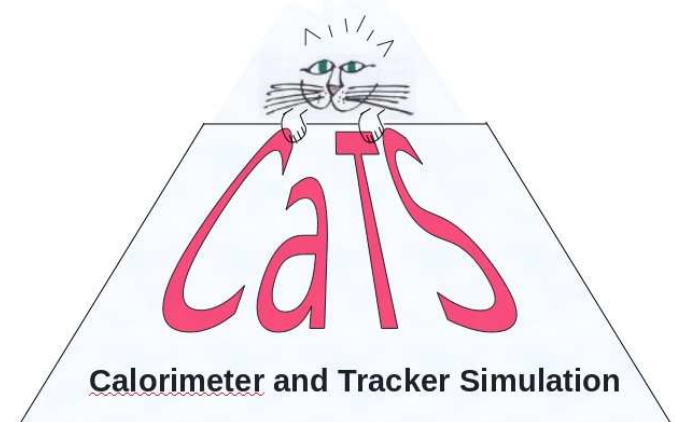


# CaTS and Dual Readout

# CaTS – Calorimeter and Tracker Simulation

- <http://home.fnal.gov/~wenzel/CaTS.html>
- Describe detector in gdml file (xml like)
- Define sensitive detector types
  - TrackerSD(Hit)
  - CalorimeterSD(Hit)
  - DRCalorimeterSD(Hit)  
(Calorimeter + counts produced Cerenkov photons)
  - StoppingCalorimeterSD (kills particle after registering total energy)
  - PhotonSD(Hit): sensitive detector that registers optical photons.



# CaTS - Output

- uses Root reflexion (gccxml) to automatically create dictionaries for all Hit classes to make the Hits persistent and stores the result in a ROOT file.
- Analysis Module allows output of more specific data that is not contained in the Hits class (generation process, particle types)
- Hits Class contains SD Type, Location + detector specific data

# Tiled Sampling DR Detector

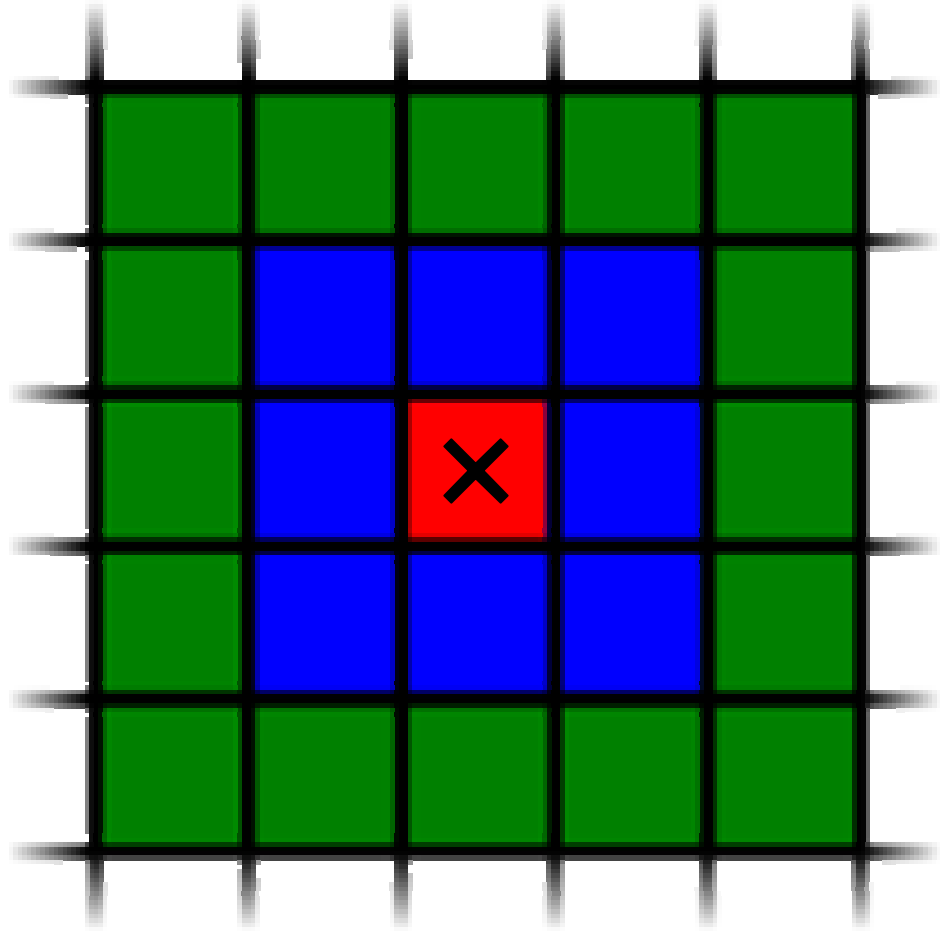
- 1.01m x 1.01m, 1 cm square tiles
- 1.5 m total absorber width (brass)
- 7 mm quartz – DRCalorimeterSD
- 5 mm scintillator – CalorimeterSD

