

Energy and direction reconstruction above 5 GeV

Simulated files with fixed energy
(5, 10, 20, 30, 40, 50 GeV)
and fixed incoming angle
(0, 10, 20, 30, 40, 50, 60 deg)

with the following source options:

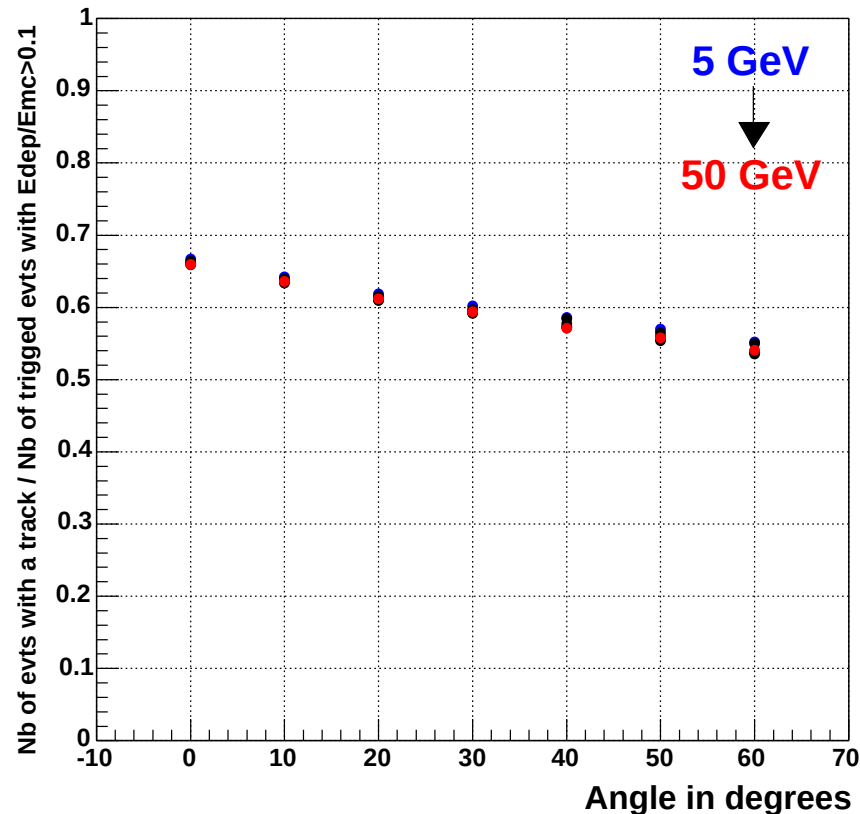
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solid angle mincos=0.500000 maxcos=0.500000  
theta=0 phi=0
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Is that really correct ?

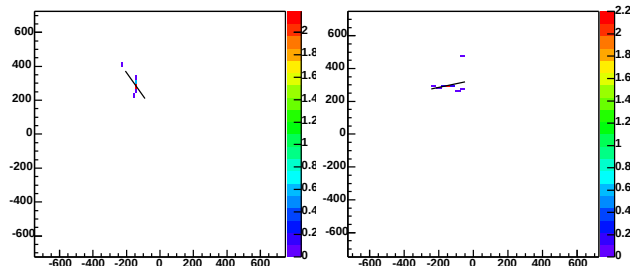
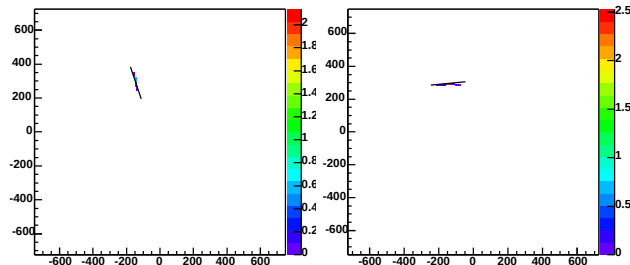
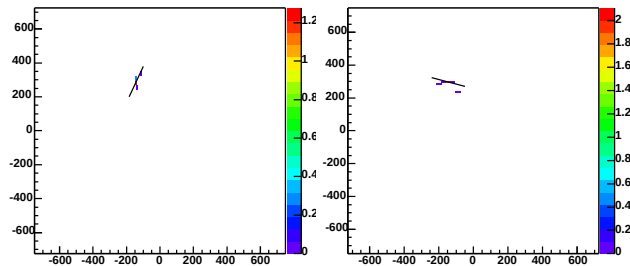
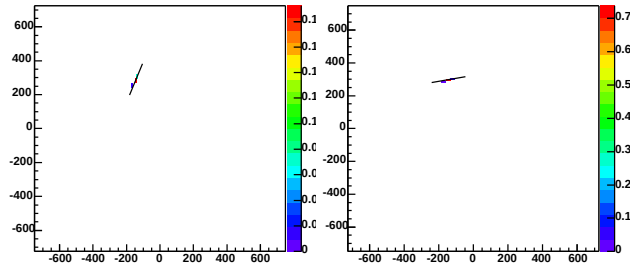
(i.e. do I need to increase the beam radius
when increasing the incoming angle ?)

