Some progresses of SSA study

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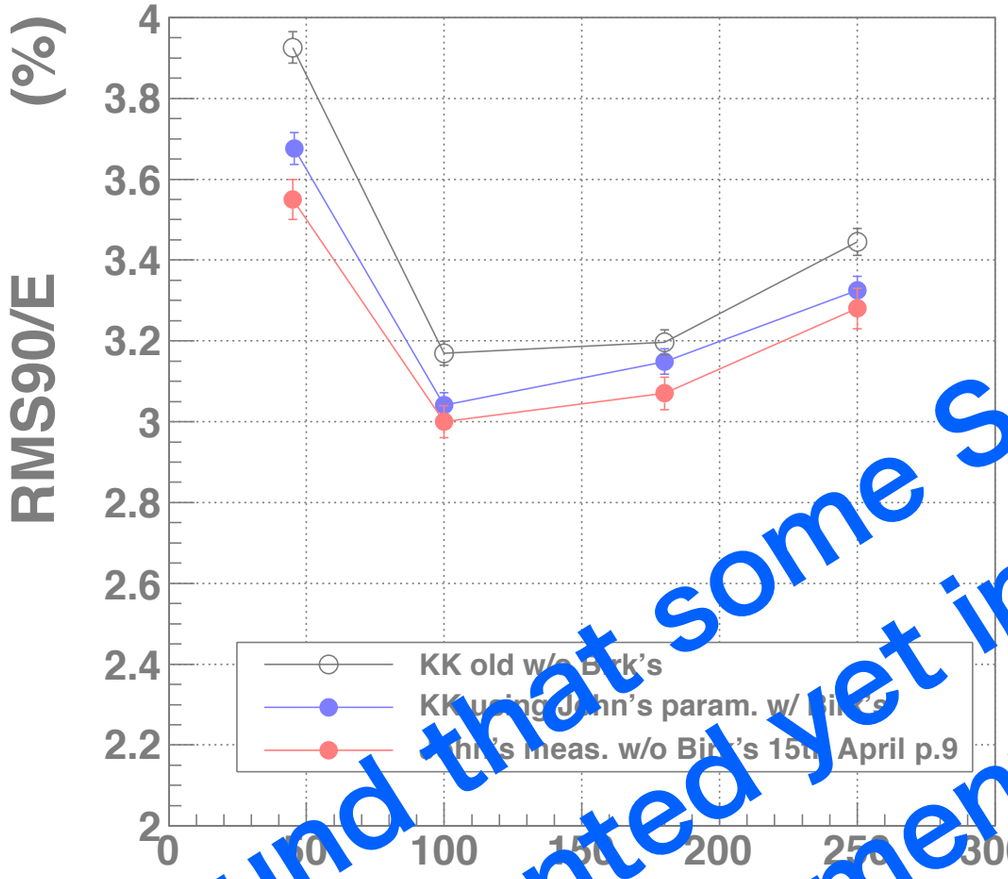
For Physics-Software meeting of ILD-Asia

