Old: use fill vertex.
- New: use STD track







Z=2

Run	Old resolution (‰)	New resolution (‰)	Radiator
525	0.374(2)	0.365(2)	Mat 1.03
538	0.353(1)	0.343(1)	Nov 1.03
548	0.445(2)	0.444(2)	Nov 1.05

New beta resolution: some conclusions

- Resolution improves ~1% using STD.

- No changes in conclusions about uniformity:
  - It seems that we are dominated by systematics.
  - Aparently N103 more uniform in beta, but MNN103 more in resolution... but it could be systematics.

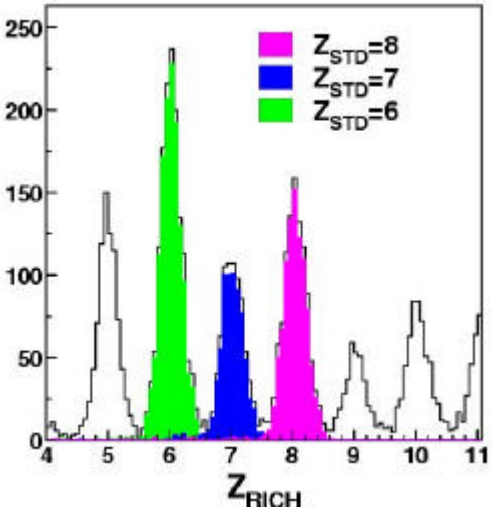
- N103 has a slighty better resolution than MNN103 under the same conditions.

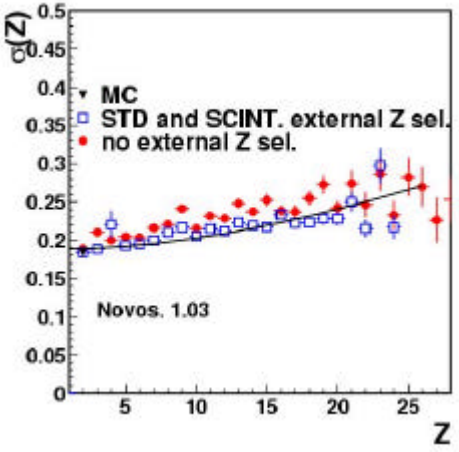
- Resolutiom evolves with Z as expected. Slighty better absolute values for high Z than in previous analysis.

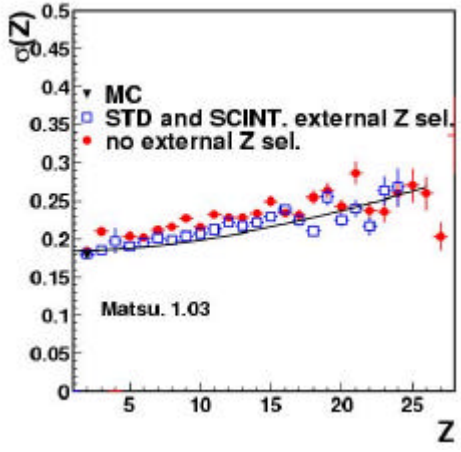
- Still N105 uniformity to be done as well as angle runs analysis.

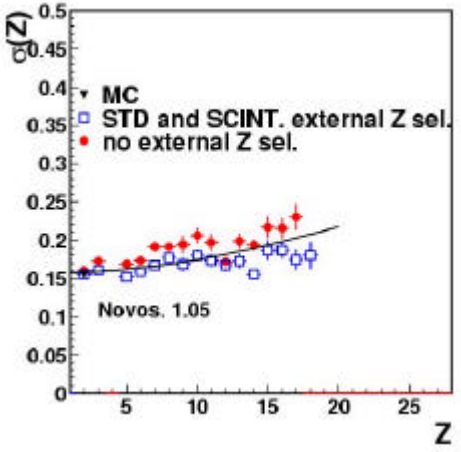
Update of charge resolution

- Estimation with external charge selection of both STD and scintillators charge
- The Z resolution is in good agreement with the MC and increases with Z as expected