Probability of reconstructing a track

Considering only events with $E_{deposited}/E_{MC} > 0.1$
 $\Rightarrow$ 35 to 45% of the events with no track



Direction reconstruction



in each plane :
the information on the “log-direction”
is coarser than in the “light-tapering”
direction

I determine the barycenter in each
plane and the second moments give a
line

Direction reconstruction

I use TMinuit to reconstruct the direction with 4 parameters:
 (x_0, y_0) at $z = \text{start of calo}$ and (x_1, y_1) at $z = \text{end of calo}$

minimizing $\sum_{layers} d_i^2 \times E_i$

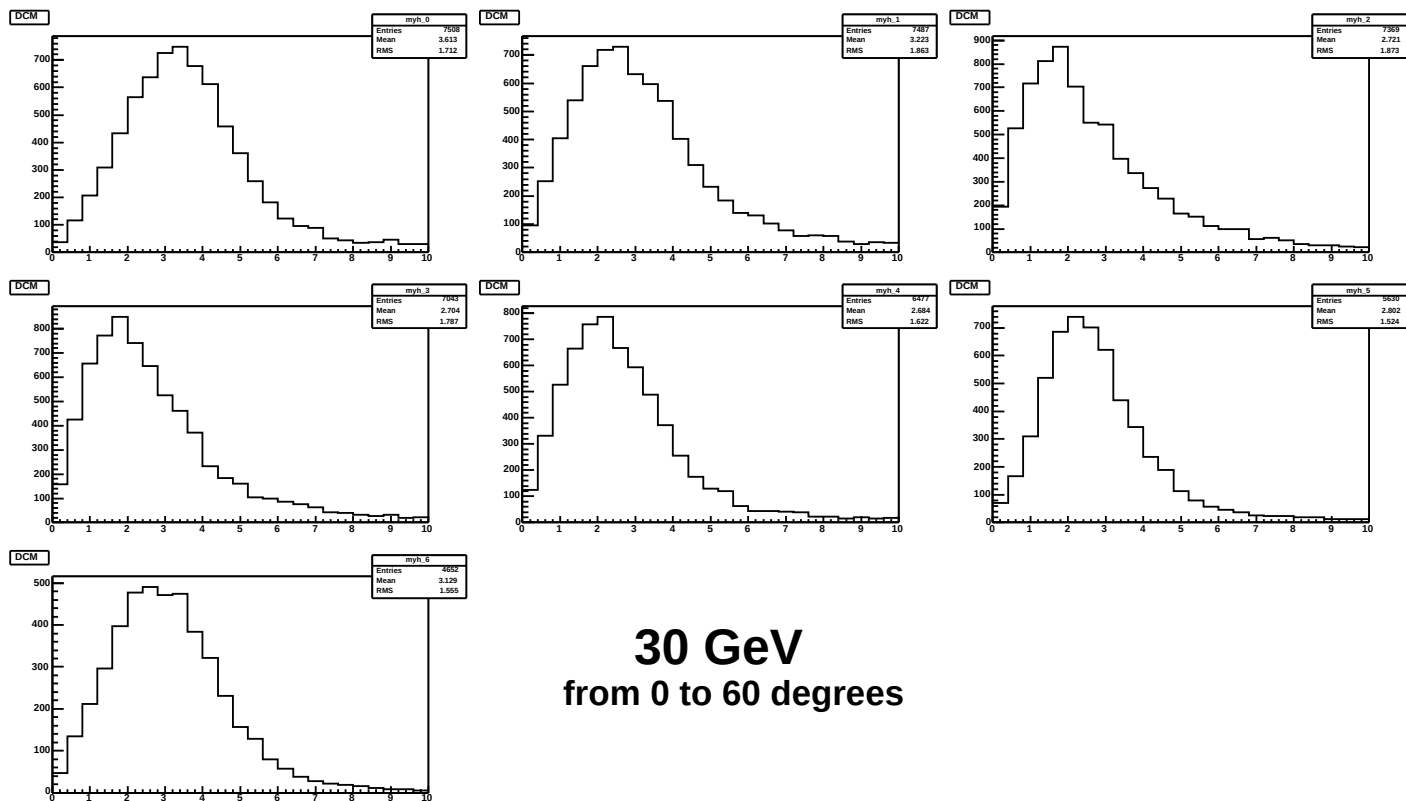
where d_i is the distance of the trajectory to the barycenter (or the line) in the i^{th} layer computed at z_i