uds jet energy: 5 x 5 x 2 mm³ Sc

Last meeting

Resolution



Conditions

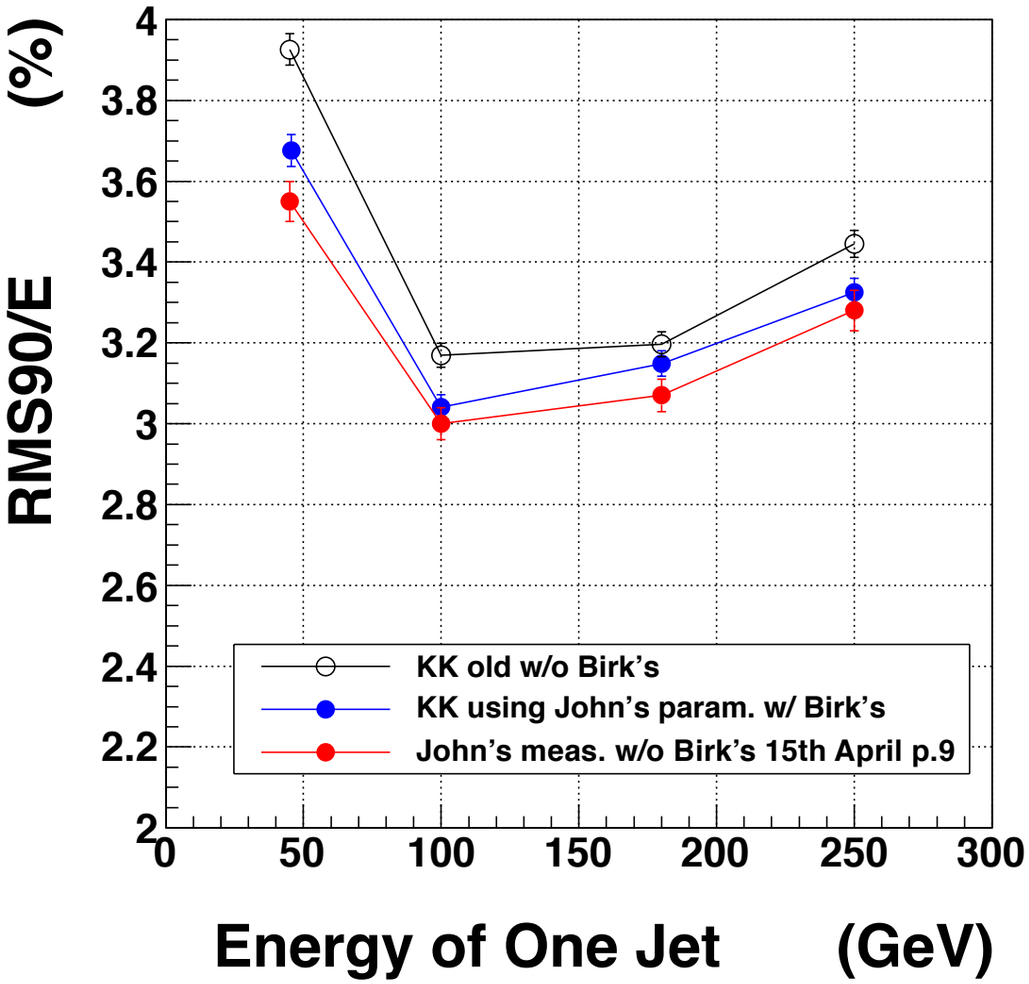
- Marlin: ilcsoft v01-16-02
- Mokka: ilcsoft v01-16-02 rev 441, SFcal05
- CalibEcal: tuned toward RMS90 mean of 10 GeV photons x 1.023
- ECalScToHad: 1.378
- ECalScToEM: 1.020
- ECALTimeWindowMax: 20.0 ns
- HCALTimeWindowMax:1000000 ns

I found that some ScECAL issues were not implemented yet in v01-16-02 (maybe my misunderstanding)
Now I implemented them and re-analyses are on going

- JER is improved than previous my result w/o Birk's law.
- Even with Birk's law, jet energy resolution by myself degrades than John's result w/o Birk's law