# Ring Definition

- Test Beam Axis

✕

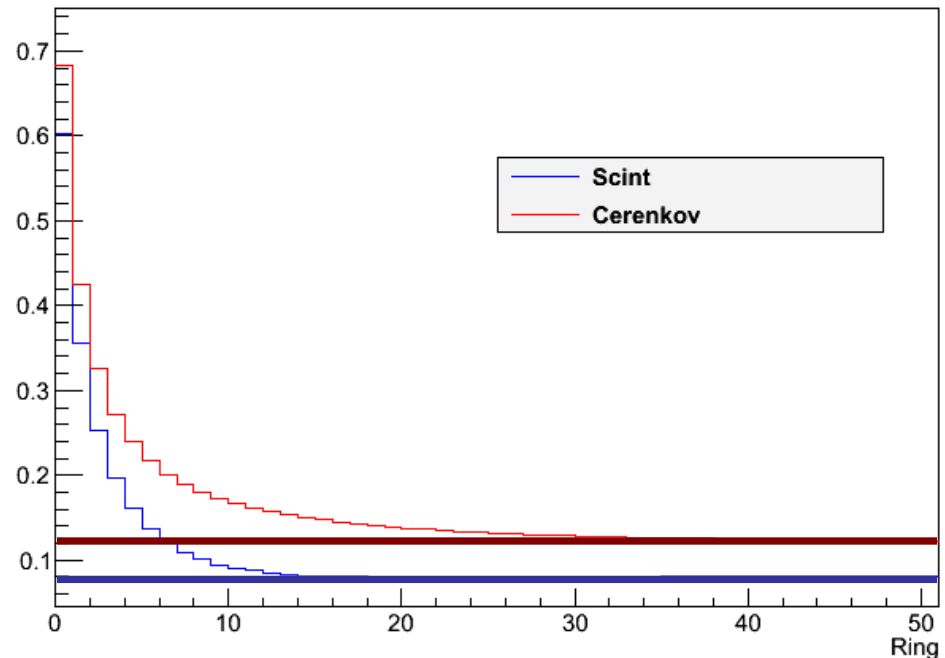
- Ring 0
- Ring 1
- Ring 2
- etc...



# Resolution

For each ring, plotted the standard deviation of the signal over the mean, ignoring anything outside the ring

