

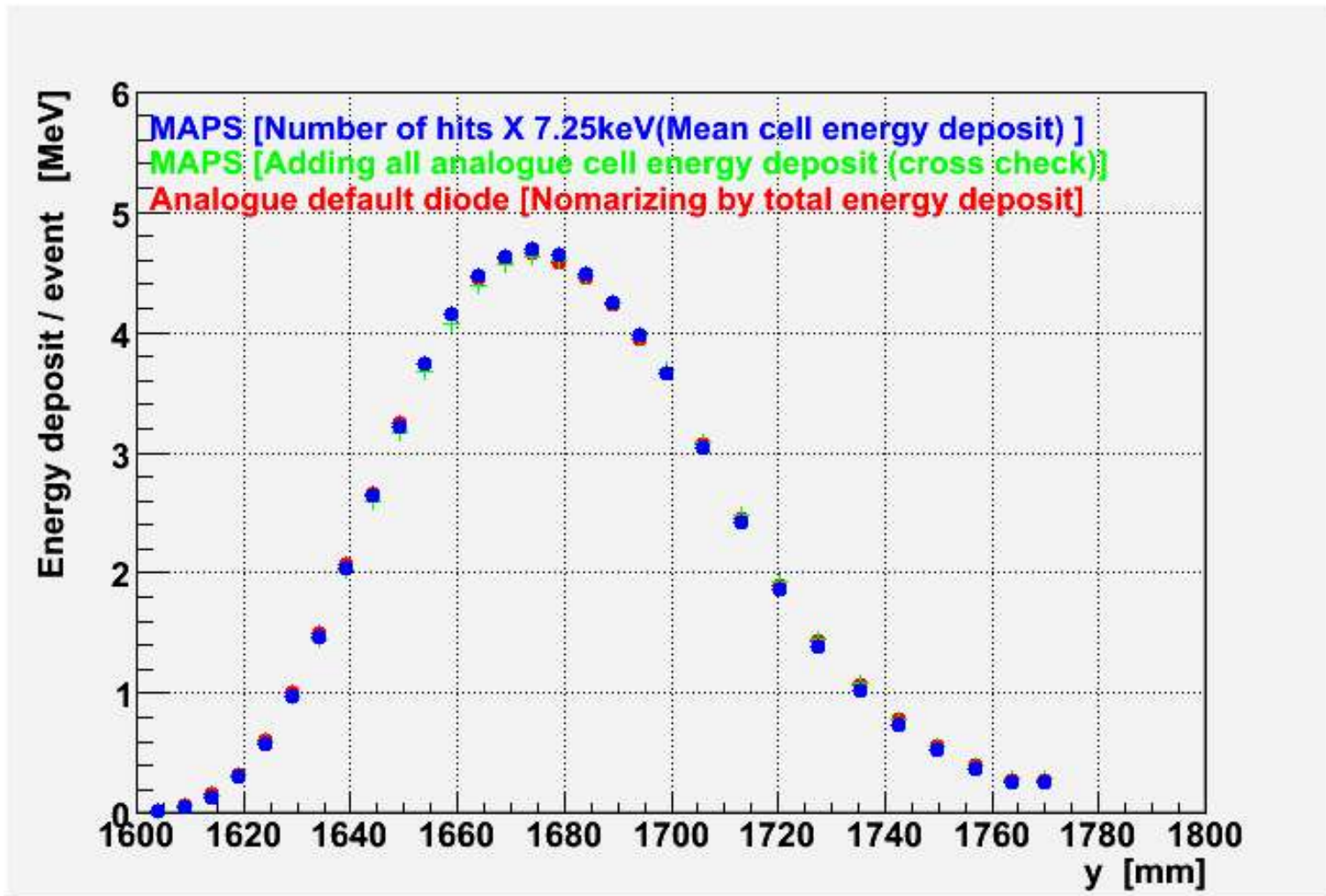
Status of MAPS study

16th July 2007

**CALICE-UK MAPS ECAL meeting
at RAL**

**Yoshinari Mikami
University of Birmingham**

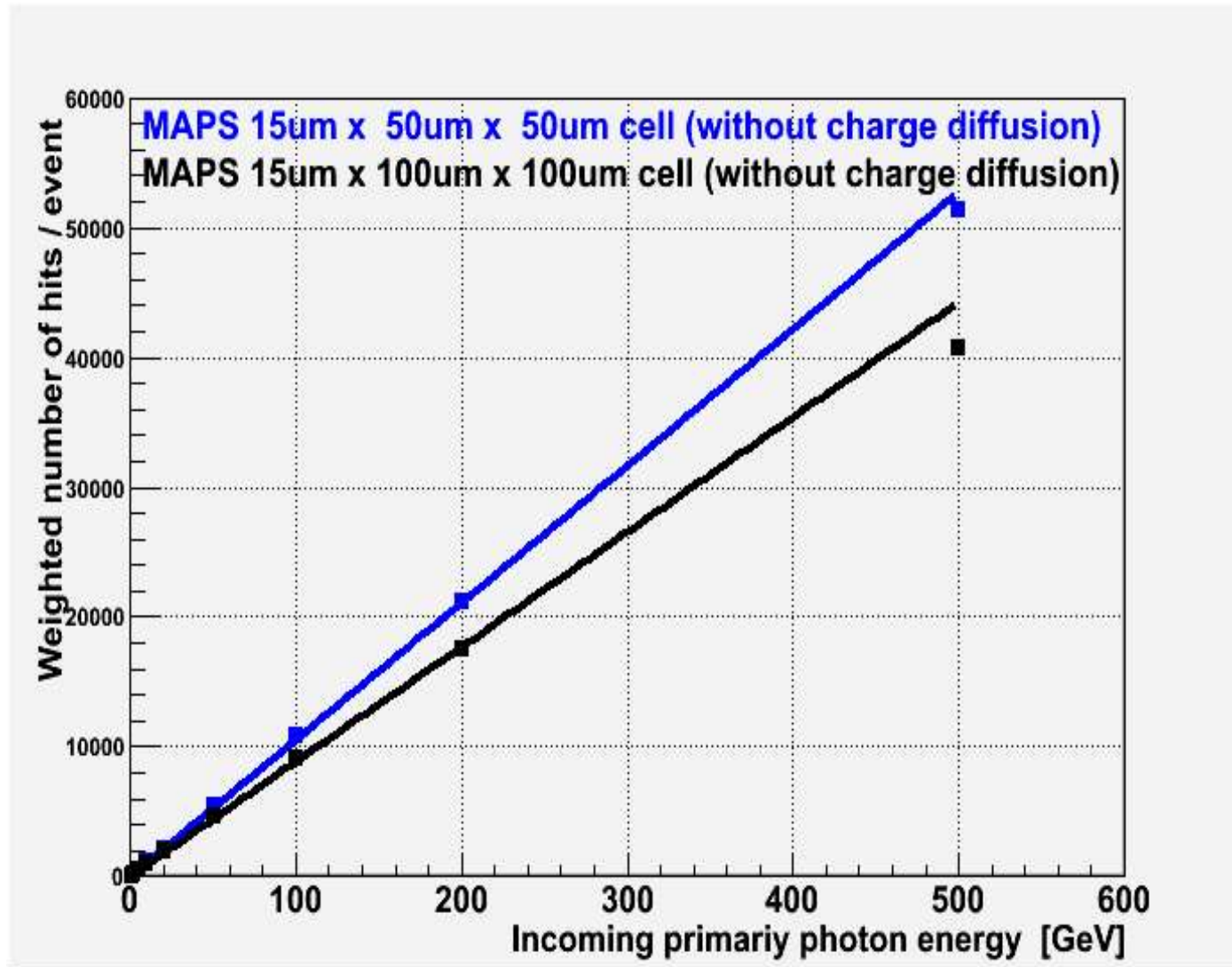