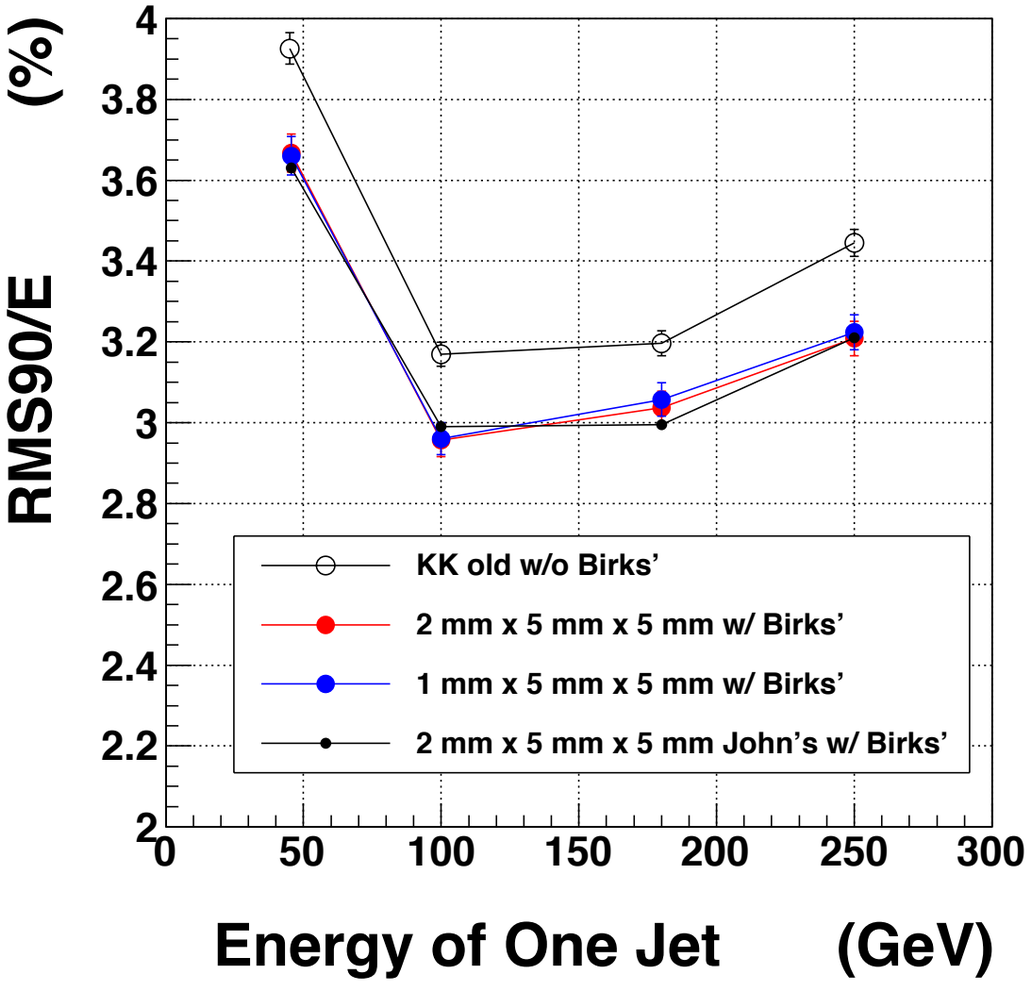
uds jet energy: 5 x 5 x 2 mm³ Sc

Resolution



uds jet energy: 5 x 5 x 2 mm³ Sc

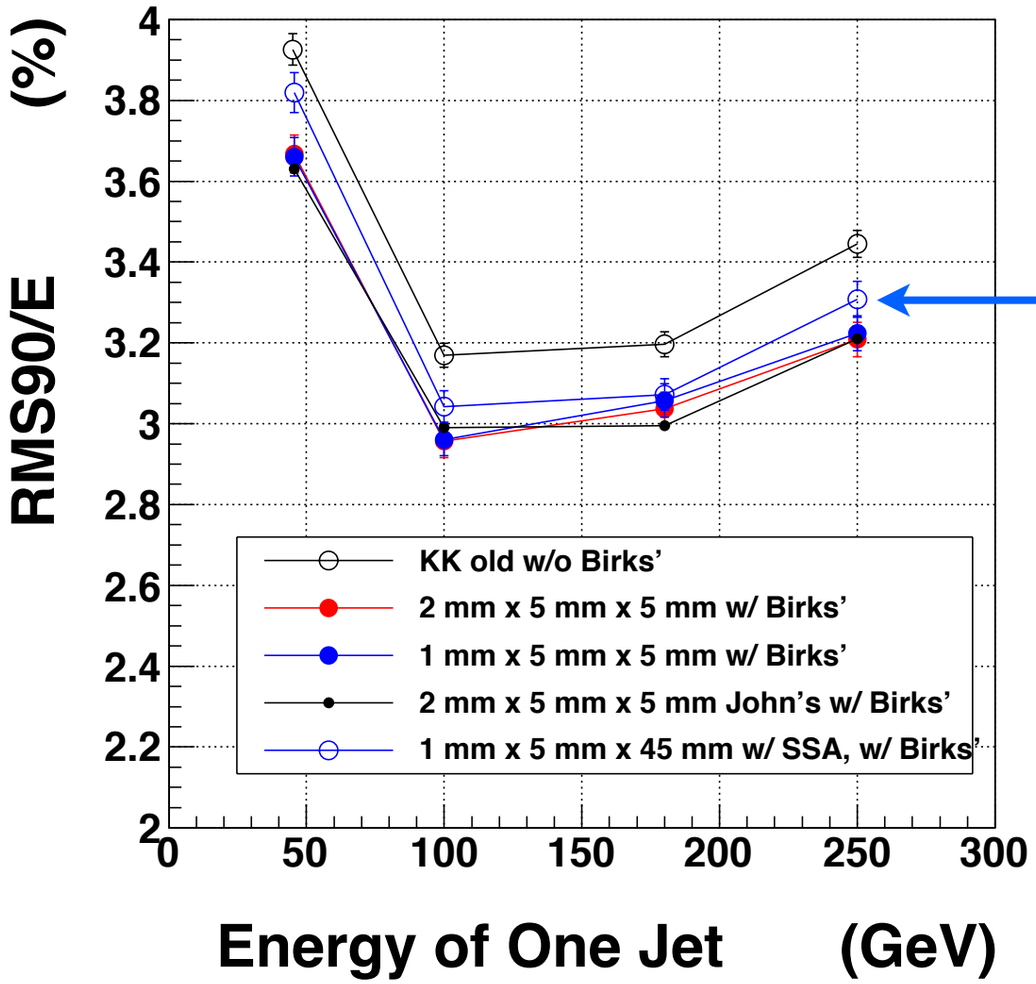
Resolution



- ScECAL issues were implemented in v01-16-02 and Hcal Ring gap problem in ILDCaloDigi which found by John Marshall was fixed.
- good jet energy resolution with both 1 mm and 2 mm thick scintillator tile layers.

