Status of Strip Clustering

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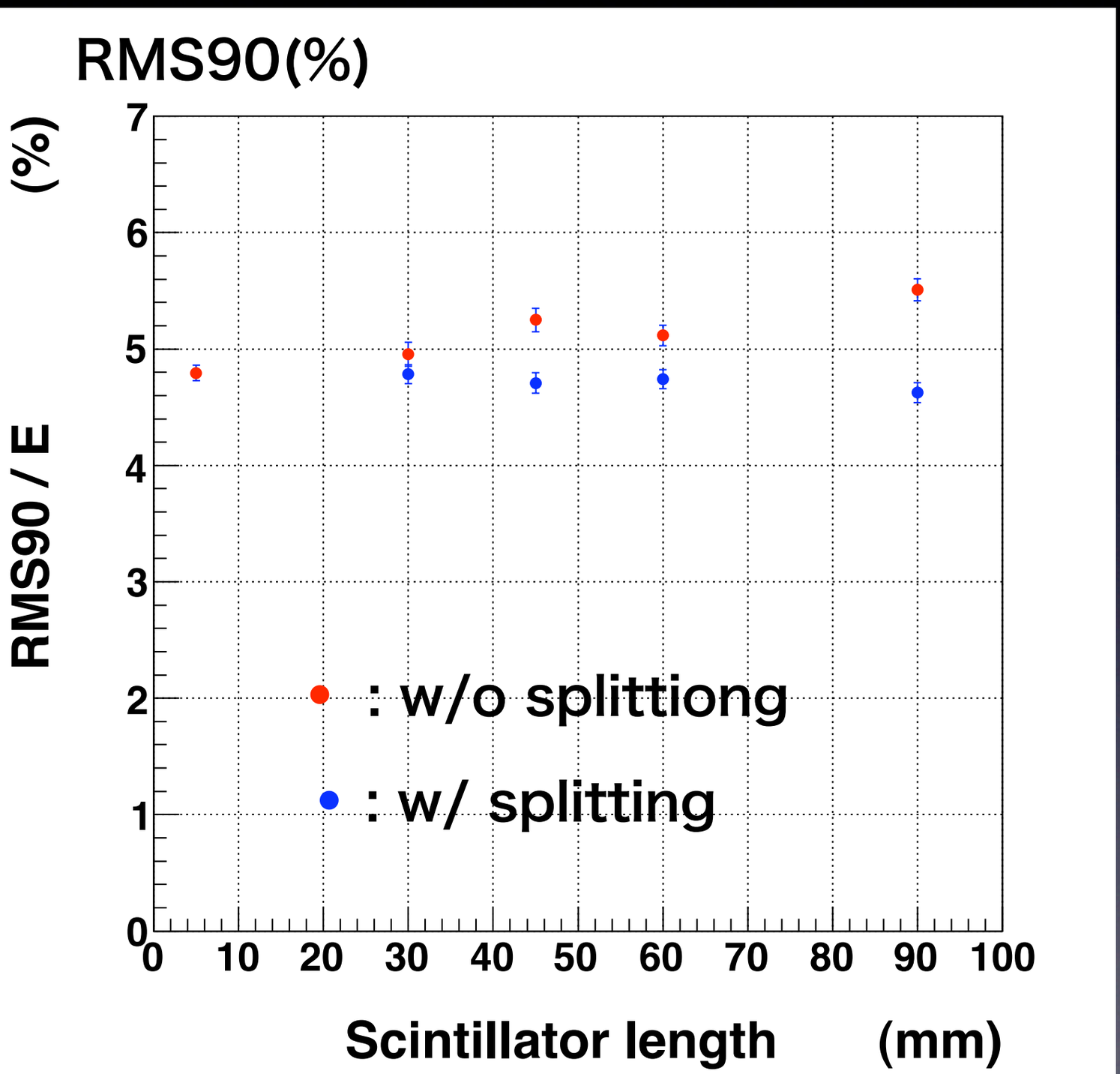
with Latest Mokka, PandoraPFANew, and Daniel's Splitting module for hybrid ECAL

To get the following steps;
- to get better JER (at least Mark's result)
- more realistic simulation (implement some dead volume from MPPC, reflector, cable, ...
- to study hybrid ecal
- confirmation of our last result (IWLC)

I am trying to use:
- Latest Mokka, mokka-07-05
  implemented scintillator strips
  realistic geometry (MPPC, Fiber, board,..)
- PandoraPFANew
  easier tuning of parameters
- D. Jeans' Splitter module
  for Si-Sc hybrid Ecal
  Lighter than my version