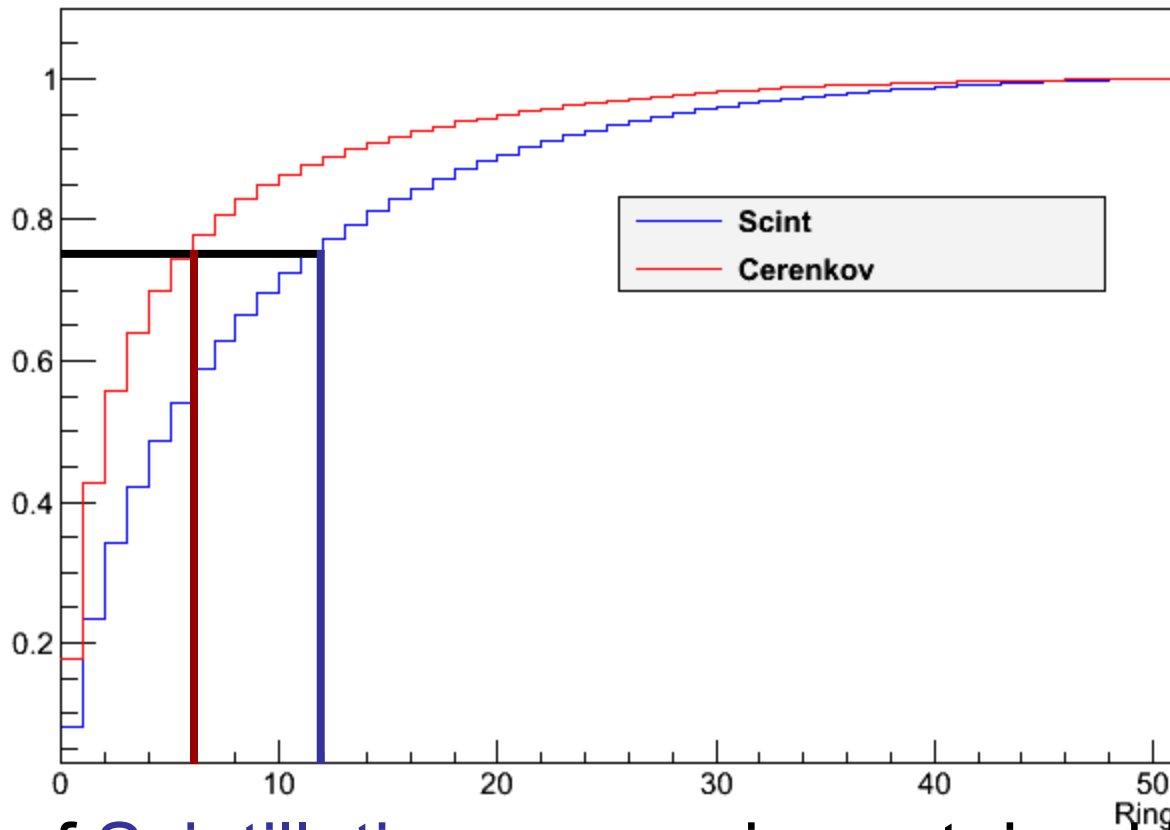
RMS/Mean per ring (Ein 100.00 GeV)



**Cerenkov** approaches 1.2 and **Scintillation** approaches 0.8 much more rapidly

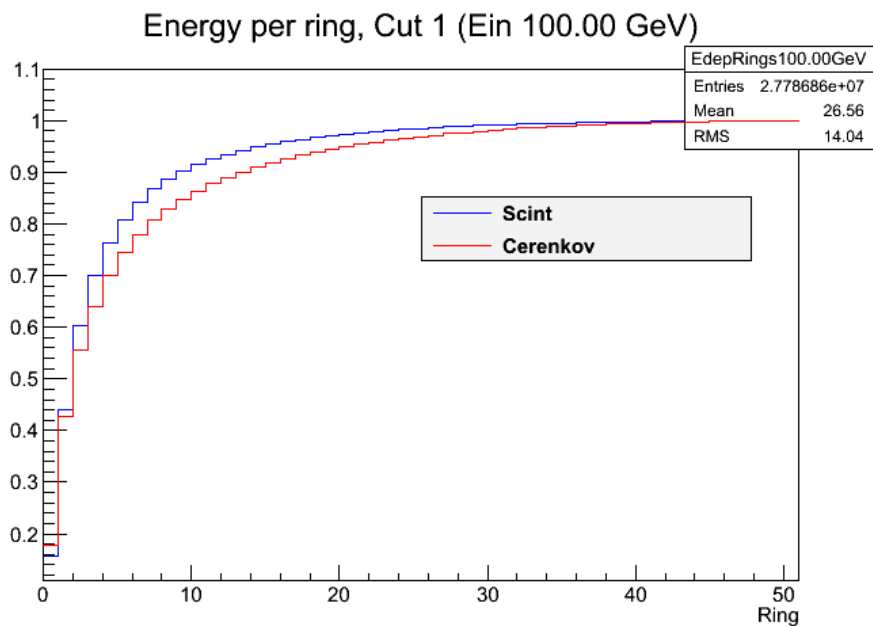
# Radial Profile (% of signal per ring)