Longitudinal Shower shape (100GeV photon)



Good agreement

Linearity comparison

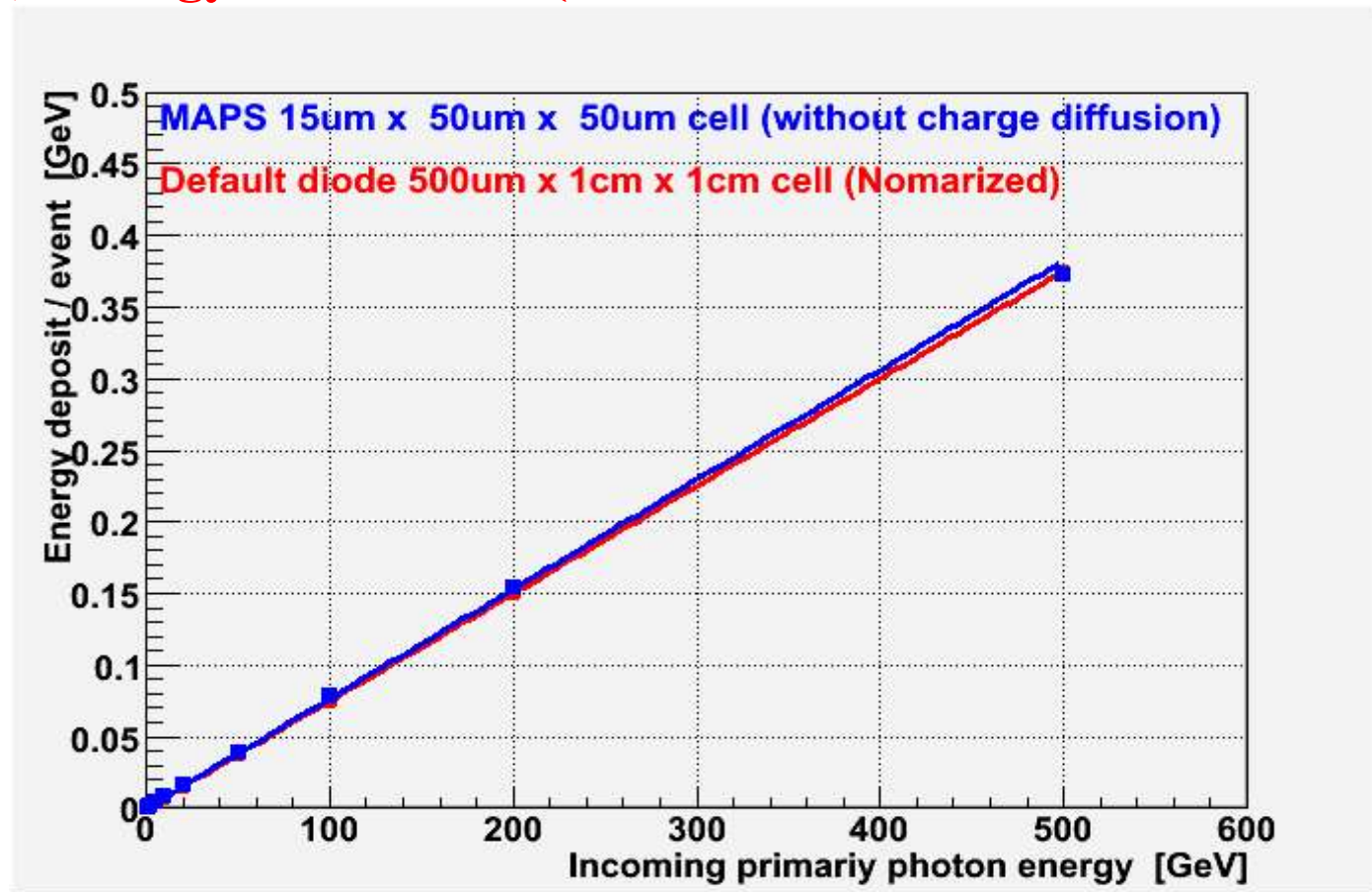
50umX50um vs. 100umX100um



50umX50um is better.