where z_i is the z layer position, modified by taking into account the derivative of the energy deposition along the layers

$\Rightarrow$ the barycenter of the shower (CalP) is the point of the trajectory of the most energetic layer

Direction reconstruction

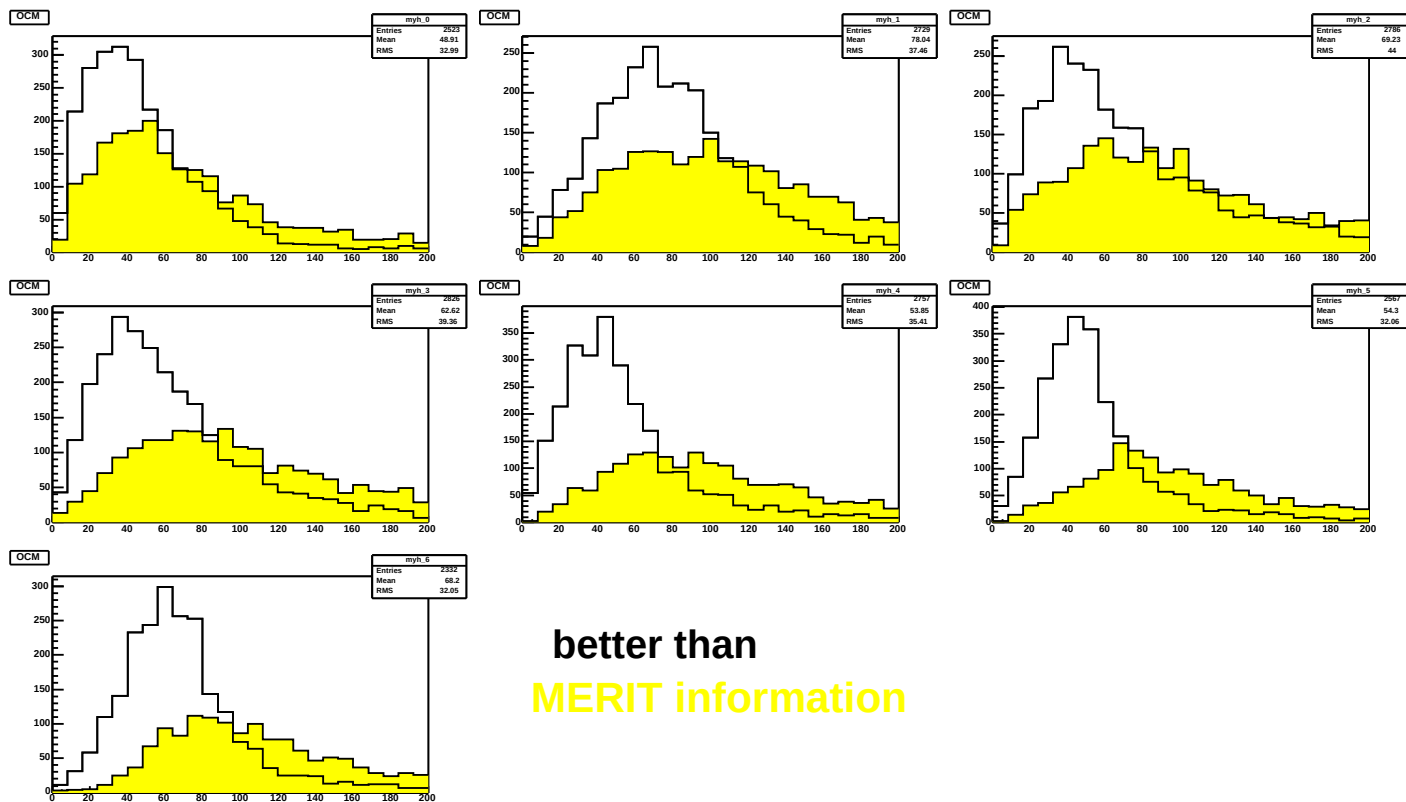
Distance of CalP to the true direction in mm