Energy per ring (Ein 100.00 GeV)

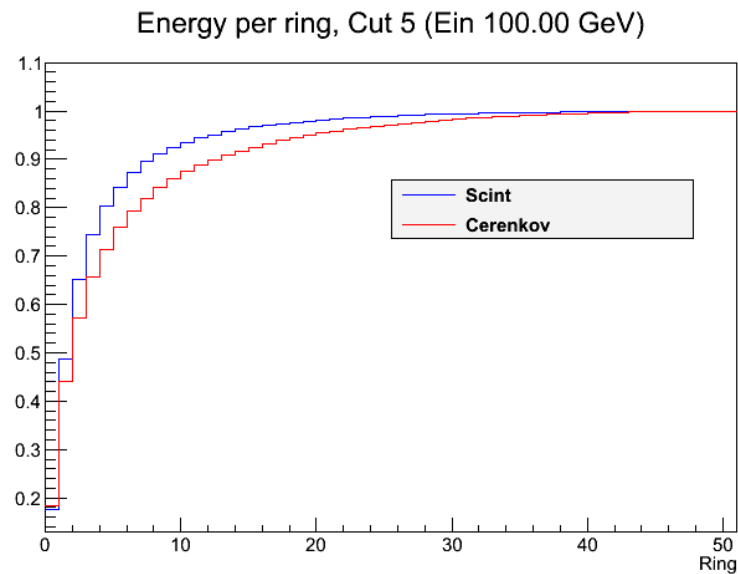


75% of **Scintillation** energy is contained in 12 rings compared to 6 rings for **Cerenkov** light.