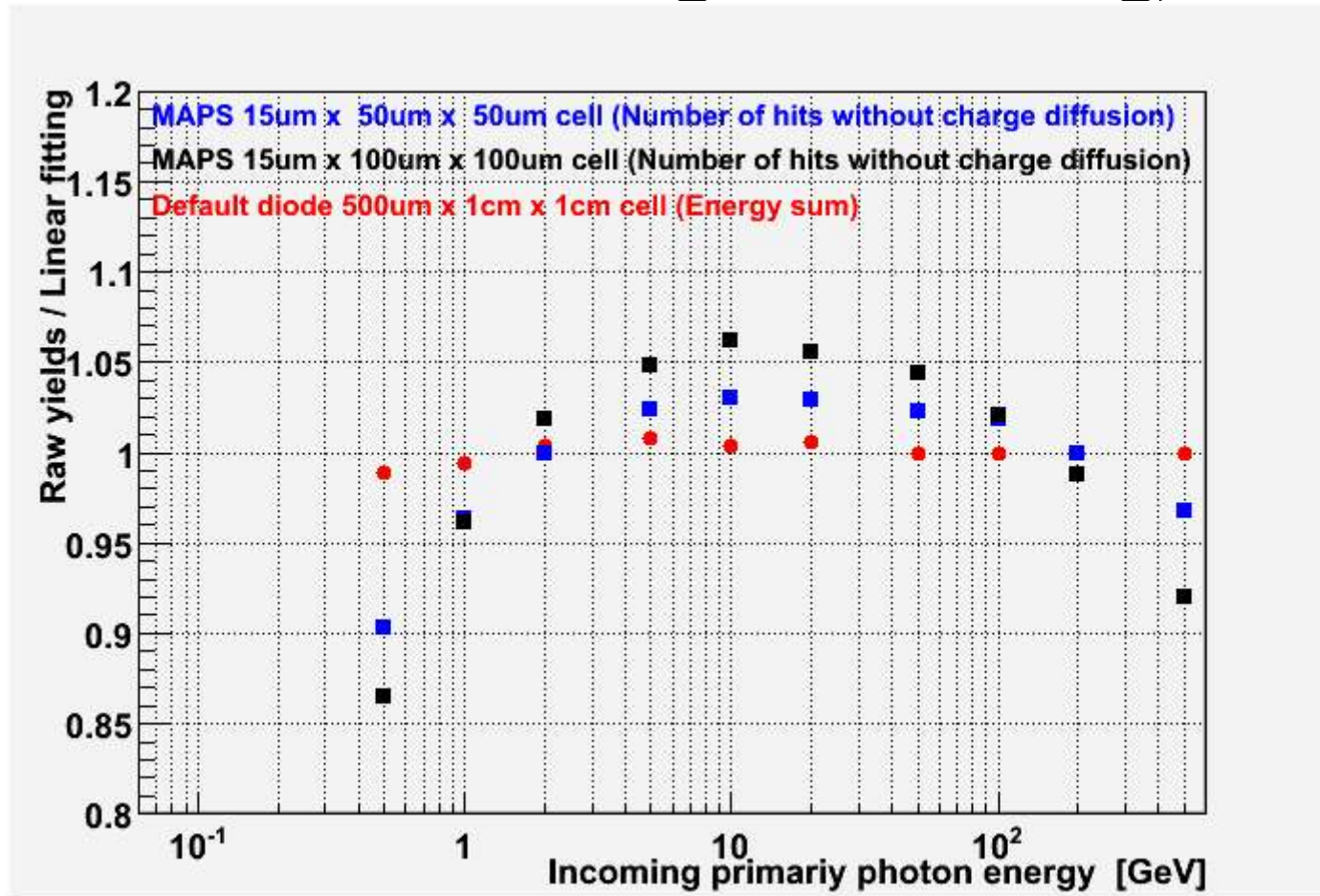
Linearity comparison MAPS vs. Diode

MAPS; Weighted #hits/event x 7.25keV (Mean cell hits energy at 100GeV photon)
Default Diode; Energy/event x 0.03 (Si sensitive thickness ratio of 15um/500um)



Good agreement

Linearity residual comparison (without charge diffusion and without charge clustering)