Even better when there is a track : helps to improve the tracker reconstruction

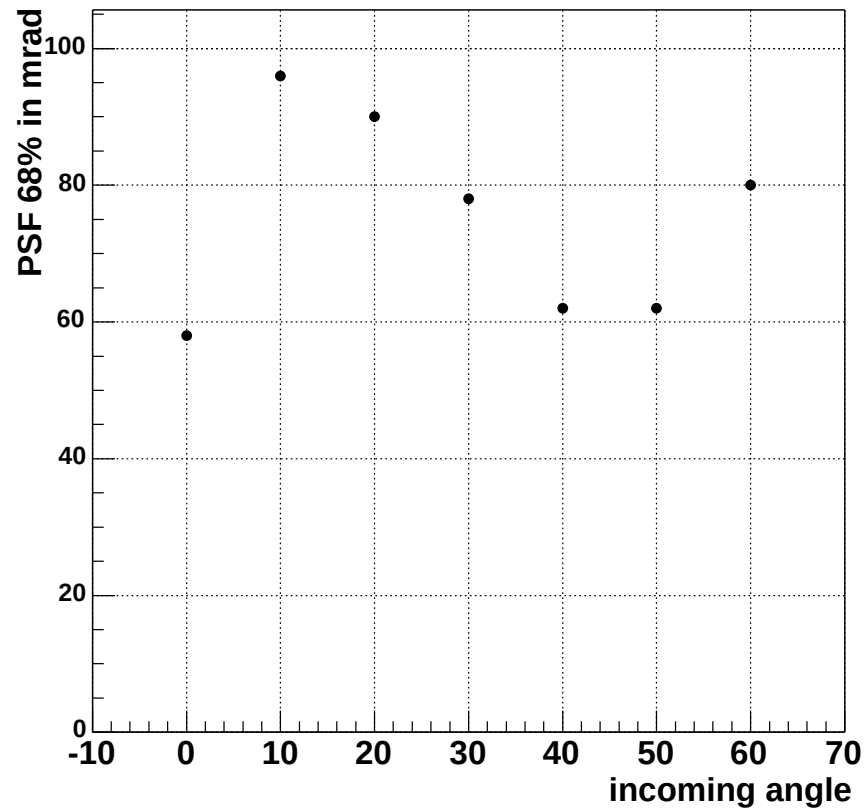
Direction reconstruction