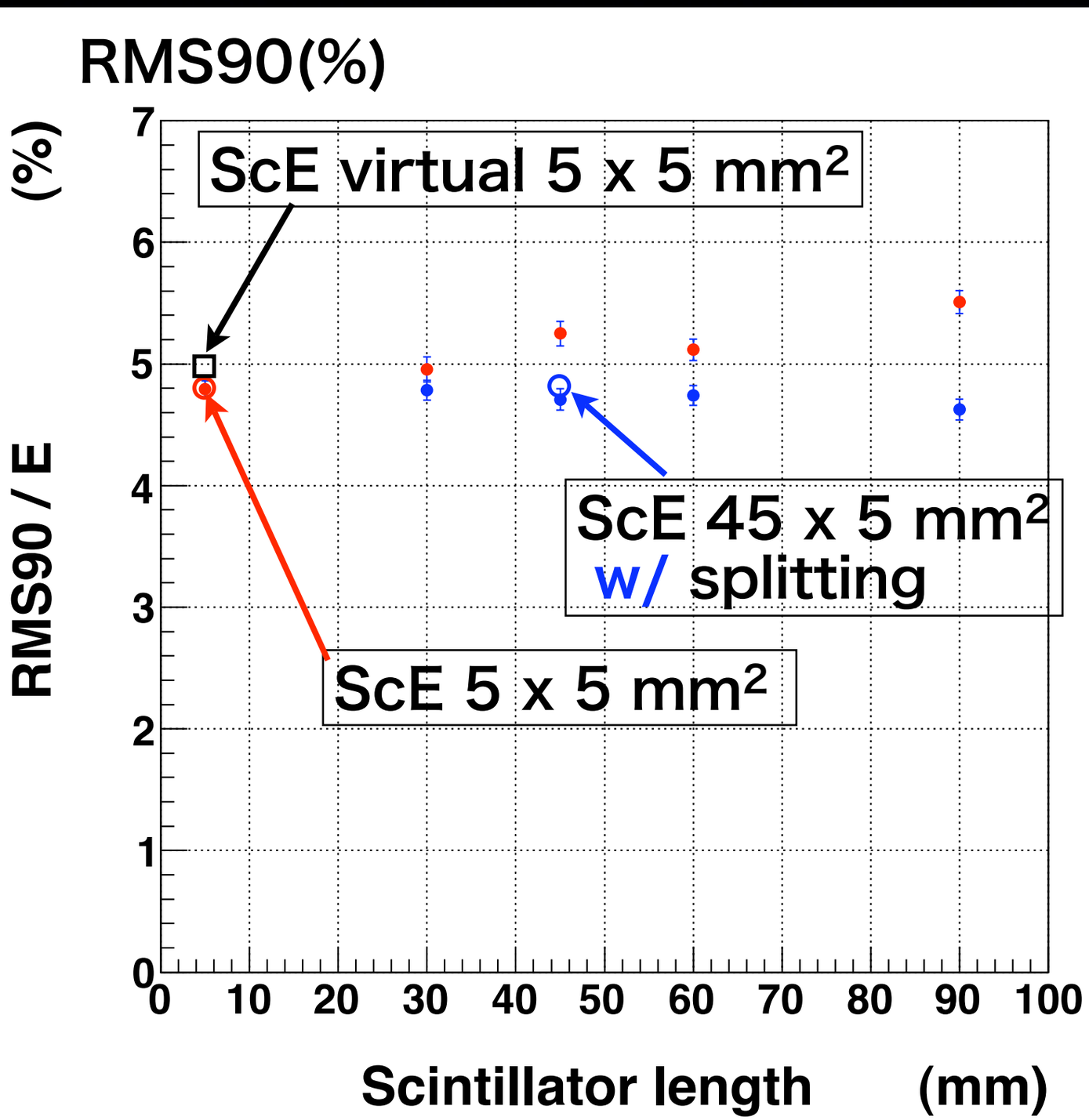
Results for √s = 91GeV two-jet events shown at IWLC Nov.2010



-good performance of strip-splitting method was presented in Nov. 2010.

-For center energy 91, 200, 360, and 500 GeV JER of Sc strip ECAL with Strip-splitting method has the similar JER by 5x5 mm^2 square cell ECAL.

Combination of PandoraNew, Mokka latest and Daniel's strip-splitting



JER with ScE 5x5 mm², ScE virtual 5x5 mm² and ScE 45x5 mm² w/ splitting method have almost common JER

Strip-splitting performance shown in IWLC was confirmed with New Mokka simulation, in which strip shape is intrinsically implemented.