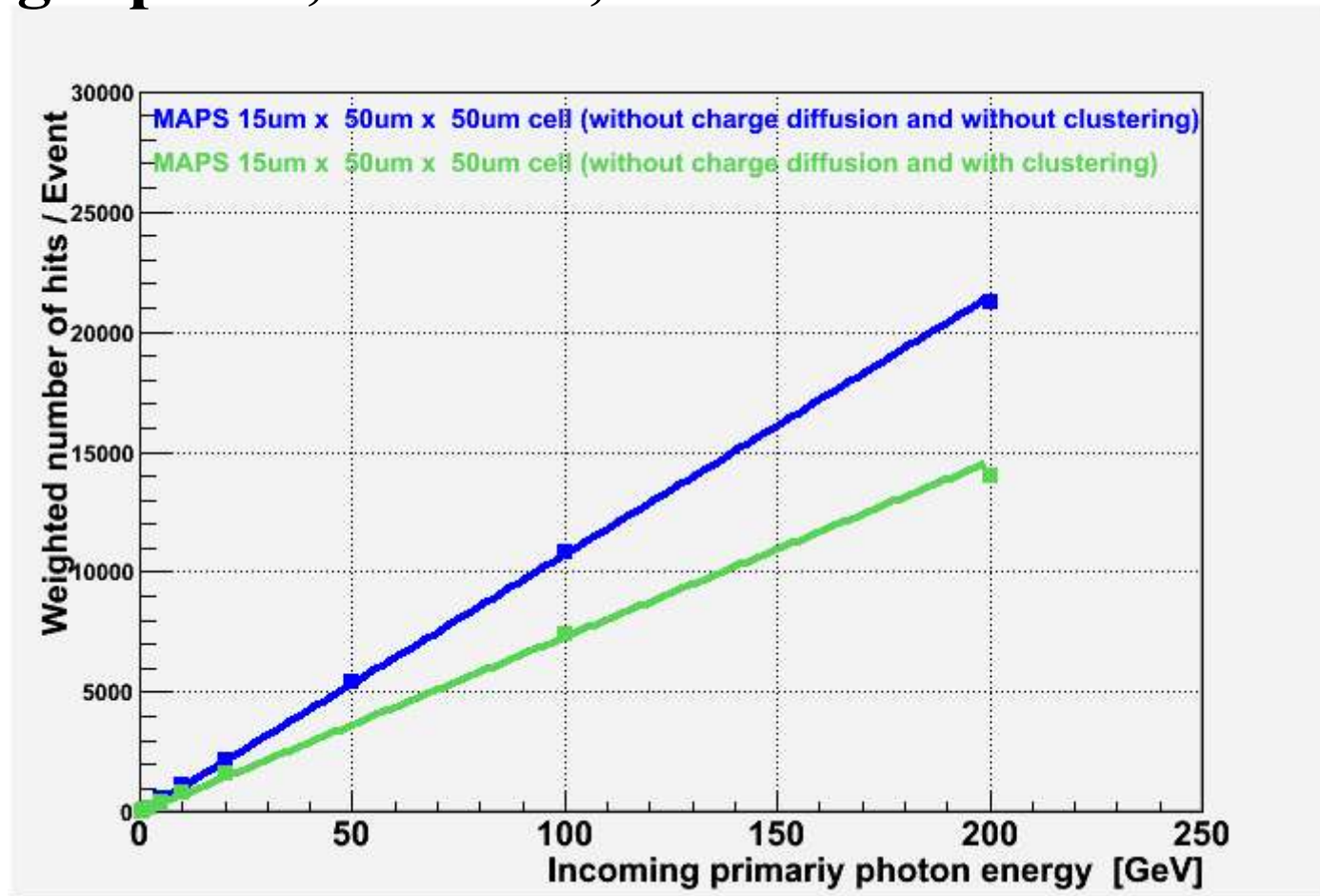
(All are weighing by standard factor 1:2 for different W thickness layers.)

-> 50umX50um is better than 100umX100um.

-> Diode pad has better linearity than MAPS.

Linearity comparison

Without clustering vs. With clustering
(No charge spread, no noise, no threshold and no dead area.)