# Radial Profile (% of signal per ring)



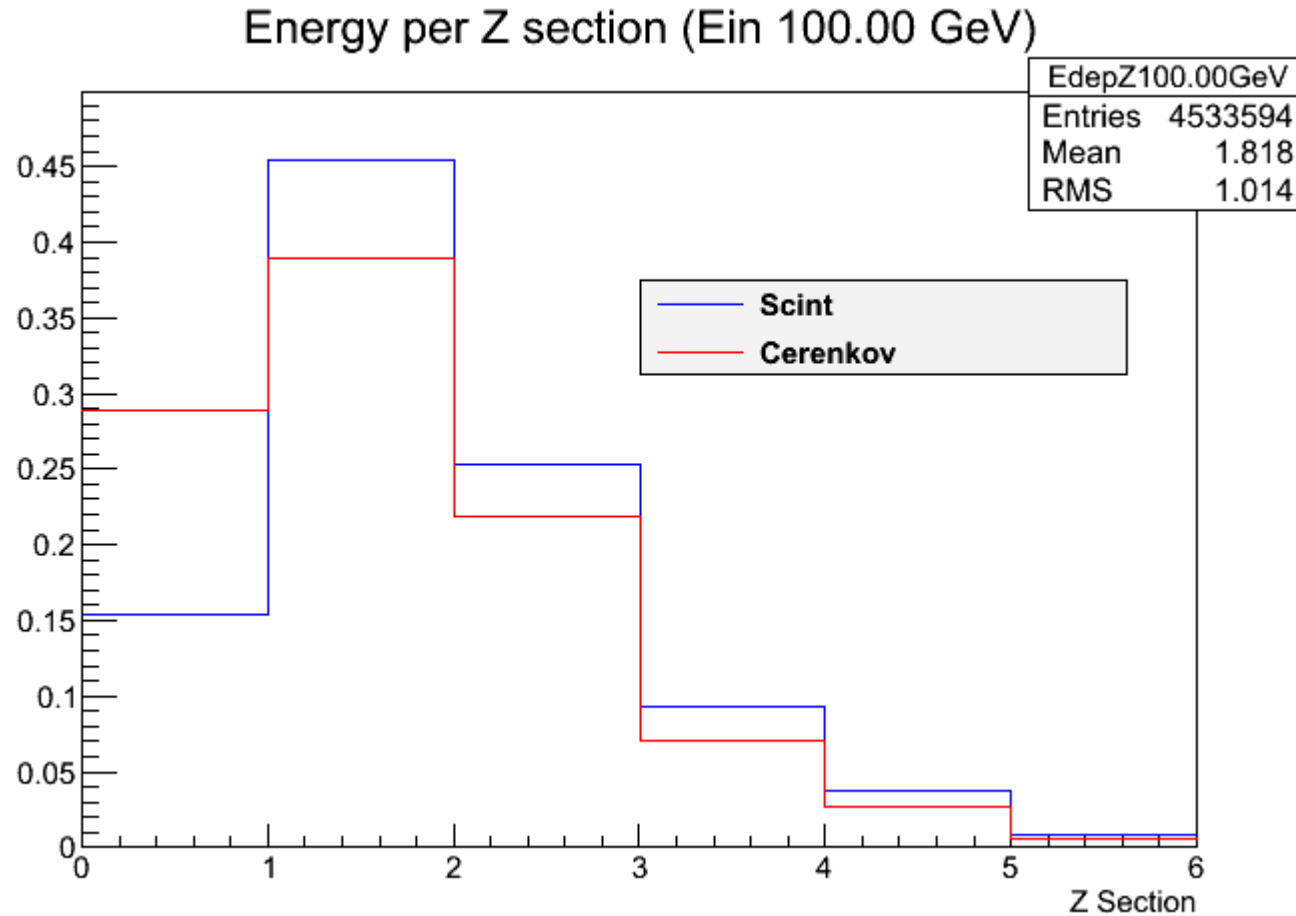
Cut 1 = 10



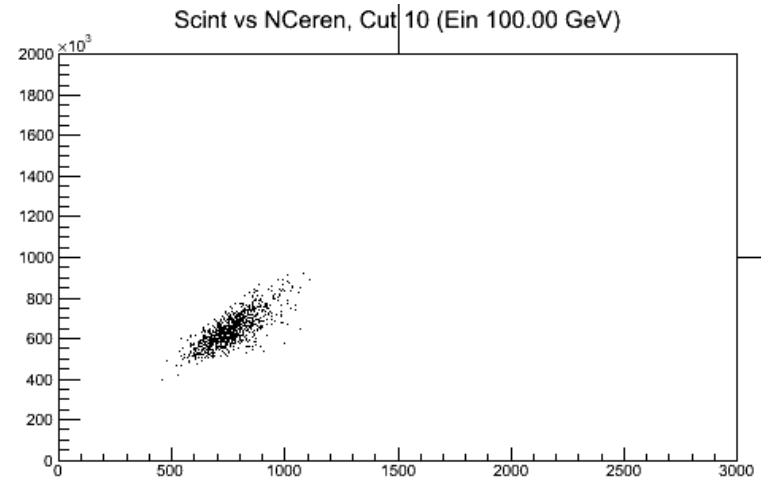
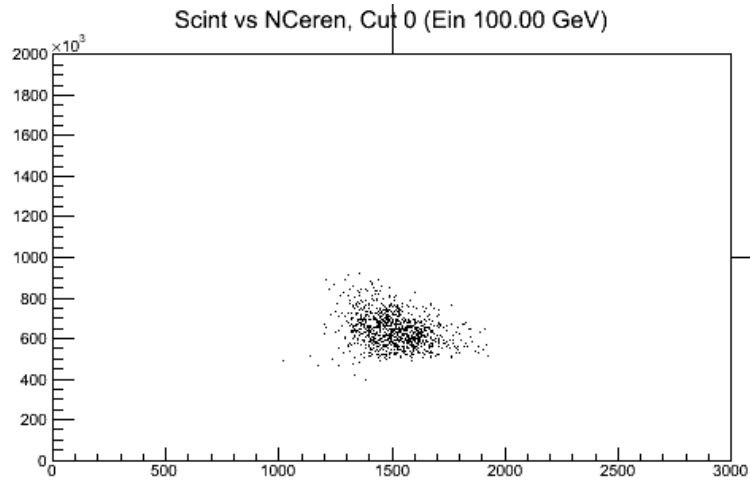
Cut 5 = 200