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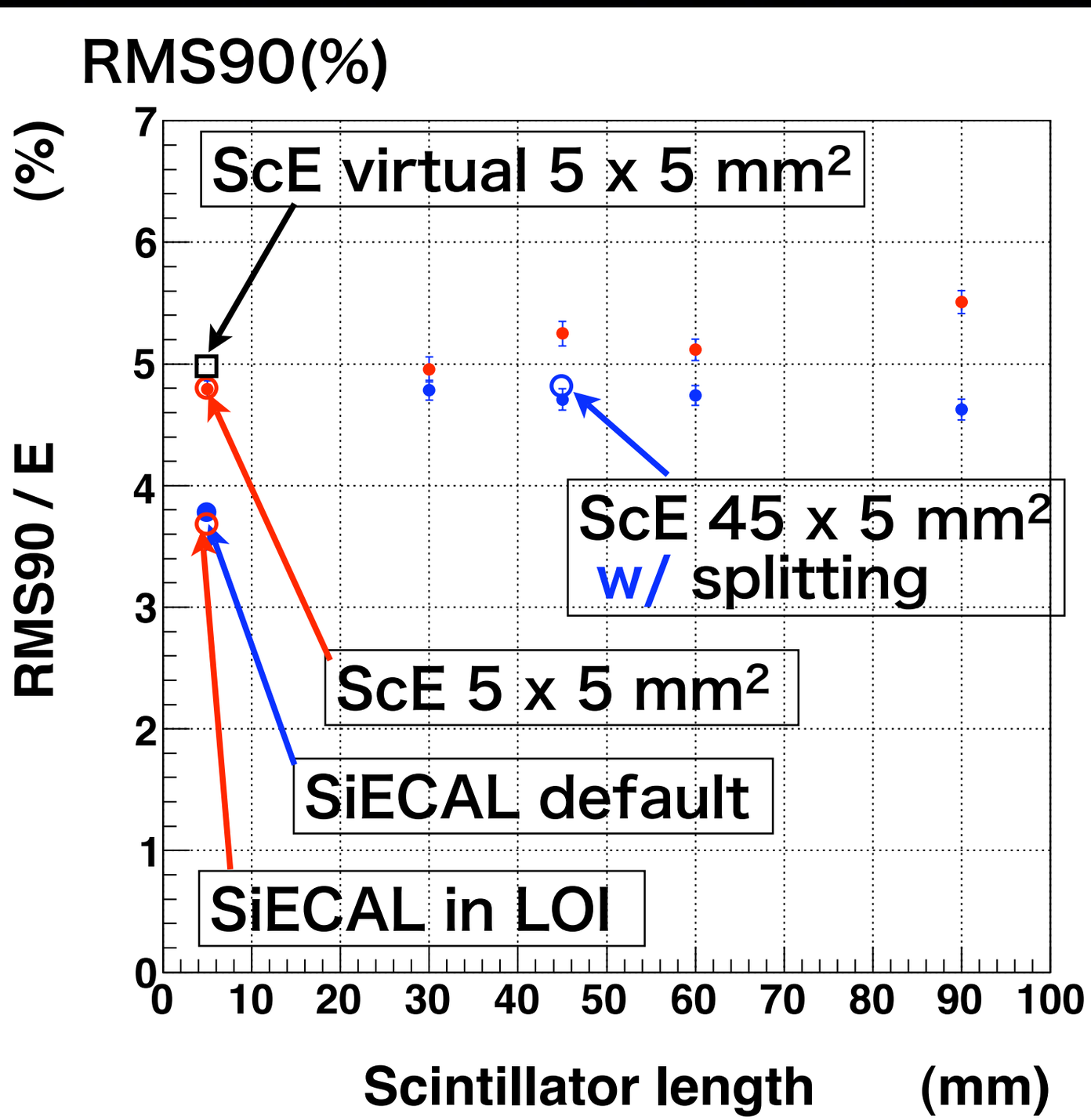