Open angle between Cal direction and MC direction when no track



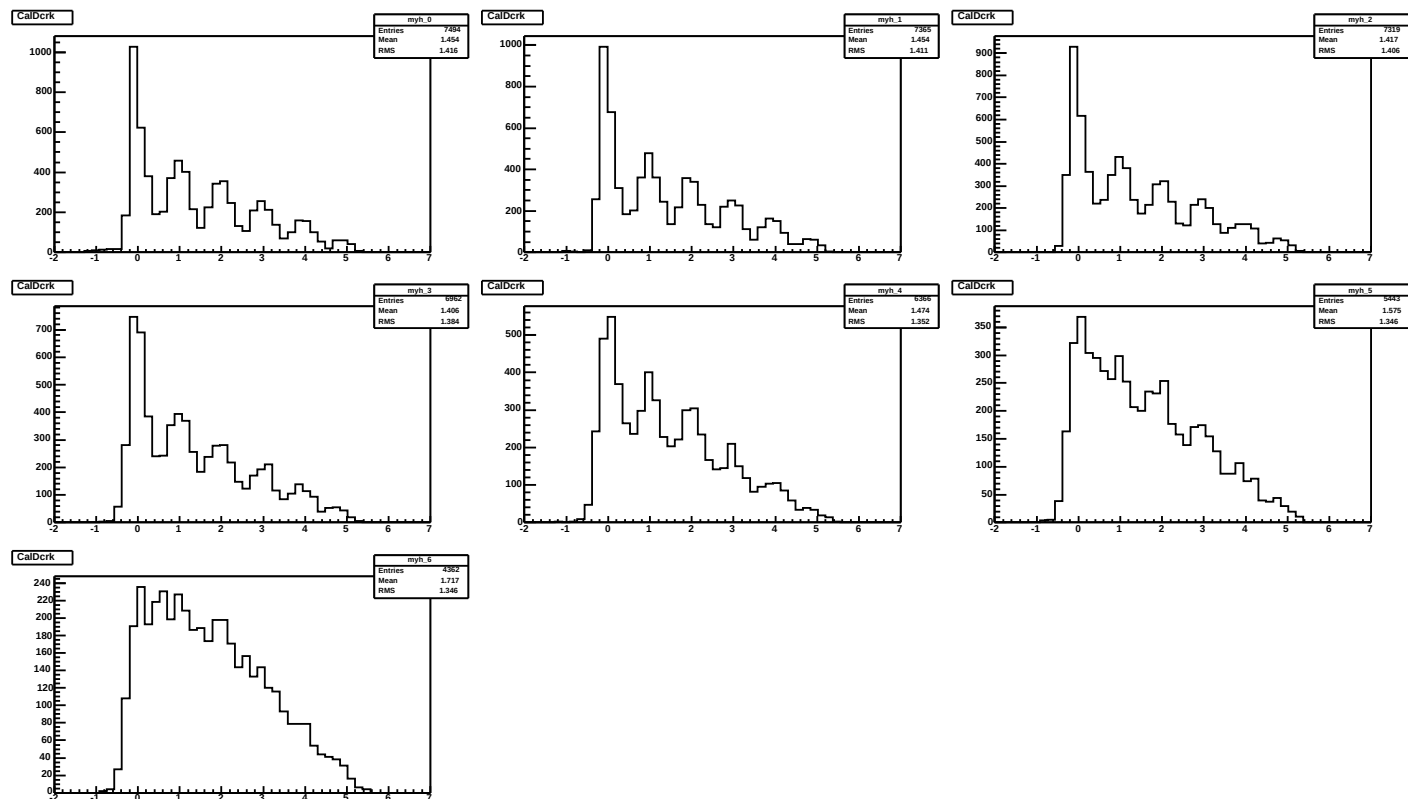
Direction reconstruction

PSF(68%) for 30 GeV