uds jet energy: 45 x 5 mm² Sc

Resolution

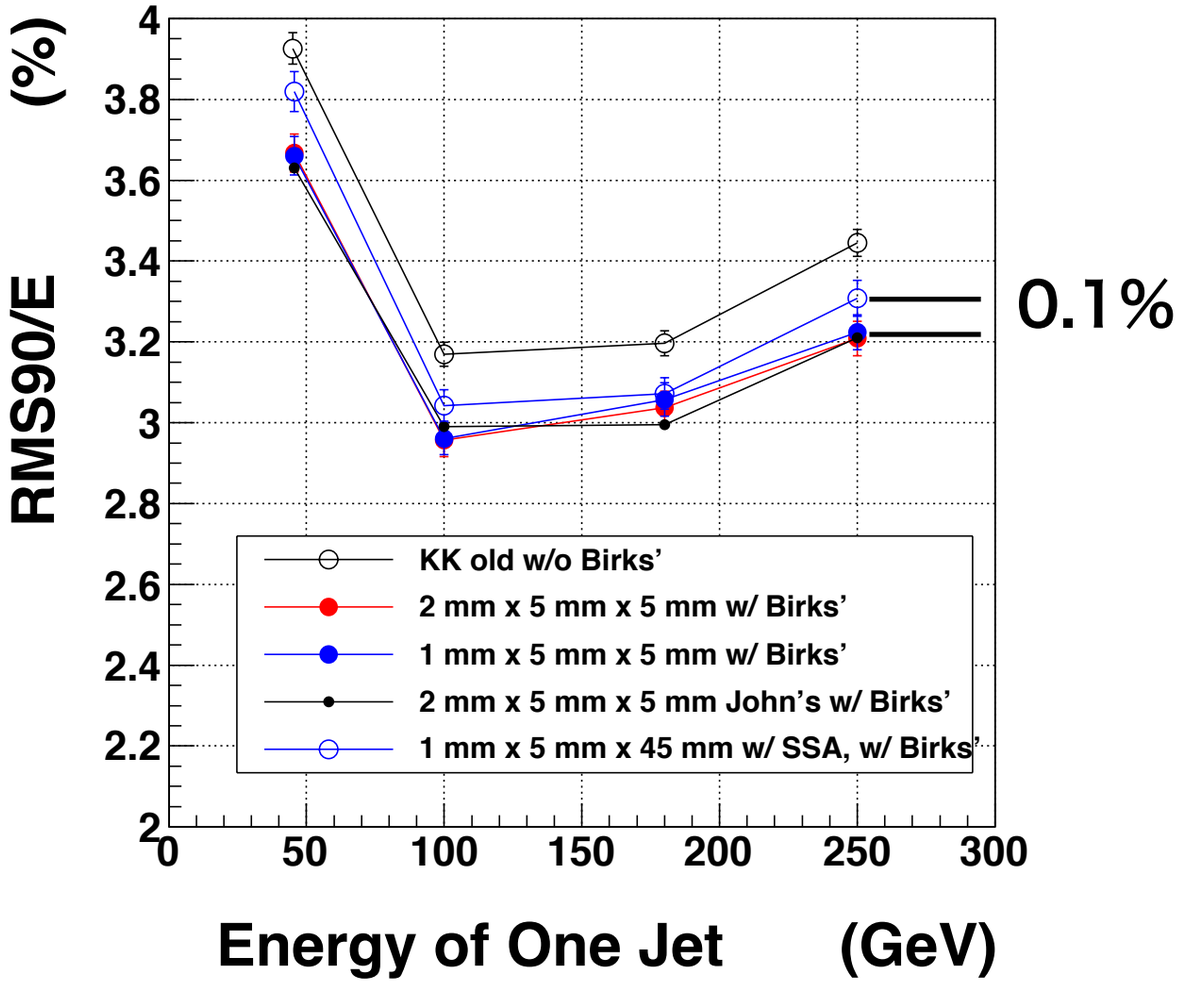


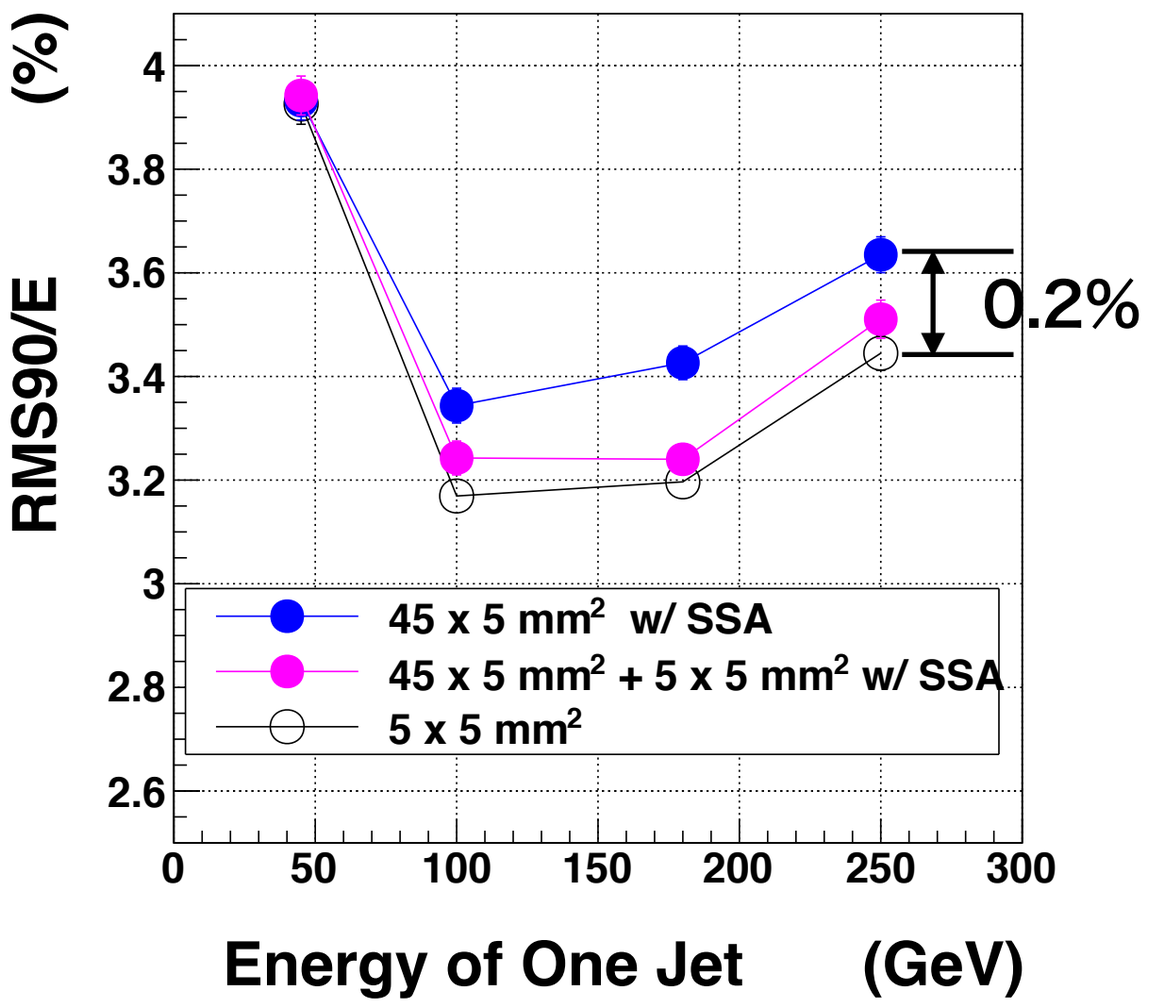
← 45 x 5 x 1 mm³ w/ SSA

- 45 mm x 5 mm x 1 mm strip based ScECAL also has good energy resolution without so large degrading from 5 mm x 5 mm ScECAL .

uds jet energy: 45 x 5 x 2 mm³ Sc

Resolution





- 45 mm x 5 mm x 1 mm strip based ScECAL also has good energy resolution without so large degrading from 5 mm x 5 mm ScECAL .
- Comparing with previous my result, degrading ratio of JER with SSA from 5x5 mm² tile is reduced with factor of 2.

←Calibration toward strip ECAL with SSA

Summary and plan

- 45 x 5 mm^2 strip ScECAL with SSA has almost similar energy resolution for z->q qbar (uds) events up to 500 GeV center of mass energy to the case of 5 x 5 mm^2 tile ScECAL
- Absolute difference of energy resolution (σ/E) between them is 0.1%.
- Plan
  - is this kept until 1 TeV center of mass energy?
    - go to study with higher energy jet.
  - a small difference with SiECAL at 500 GeV center of mass even with tile ScECAL.

    → John has shown the stand alone photon clustering can remove this→ I will try it.
- It's already shown that particle separations are not different in both tile ScECAL and strip ScECAL with SSA except 10 - 20 mm particle distance.

  → Is this reasonable? → See MC true
- Distribute this analysis parameters to
  - Study of Hybrid ECAL, Study of tau decay. ...