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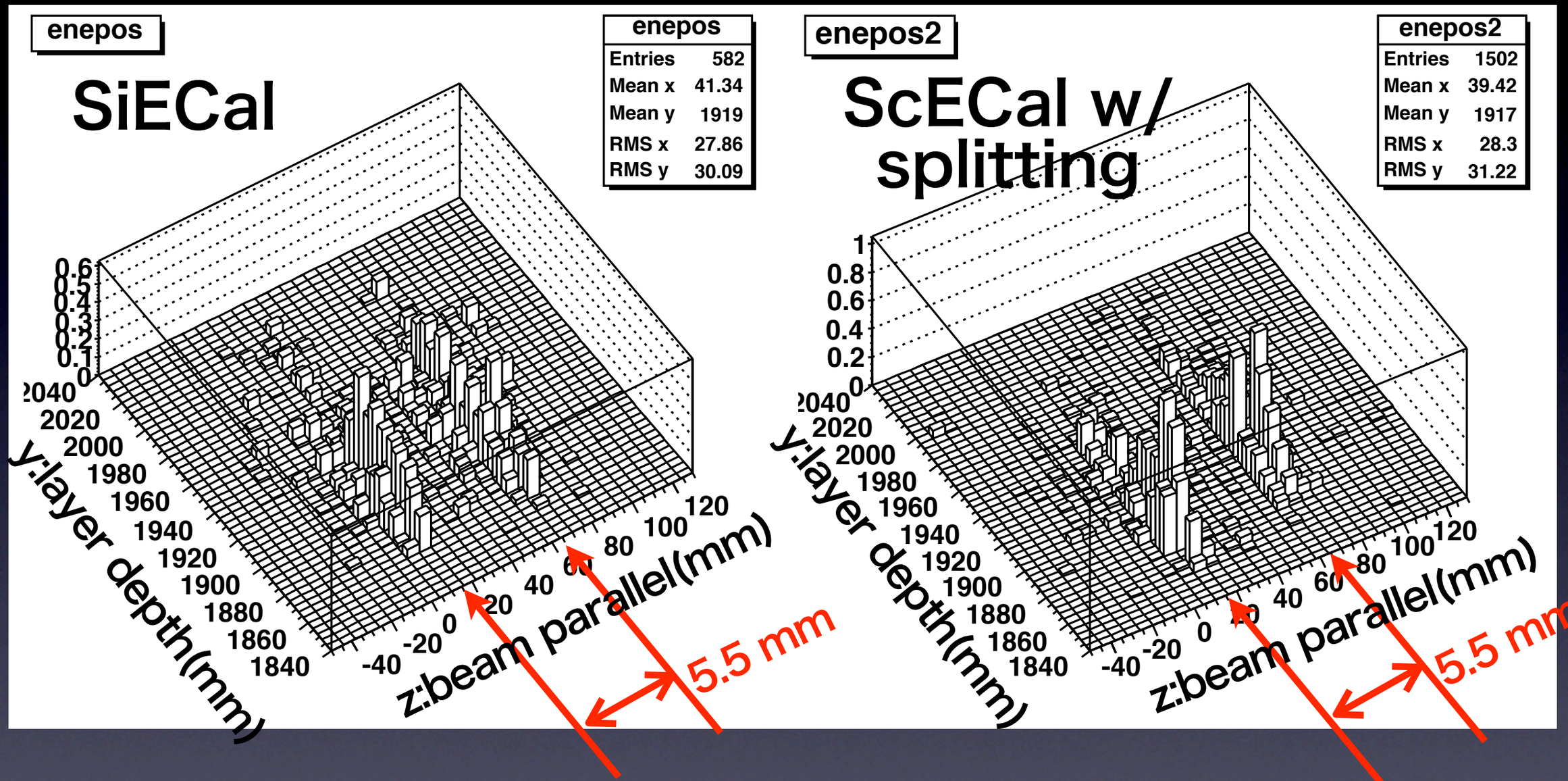
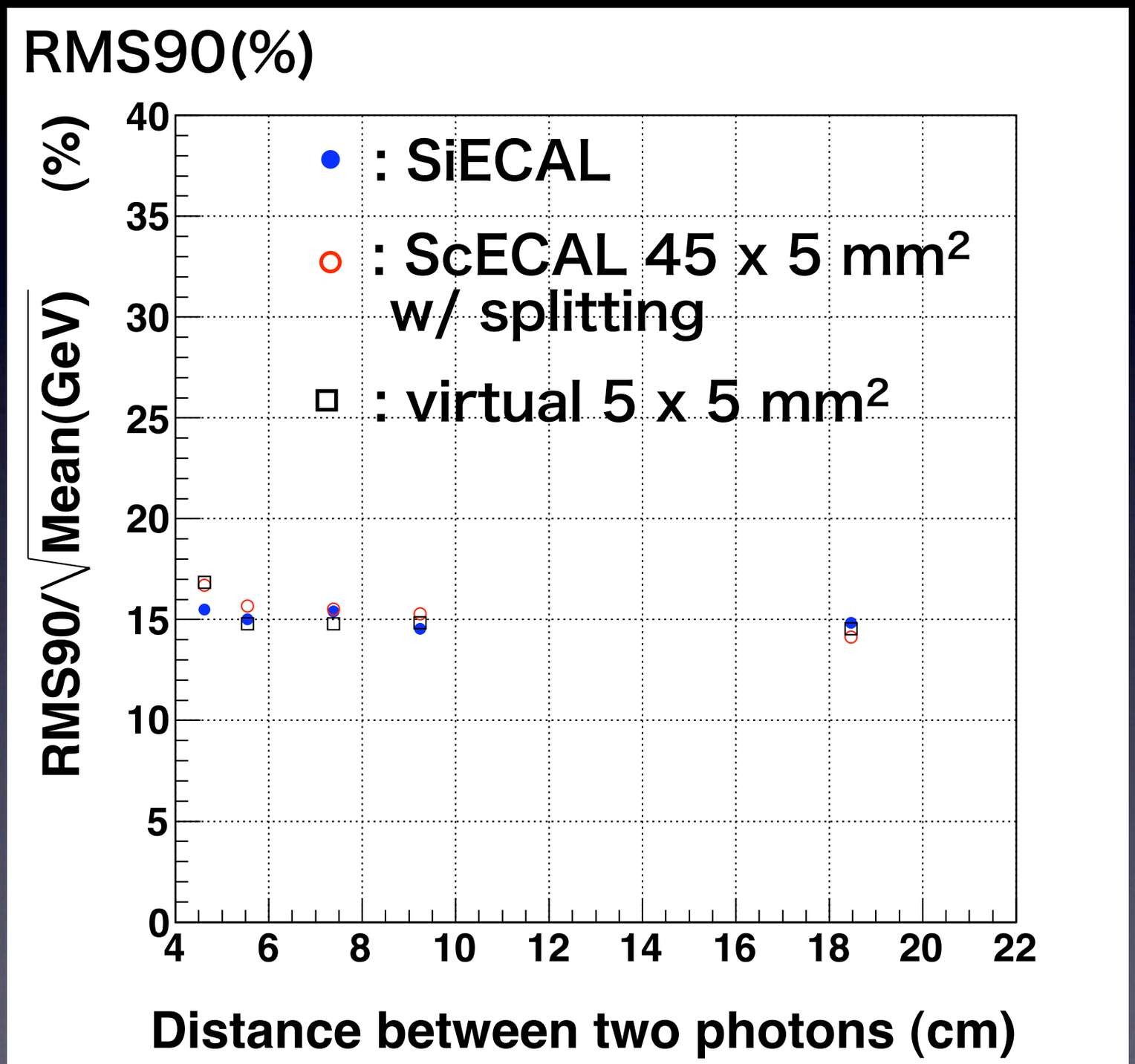
SiECAL has better performance→ we need tune for ScECAL