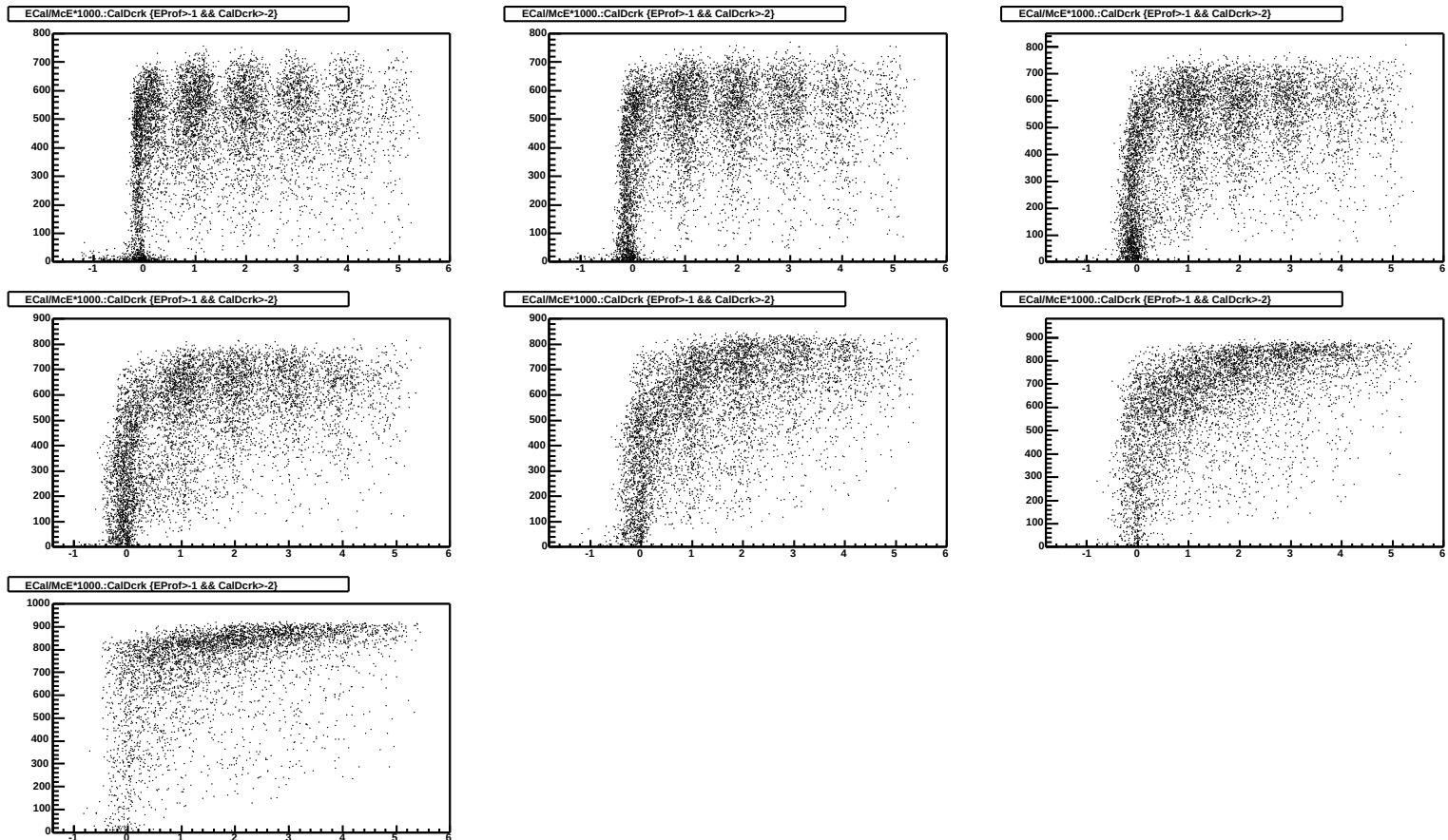
Energy reconstruction

Distance of CalP to the nearest crack in log unit



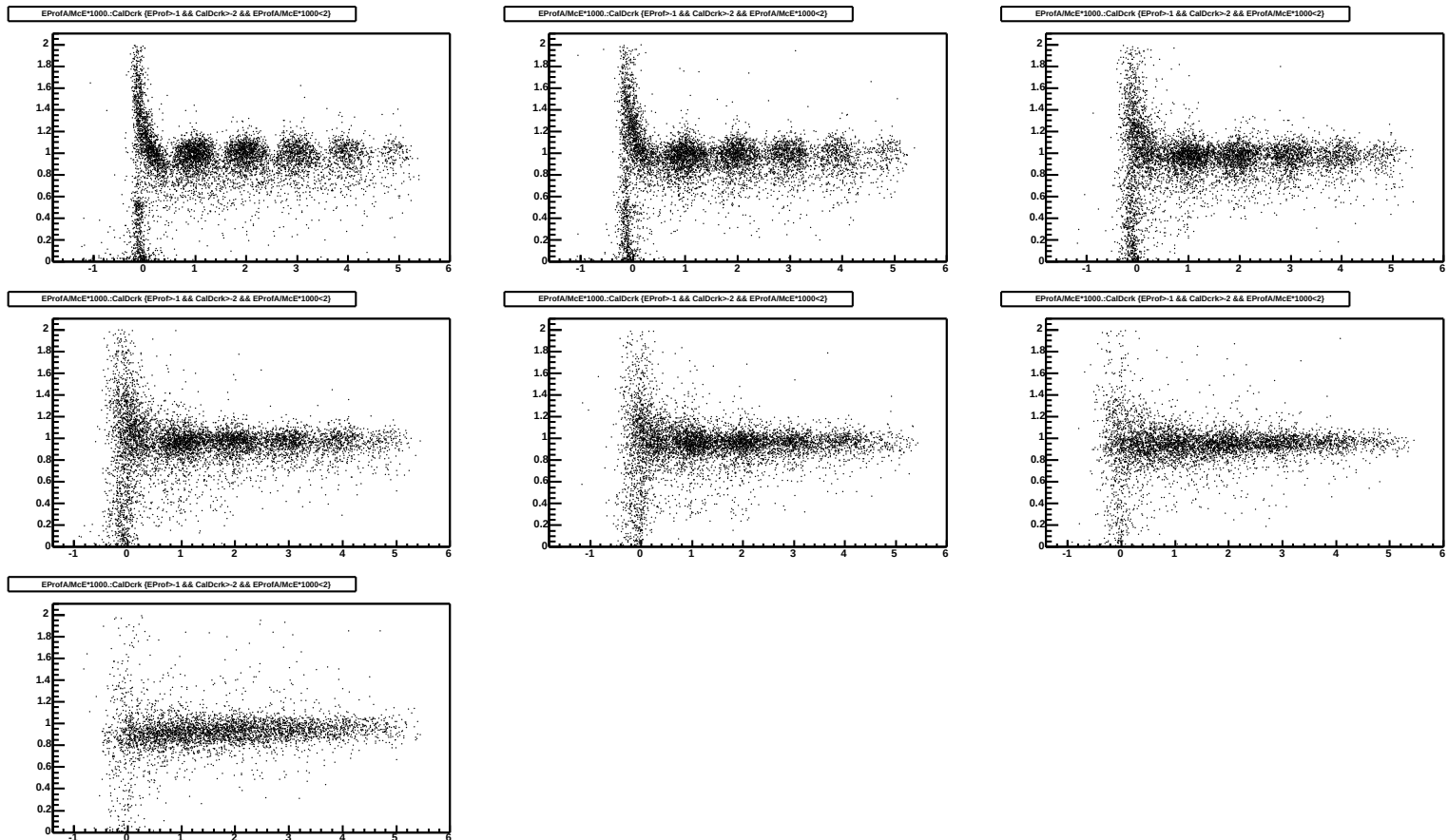
