Some AHCAL Plots

November 22, 2010

Energy Weighted Shower Radius & Length

$$cogX = \frac{\sum_i E_i \cdot x_i}{\sum_i E_i} \qquad cogY = \frac{\sum_i E_i \cdot y_i}{\sum_i E_i} \qquad cogZ = \frac{\sum_i E_i \cdot z_i}{\sum_i E_i}$$

$$
\begin{aligned}
r_i &= \sqrt{(x_i - cogX)^2 + (y_i - cogY)^2} \\
<R> &= \frac{\sum_i E_i \cdot r_i}{\sum_i E_i} \\
<R^2> &= \frac{\sum_i E_i \cdot r_i^2}{\sum_i E_i}
\end{aligned}
$$

$$
\begin{aligned}
l_i &= (z_i - cogZ) \\
<L> &= \frac{\sum_i E_i \cdot l_i}{\sum_i E_i} := 0 \\
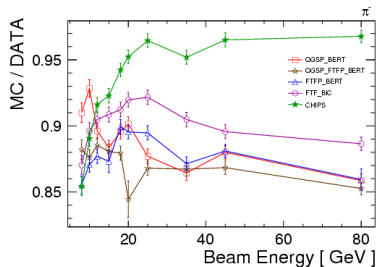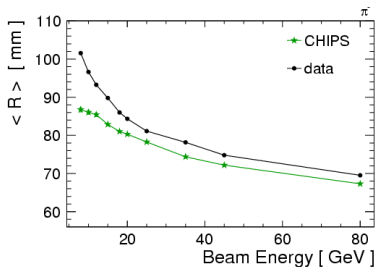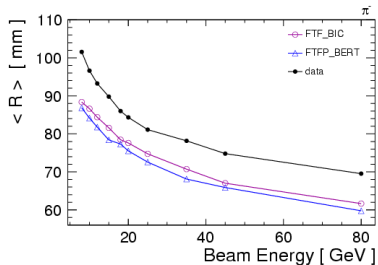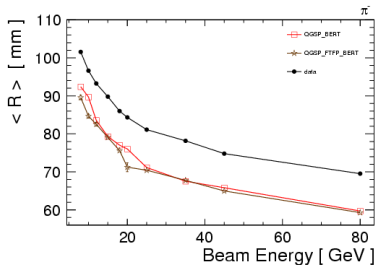<L^2> &= \frac{\sum_i E_i \cdot l_i^2}{\sum_i E_i}
\end{aligned}
$$

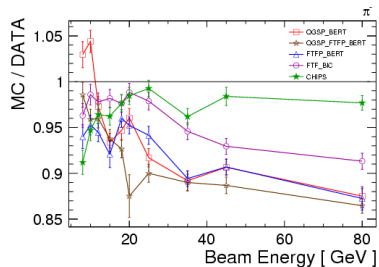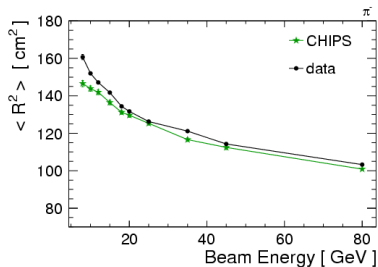# EM Showers, plots by Sergey
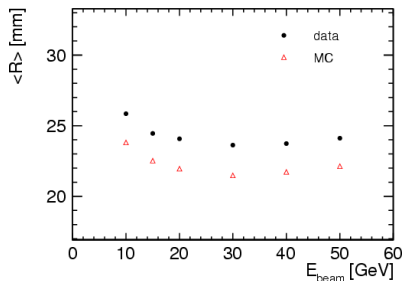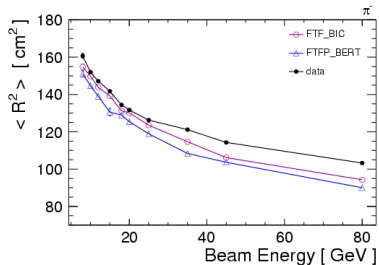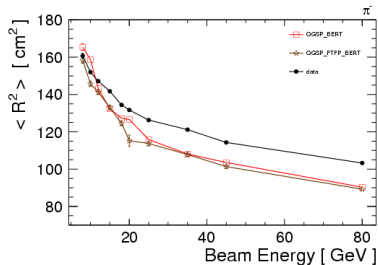