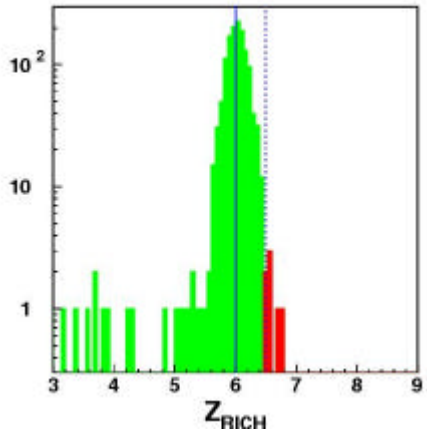


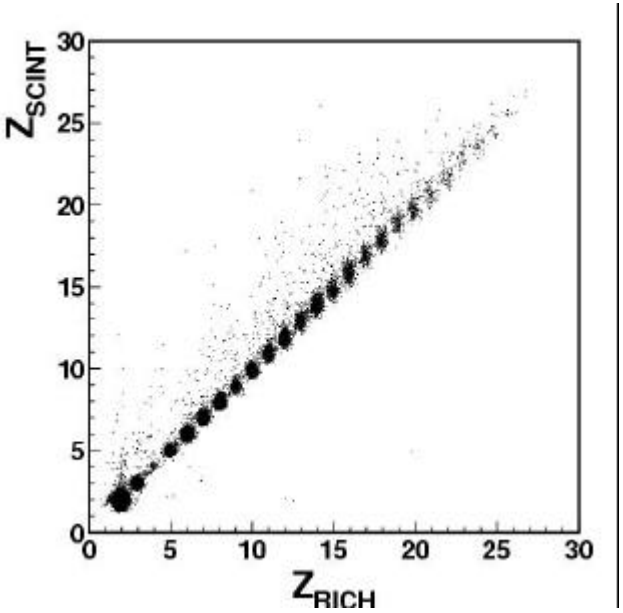


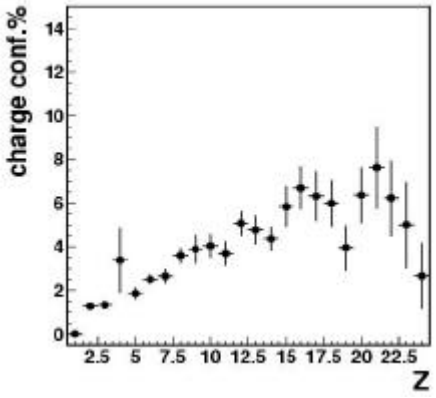


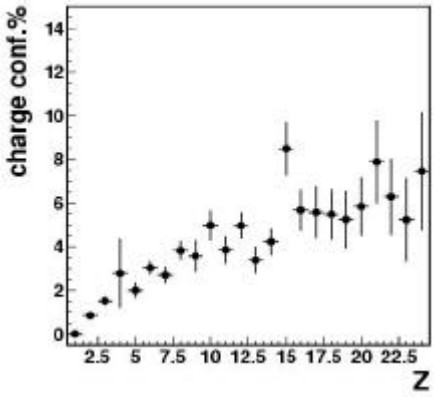
Estimation of charge confusion (very preliminary)

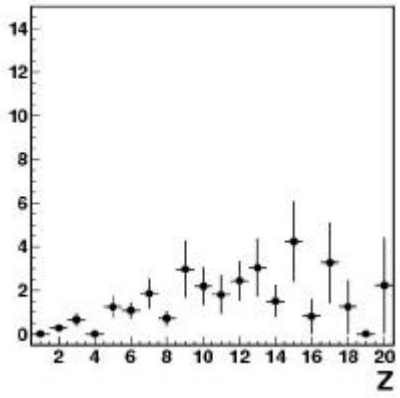
The charge selection with both STD and scintillators removes most of fragmented nuclei (but not all of them), so we compute the charge confusion on the right side





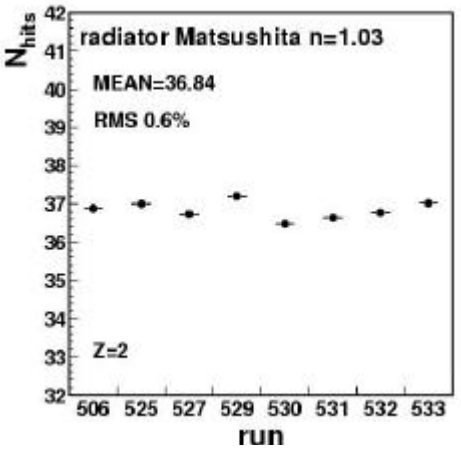


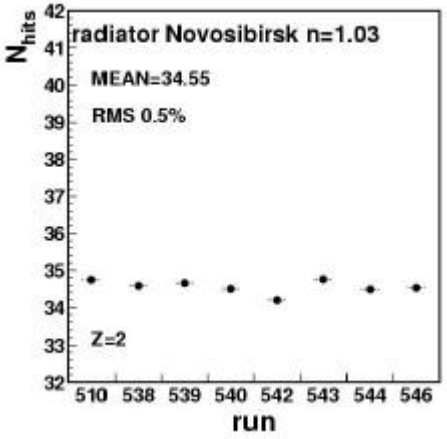




Charge uniformity (review)

- To estimate the aerogel uniformity we plot de mean number of hits for the He sample in each run
- The tile of Agl Novos. 1.05 too small (5 cm side) to prove the uniformity