Two photon clusters in SiEcal and ScStirpEcal with Splitting method

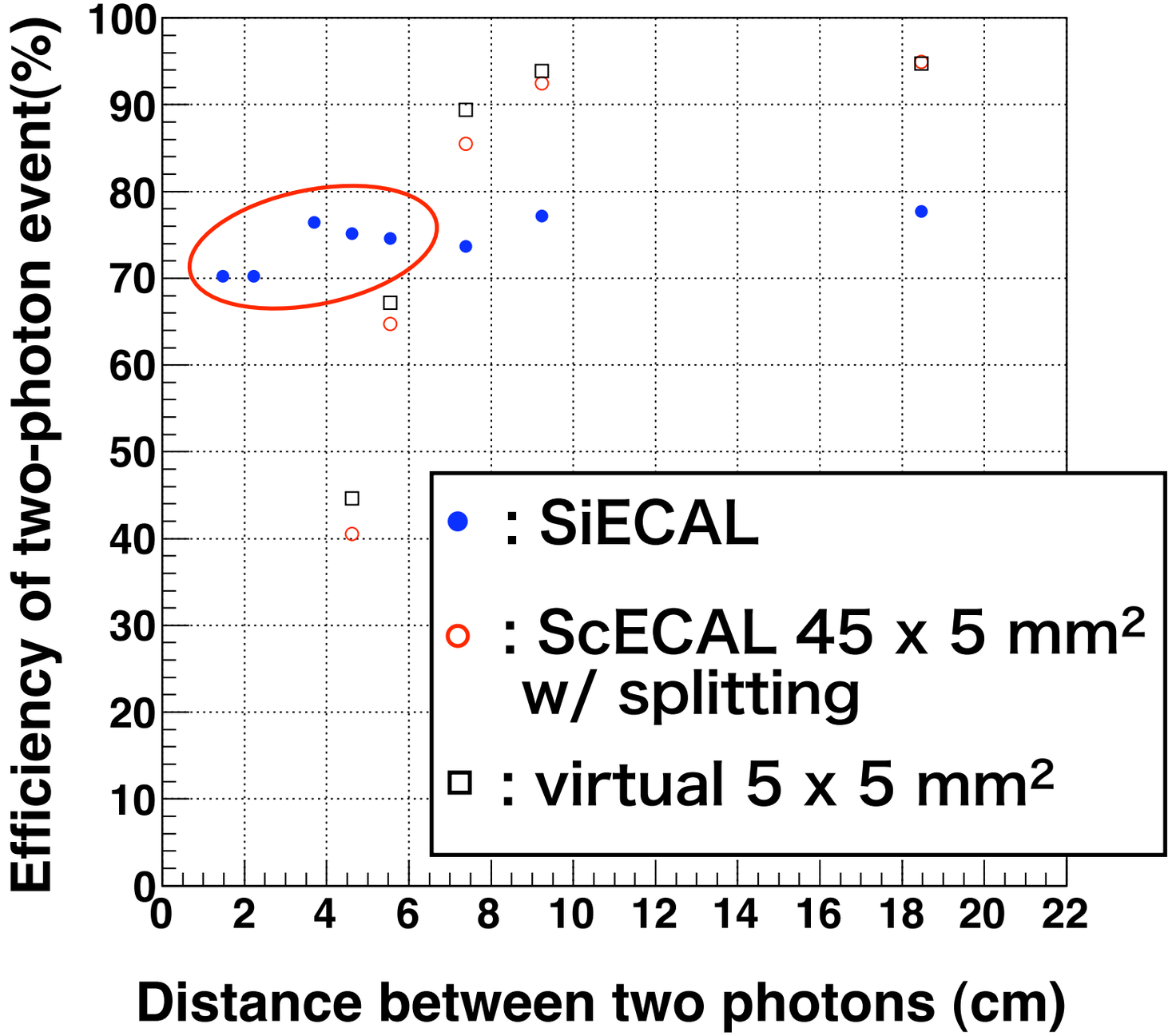


Energy resoution of 10 GeV two photon events



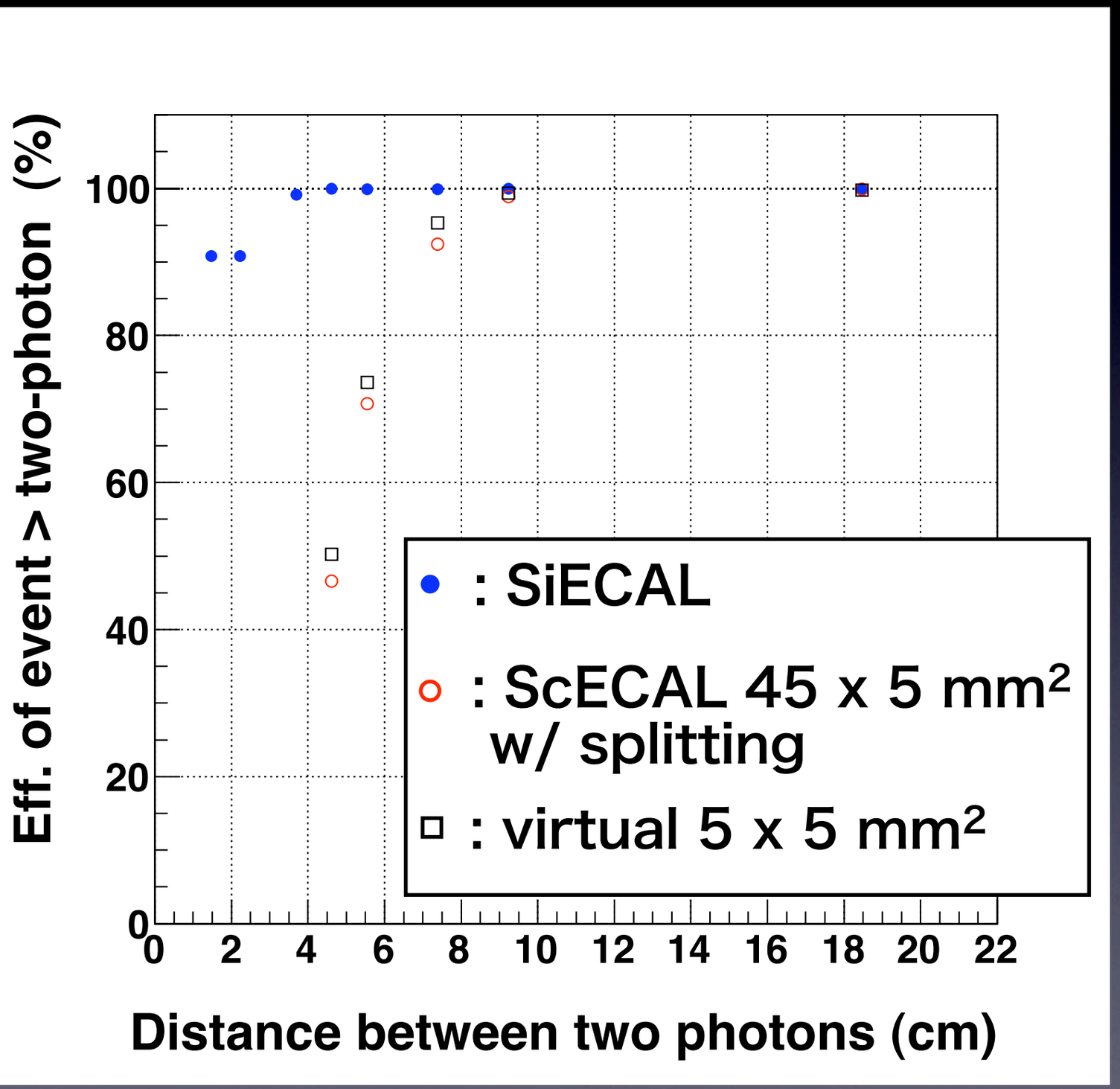
-There is no large differences between SiECAL and ScECAL 45 x 5 mm w/ splitting method, although Enegy resolution of ScECAL is slightly degrades as distance of photons decreases.