# Z Profile (% of total signal)

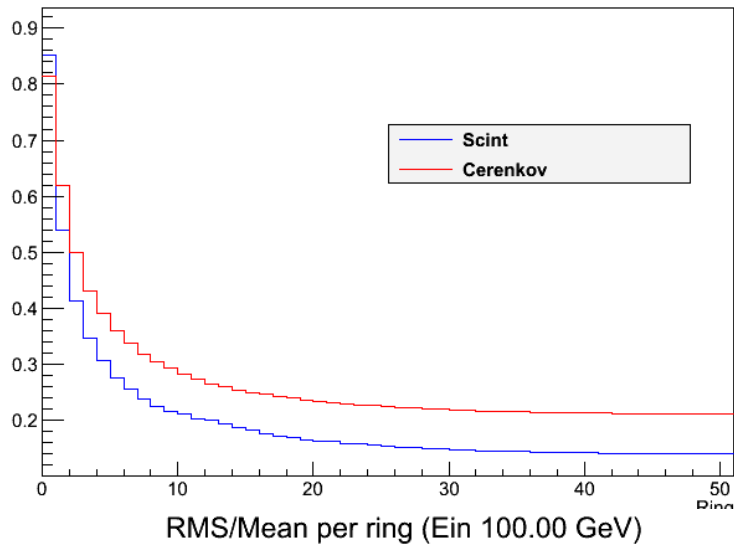


# Scintillation vs Cerenkov

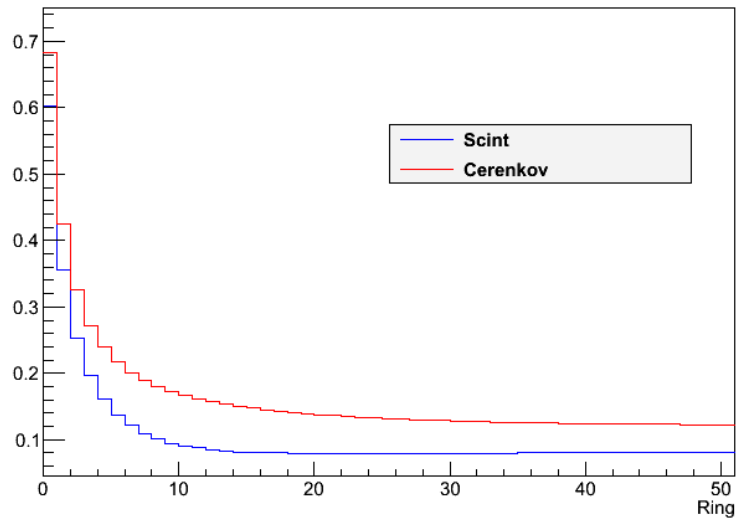


# Resolution at different energies

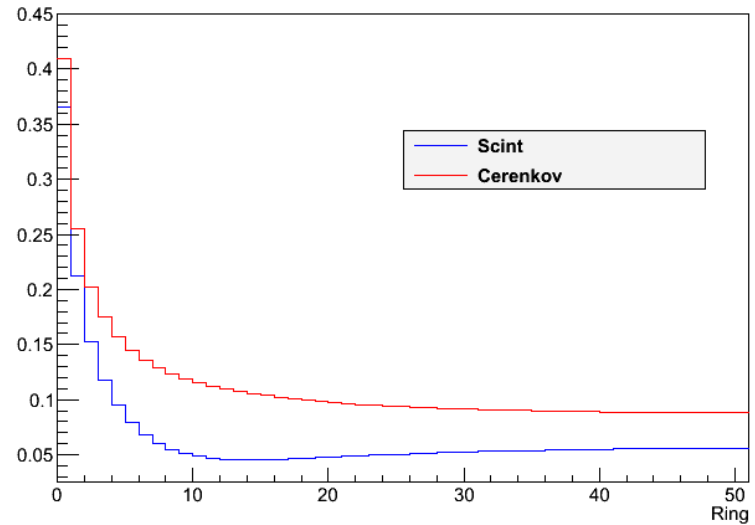
RMS/Mean per ring (Ein 20.00 GeV)