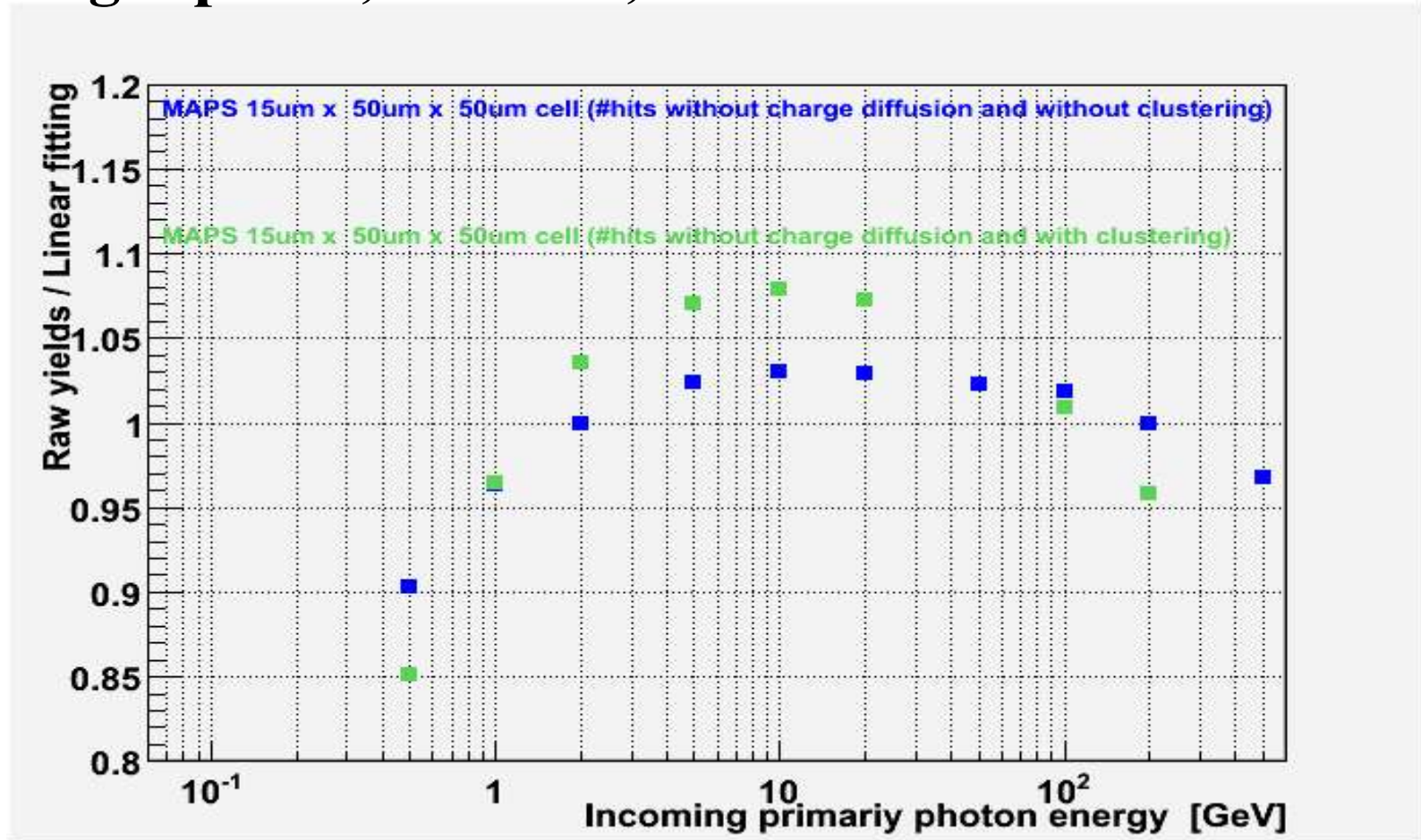
Without clustering; ~106 hits/GeV

With clustering; ~ 73 hits/GeV

Linearity residual comparison

Without clustering vs. With clustering

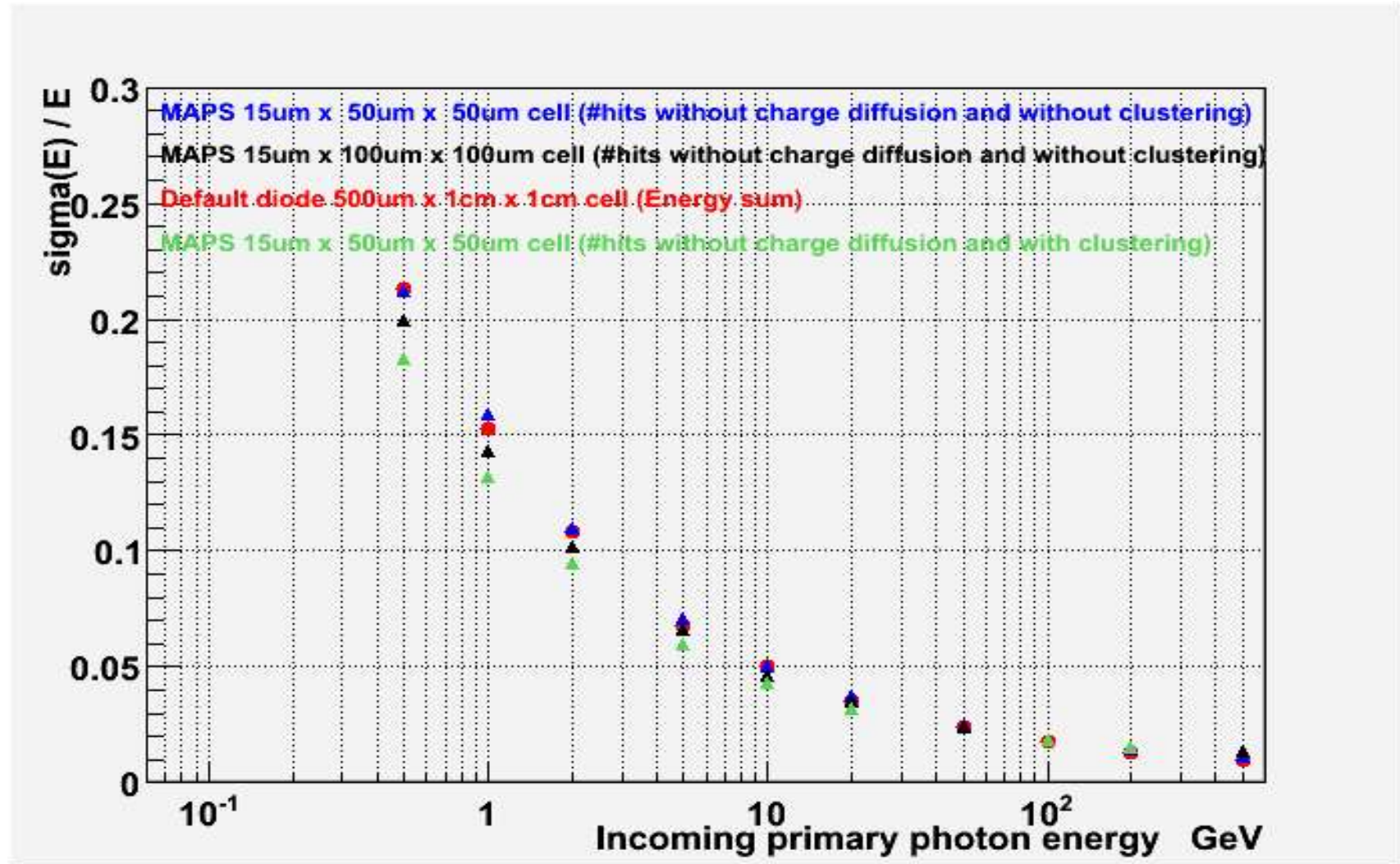
(No charge spread, no noise, no threshold and no dead area.)



->Without clustering is better linearity.