Efficiency of two-cluster events for two-photon events



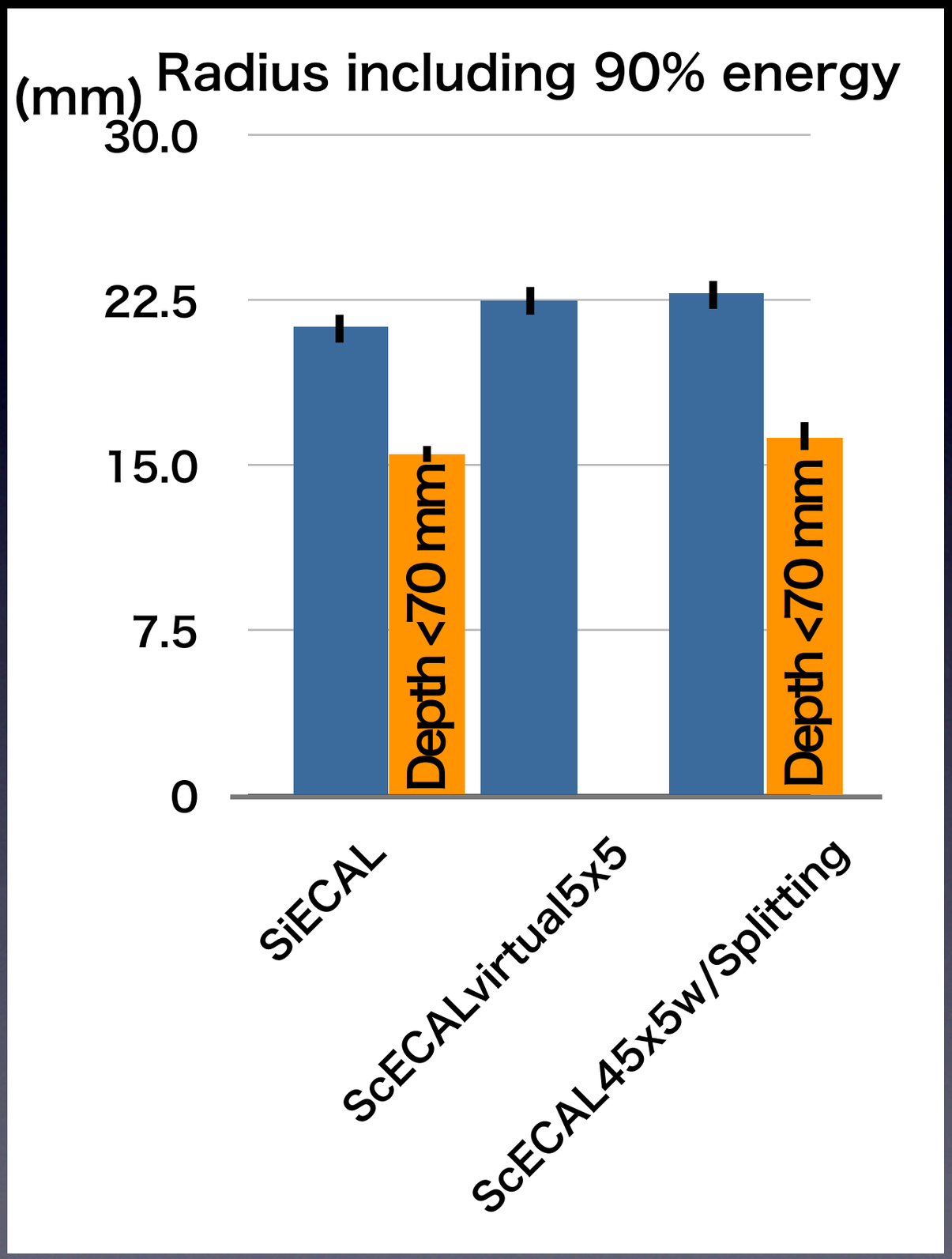
-Most clearly different point between Si and ScEcal is efficiency of two-cluster events.
-When distance of two photons is larger than 6 cm, two-cluster event efficiency by ScECAL is better than SiECAL. However, when the distance becomes smaller than 7 cm, the two-cluster event efficiency of ScECAL steeply drops down.