$\approx 8\ \%$ difference between simulation and data
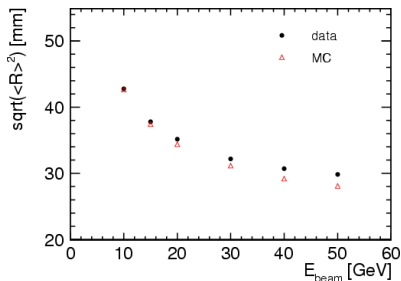
good agreement up to 20 GeV
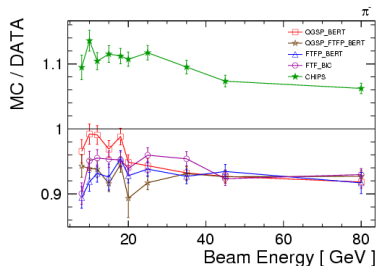≥ 30 GeV, saturation correction comes into play
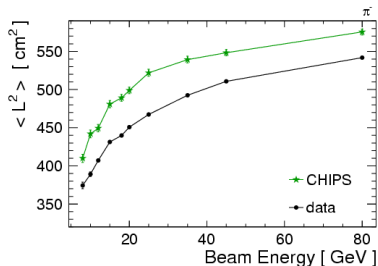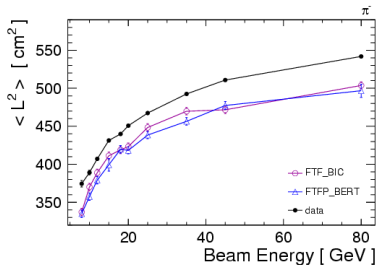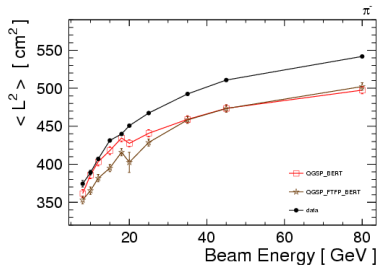$\approx 6.8\ \%$ difference @ 50 GeV

Average shower radius (energy weighted).

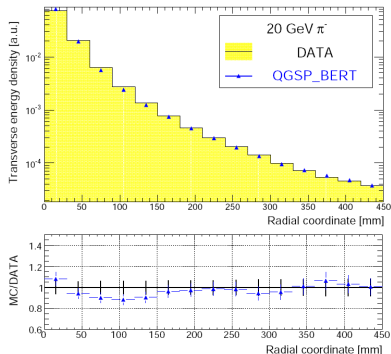# Second moment of shower radius (energy weighted).
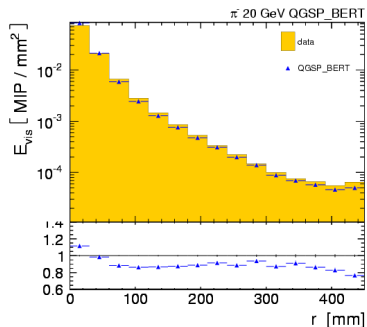
Second moment of shower length (energy weighted).

Transverse Profile, 20 GeV, 3 cm bin size

Position relative to Tracker
Correction for lateral leakage
Smoothening

Position relative to COG
No leakage correction
No Smoothening

Latest plot shown by Angela
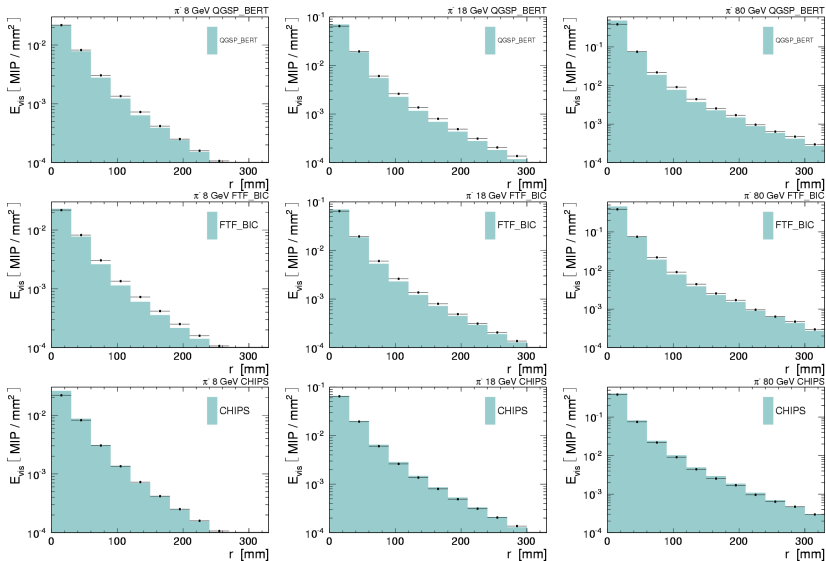
More similar to ECAL plots

Figure: Transverse shower profile for 8, 18 and 80 GeV pions. The error bars include the statistical uncertainty.