->It would be due to that cell boundary effect compensate the linearity wrongly.

Resolution comparison



At least up to ~ 100 GeV,

- > 100umX100um is better resolution than 50umX50um at Geant4 level.
- > Clustering has better resolution. (Consistent with AM's study)

Summary for clustering effect

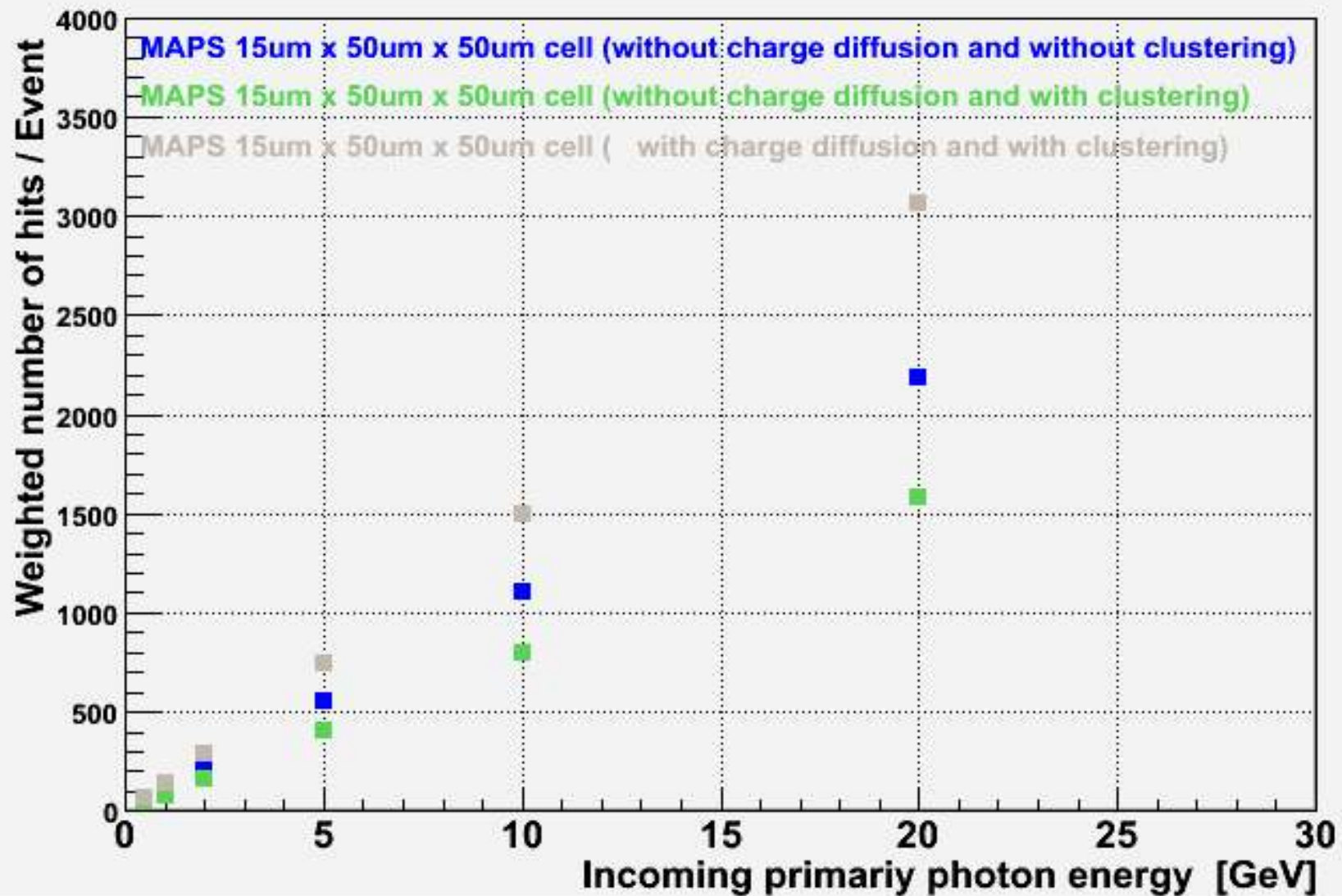
In lower energy range (up to $\sim 100\text{GeV}$),

Linearity: **Diode > 50umX50um > 100umX100um > Clustering**
(**'Diode > MAPS'** is due to multi hits in one MAPS cell.)
(**'50umX50um > 100umX100um > Clustering'** will be due to that cell boundary effect compensate the linearity wrongly.)

MAPS Resolution: **Clustering > 100umX100um > 50umX50um**
(The less boundary effect is the better resolution.
-->Agree with expectation)