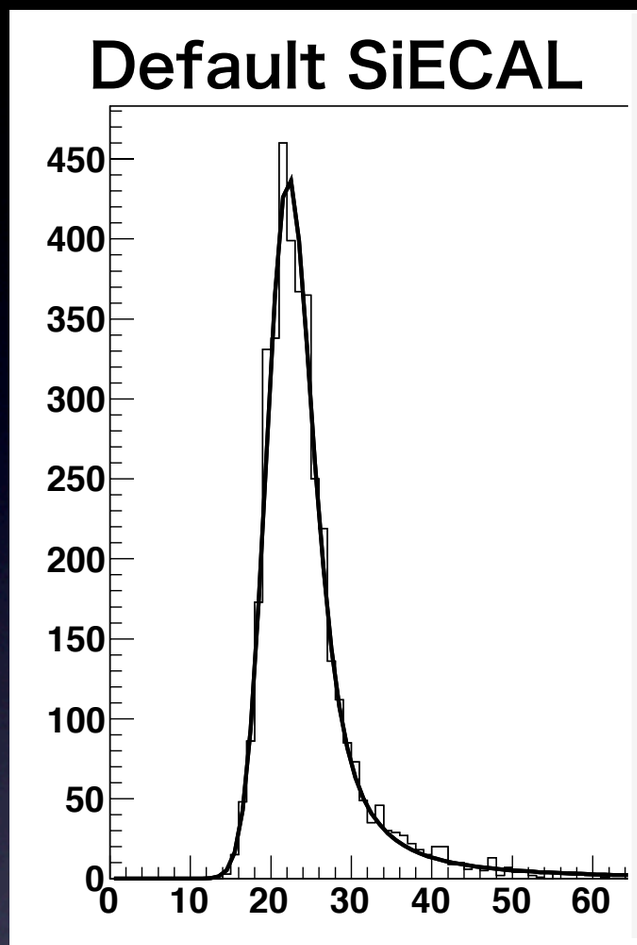
Efficiency of events having more than 2 clusters.

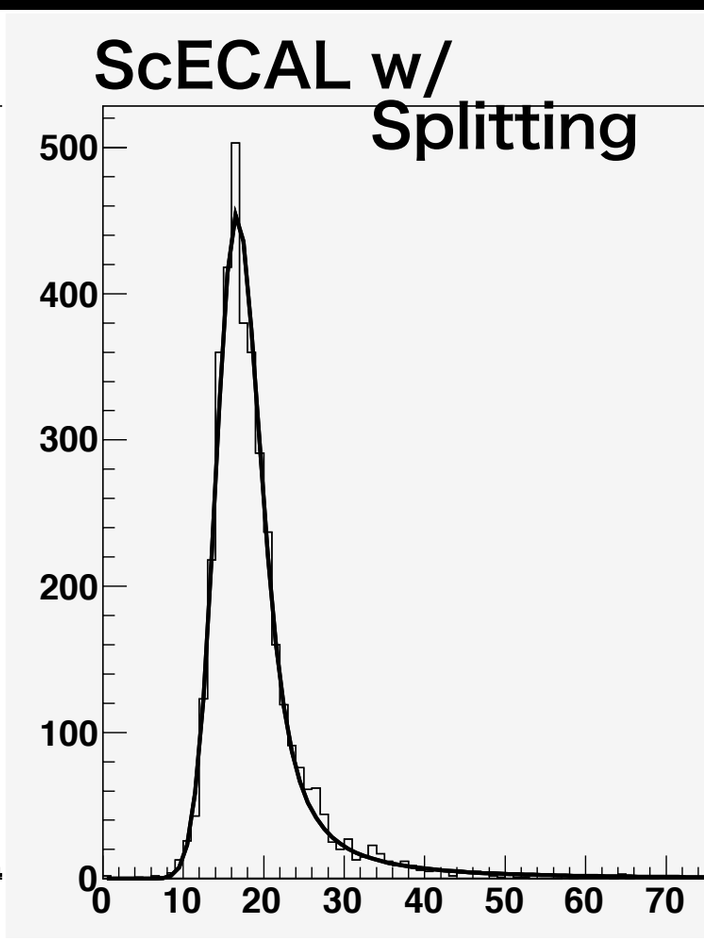


-SiECAL does not have one-cluster events with two photon distance greater than 3 cm and many 3 cluster events. This means that SiECAL is tuned to have higher sensitivity toward cluster separation.... although I used same analysis code....?