	Num of hits	uniformity
Matsu. 1.03	36.84	0.6%
Novos 1.03	34.55	0.5%

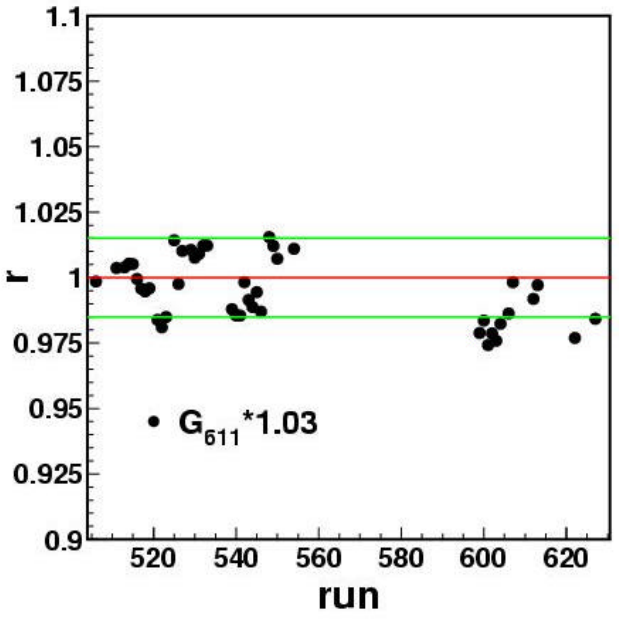
Monitoring of Gain stability

All the runs are processed with G computed from LED run 611

To monitor the G stability we compare the mean hit signal of He in data and MC: fine tuning of the applied Gain run per run

- G stability estimated within 1.5%
- Raw led runs give a 3% lower G than data

$$R = \frac{\langle \text{signal} \rangle_{\text{data}}}{\langle \text{signal} \rangle_{\text{MC}}}$$

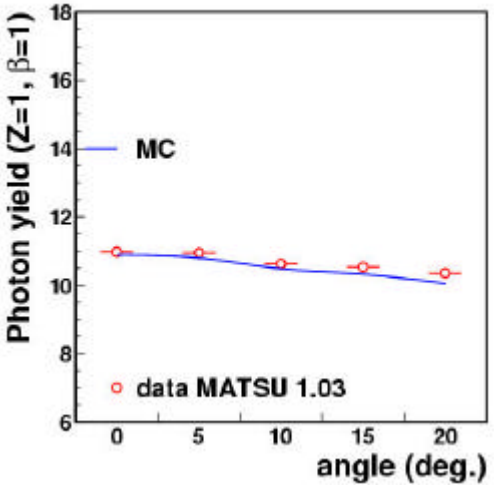


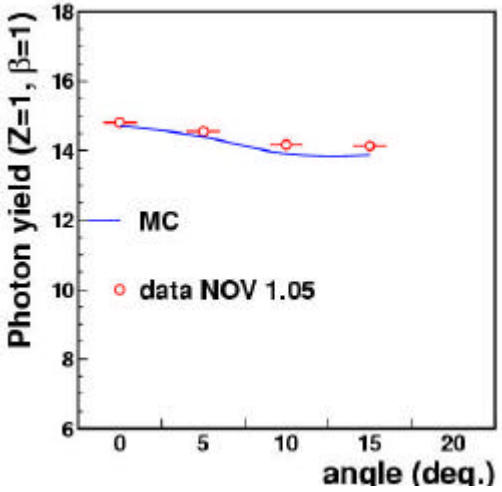
Photon yield

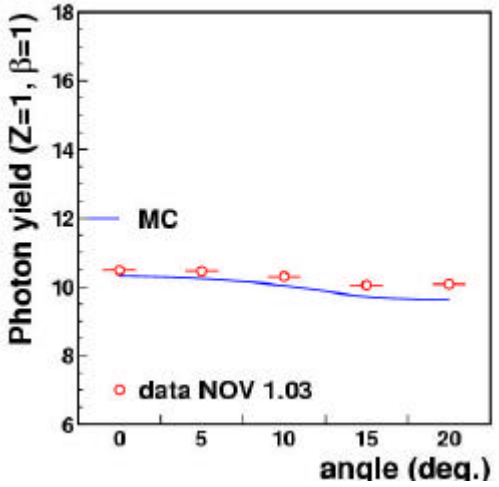
Photon yield estimated as the number of expected p.e. for a particle of ß=1 and Z=1

- at normal incidence (table)
- Vs angle: at 20 deg inclination the photon yield reduces of about 2-4% for fully contained rings

Nov 1.03	10.5
Matsu 1.03	11.0
Nov 1.05	15.0







Conclusions

- Radiator Matsu. 1.03 and Novos. 1.03 have very similar photon yield and thus similar results
- Radiator Novos. 1.05 has a higher photon yield and better charge resolution, unfortunately the tile uniformity has not been proved
- All the radiator perform as expected from their optical properties and results are in agreement with MC simulation

Summary of some parameters relative to He

Agl	N_{hits}	s (Z)	Uniformity
CIN 1.03	34.55 34.20	0.184 0.183	0.5%
MNN 1.03	36.84 37.12	0.180 0.178	0.6%
CIN 1.05	47.10 47.25	0.155 0.155	?

Black data, red MC