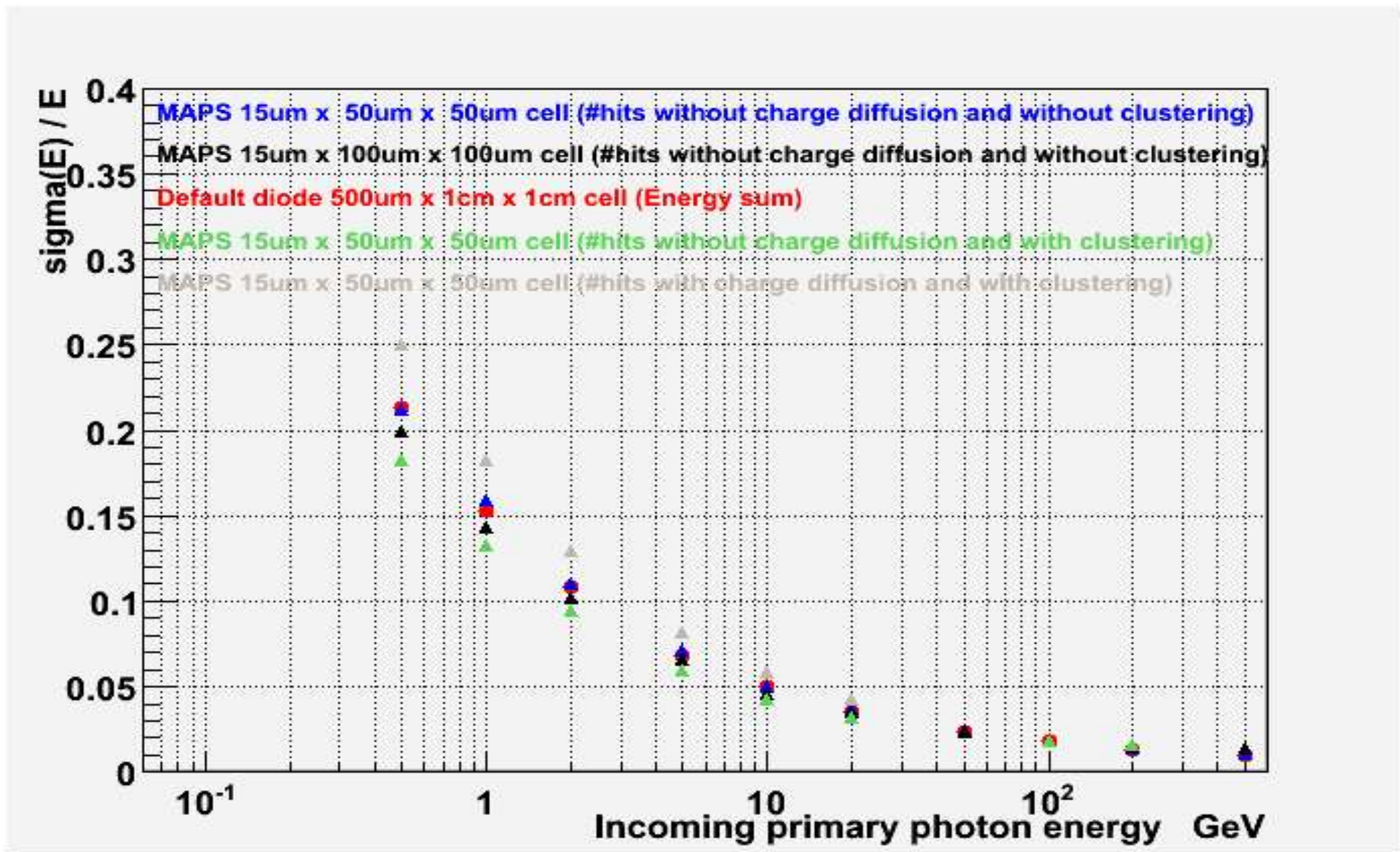
Linearity after charge diffusion

(No noise, no threshold and no dead area.)



Resolution after charge diffusion

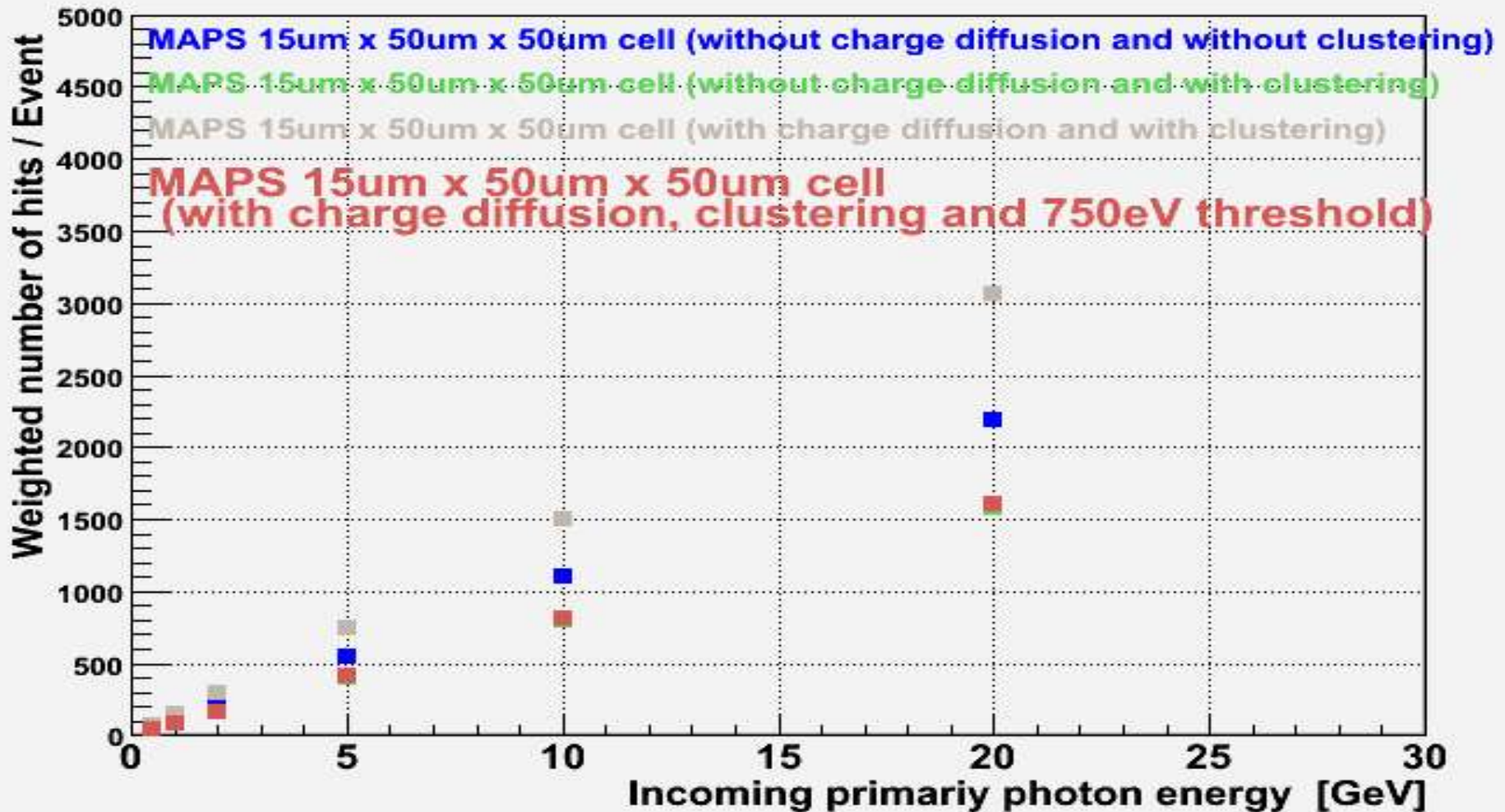
(No noise, no threshold and no dead area.)