Moliere radius of 10 GeV in ECAL







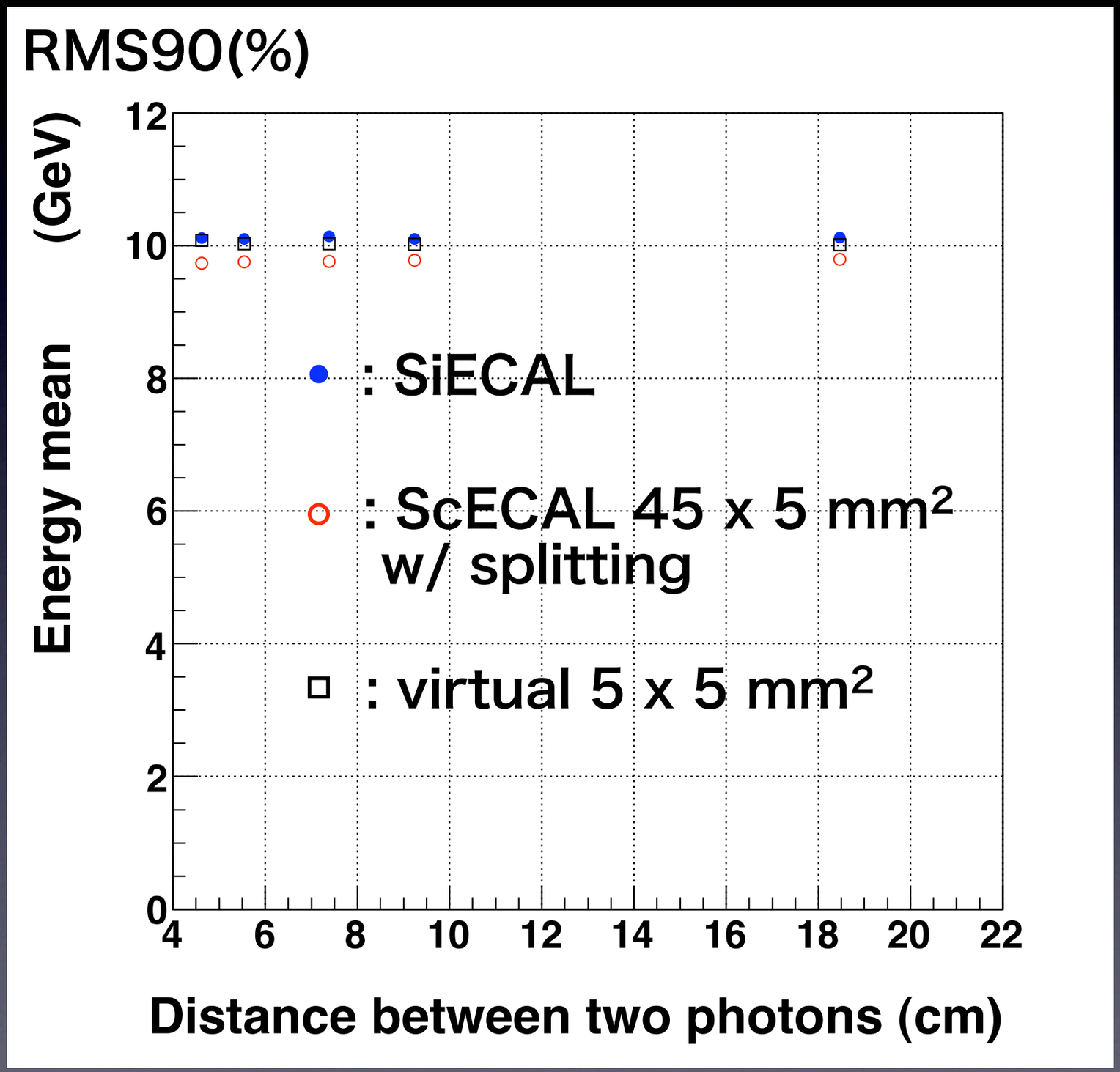
Radius including 90% energy (mm)

-MPV of Landau-gaussian fit to cluster radius including 90% energy is not so different between SiECAL and ScECAL

Summary

- Crosscheck for IWLC results have been partially done.
  - Strip-Splitting for 45 x 5 mm^2 ScECAL with latest mokka and Daniel's code made similar performance to my code.
- Difference between SiECAL and ScECAL still remains.
  - SiECAL and ScECAL do not have large difference of the energy resolution of 10 GeV photon from each other.
  - also cluster radius..
  - But ... Large difference of two cluster separation between Si and ScECAL despite using common cell size (5 x 5 mm).
  - I am seeking cause of this difference.

Mean values of 10 GeV two photon events



-45 x 5 mm2 ScECAL made a little smaller mean value than virtual 5 x 5 mm cell ScECAL. This can be improved by tuning of sensitivity