RMS/Mean per ring (Ein 100.00 GeV)

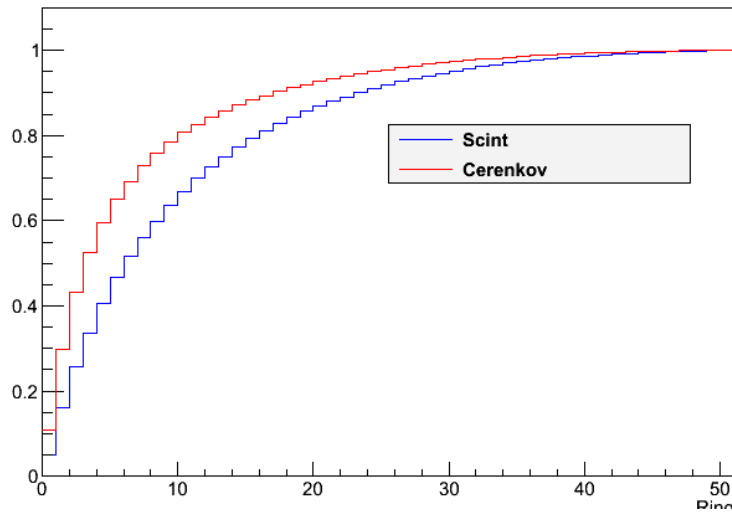


RMS/Mean per ring (Ein 500.00 GeV)

