Logaritmic Binning and Energy Steps

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Where were we?



- Using uniform random seeding
- Uniform timebinning 8 ns
- Energy resolution not good

Try using Logarithmic Binning

- Energy scans
 - Truth = 50 GeV
- Using Log-binning along with increased oversampling minimizes fluctuations in LLH landscape for energy.
- Oversampling 1000 chosen for ongoing reconstructions



Changing the seed to a more realistic scenario (1/4)

- Using COG as seed for x,y,z
- Using linefit \rightarrow SPE fit for angles
- Scaling number of pulses with appropriate factor for 50 GeV electron. (This will be changed late to a more general scaling)

Changing the seed to a more realistic scenario (2/4)

- Seed distributions only using linefit as angular seed to test is good enough since SPE fits extend computational time
- Zenith is seeding 0.5 rad away from truth
- Other parameters looks okay (Energy very good but specific factor used for a 50GeV electron)



testing realistic seed with line fit

Changing the seed to a more realistic scenario (3/4)

- Adding SPE fit with 11 iterations
- Zenith is seeding better than before but 10 times more calculation time
- Other parameters looks okay (Energy very good but specific factor used for a 50GeV electron)



testing realistic seed with SPE fit (11 iterations)

Changing the seed to a more realistic scenario (4/4)

- Adding SPE fit with only 1 iterations
- Basically the same as using 11 iterations so this is preferred going forward
- Other parameters looks okay (Energy very good but specific factor used for a 50GeV electron)



testing realistic seed with SPE fit (1 iteration)

Recoing with the new seed (1/2)

- Reconstruction made using logbinning, oversampling 1000 and uniform random seed
- Not so good with random seed
- Comparable to os 100 uniform binning ☺



Recoing with the new seed (2/2)

- Reconstruction made using logbinning, oversampling 1000 and the more realistic seeding
- How is the seed influencing the reco? Is it doing better than the seed?



Using 10 GeV Stepsize in energy

- Energy resolution not that good
- The reco has a tendency to overshoot the true energy





- Looking at |recotrue|/|seed-true| if below 1 the reco is closer to truth than the seed
- 16 % of events is recoing better than seed.



Using 5 GeV Stepsize in energy

- Energy resolution better by ~a factor
 2
- The reco still has a tendency to overshoot the true energy
- Looking at |recotrue|/|seed-true| if below 1 the reco is closer to truth than the seed
- 26 % of events is recoing better than seed.



Using 2 GeV Stepsize in energy

- Energy resolution better by ~a factor
 2
- The reco still has a tendency to overshoot the true energy for seed higher that true
- Looking at |recotrue|/|seed-true| if below 1 the reco is closer to truth than the seed
- 53 % of events is recoing better than seed.











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Bonus slides

5GeV step



5GeV step