Linearity

after charge diffusion+750eV threshold

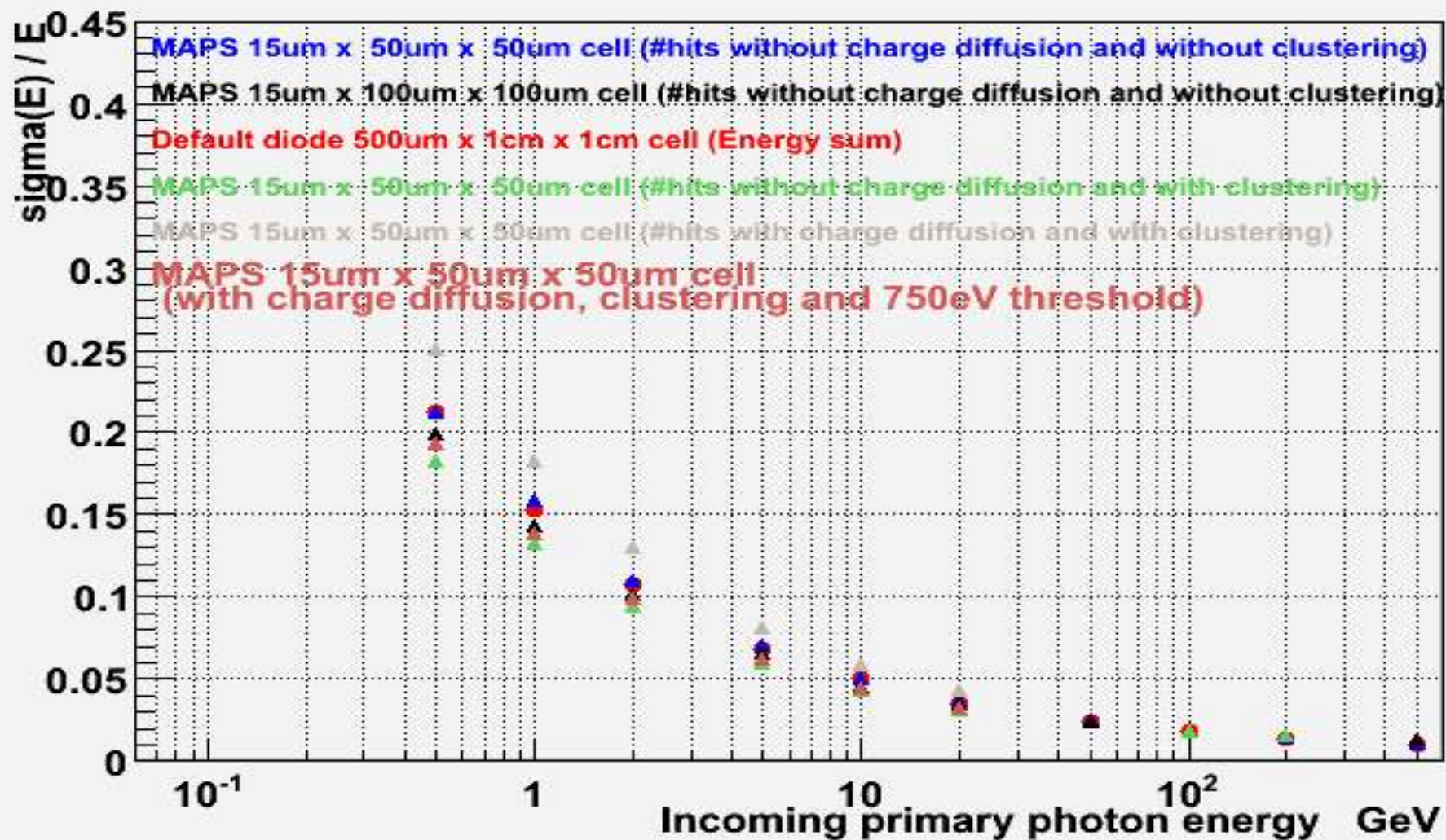
(No noise and no dead area.)



Resolution

after charge diffusion+750eV threshold

(No noise and no dead area.)



Summary

Anne-Marie's clustering is working well even in 200GeV scale !!

Tested the linearity after charge diffusion and charge clustering.

Next steps

- Understanding threshold effect more explicitly
- Charge diffusion study up to 200GeV energy scale
- Applying noise and dead area as well

Backup slide (1)