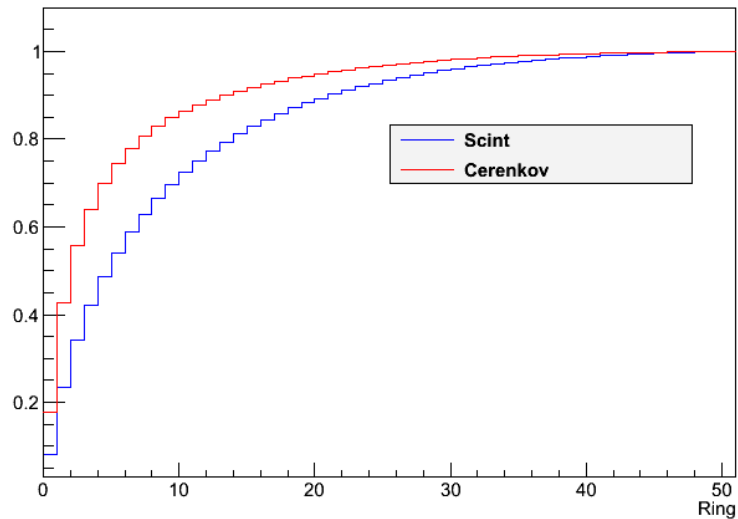


# Radial Profile (% of signal per ring)

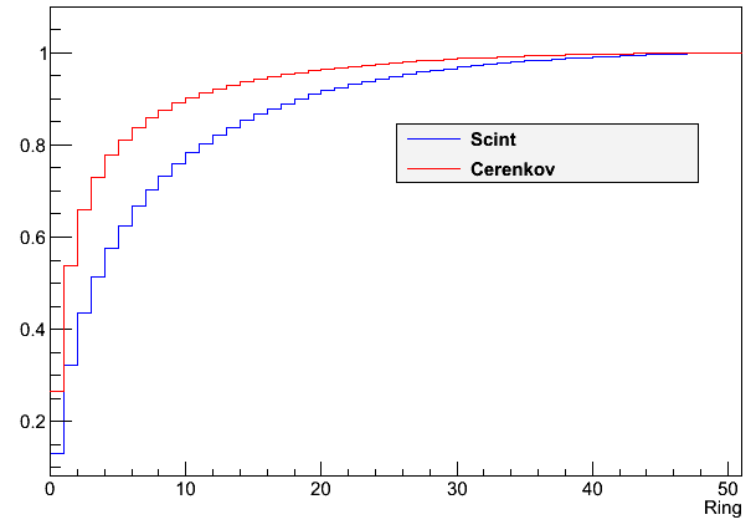
Energy per ring (Ein 20.00 GeV)



Energy per ring (Ein 100.00 GeV)

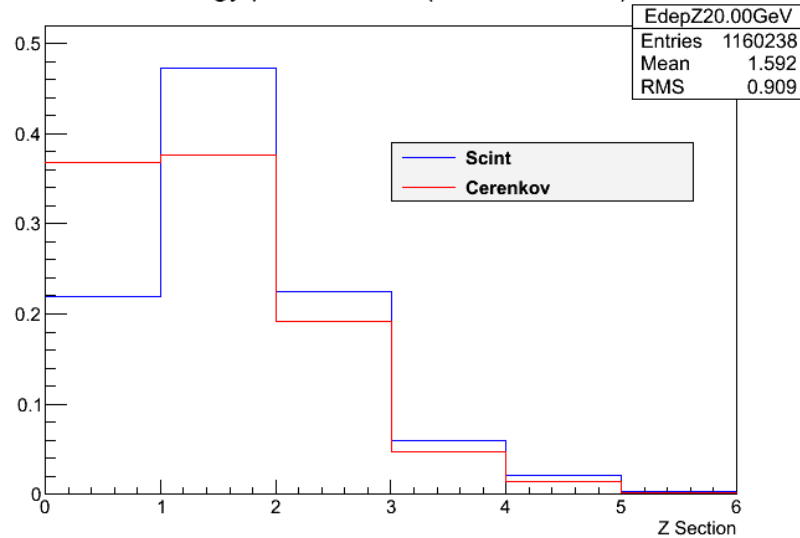


Energy per ring (Ein 500.00 GeV)

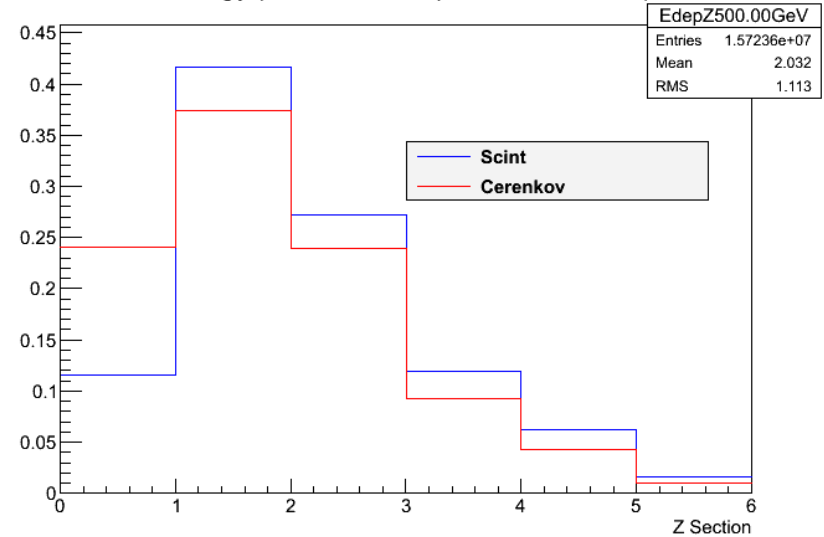


# Z Profile (% of total signal)

Energy per Z section (Ein 20.00 GeV)



Energy per Z section (Ein 500.00 GeV)



Energy per Z section (Ein 100.00 GeV)