Energy reconstruction

Deposited energy versus distance to crack



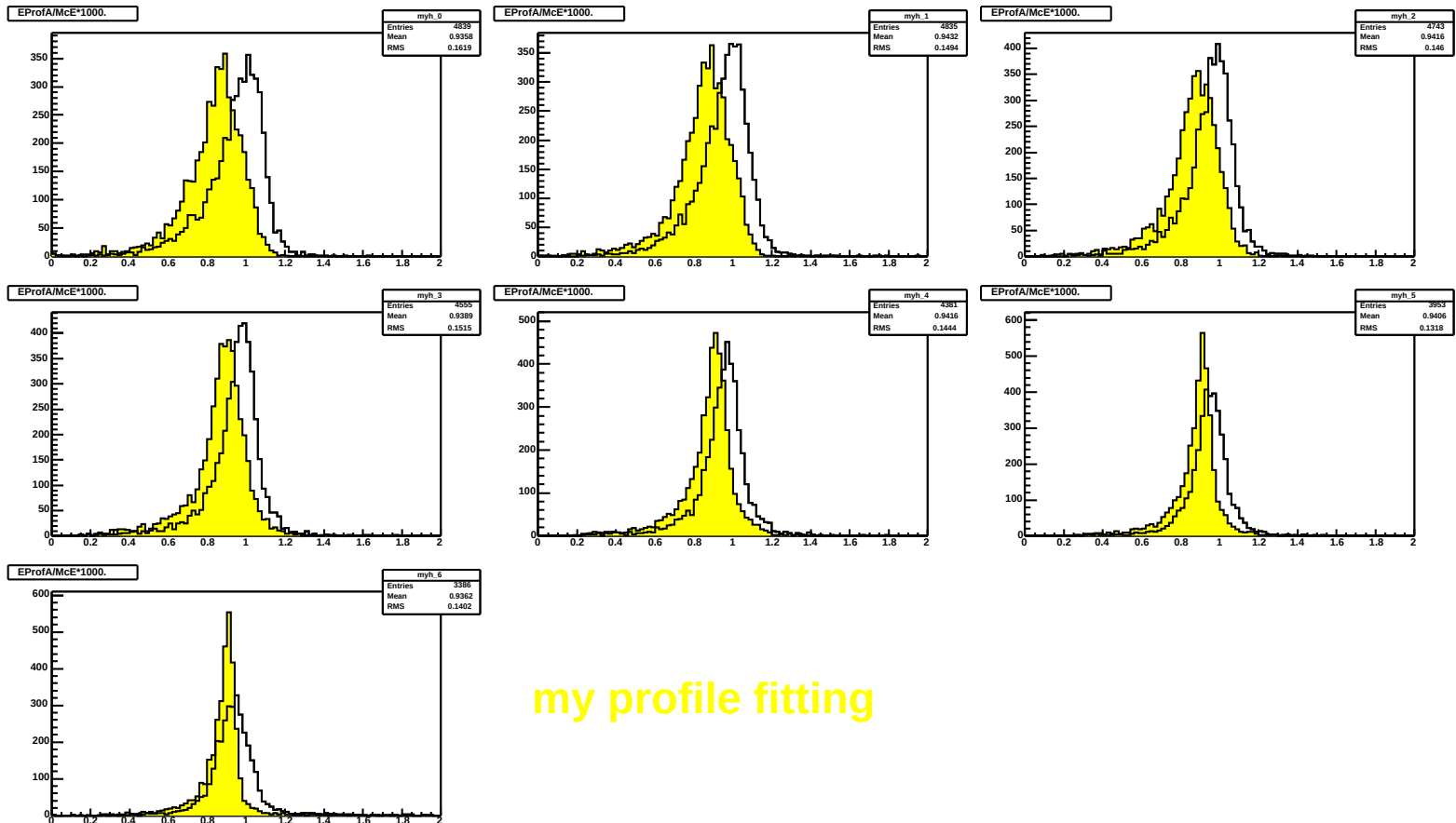
Energy reconstruction

Average profile fitting: energy versus distance to crack



Energy reconstruction

$$E_{rec}/E_{MC}$$



my profile fitting

Energy reconstruction

Resolution at 30 GeV

Graph

