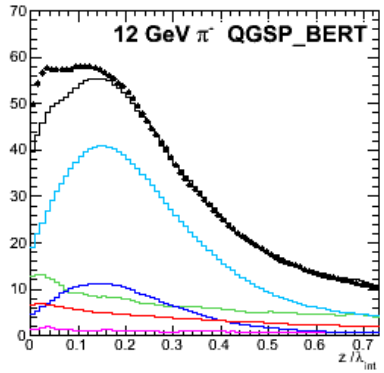
Updated longitudinal profiles in the SiW ECAL

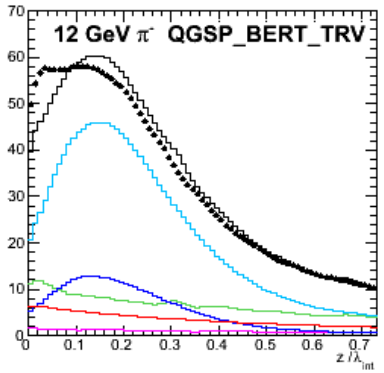
David Ward

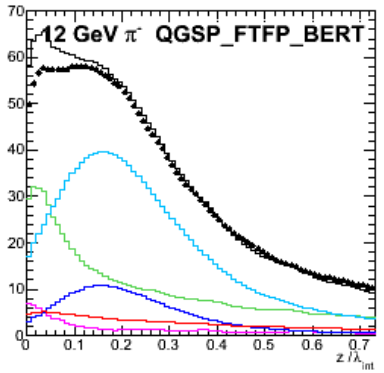
What is the change?

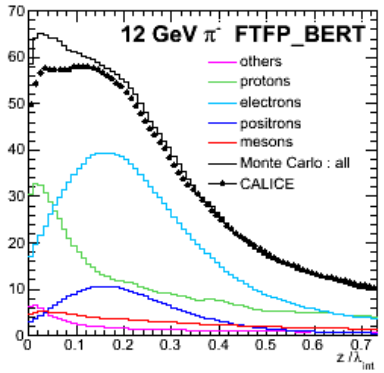
- For the EUDET note, Erika proposed to present longitudinal energy profiles for both ECAL and AHCAL in units of λ_{int}, to facilitate comparison.
- Non-trivial for ECAL because of non-uniform sampling. In the paper we used instead layer number w.r.t. shower start, inserting 1 or 2 "pseudolayers" between physical samplings in stacks 2 and 3 respectively.
- First find the effective pion λ_{int} between sampling layers. Use GEANT4 MC to find the fraction of pions which have a **true** interaction point between each pair of layers.
- For each sampling layer in the reconstructed shower, compute number of λ_{int} since interaction layer.
- So we have a series of samples of the shower at known depths in λ_{int}. Interpolate to generate an energy at each bin of a profile histogram in λ_{int}.

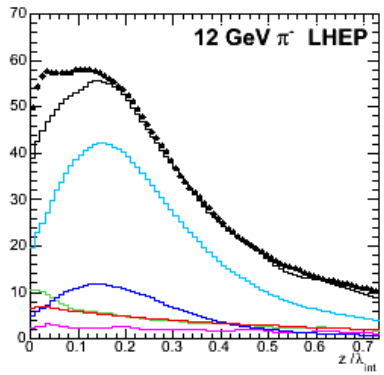
New version in units of λ_{int}

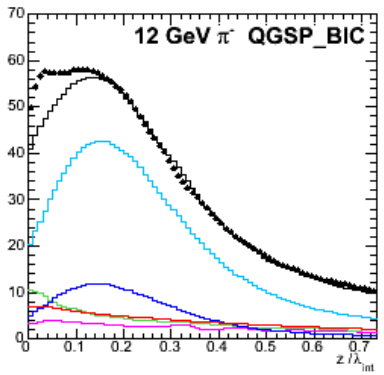


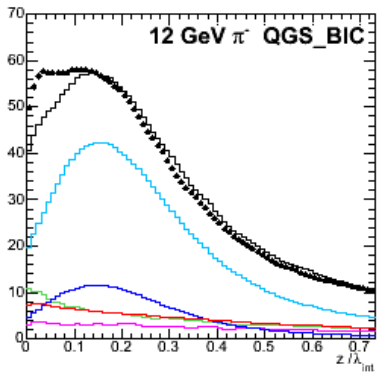


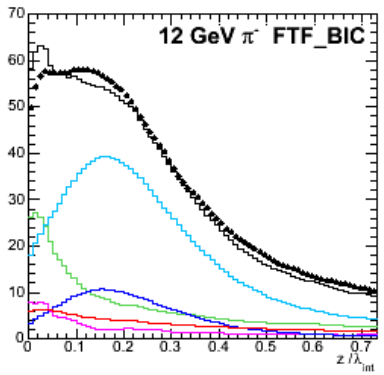




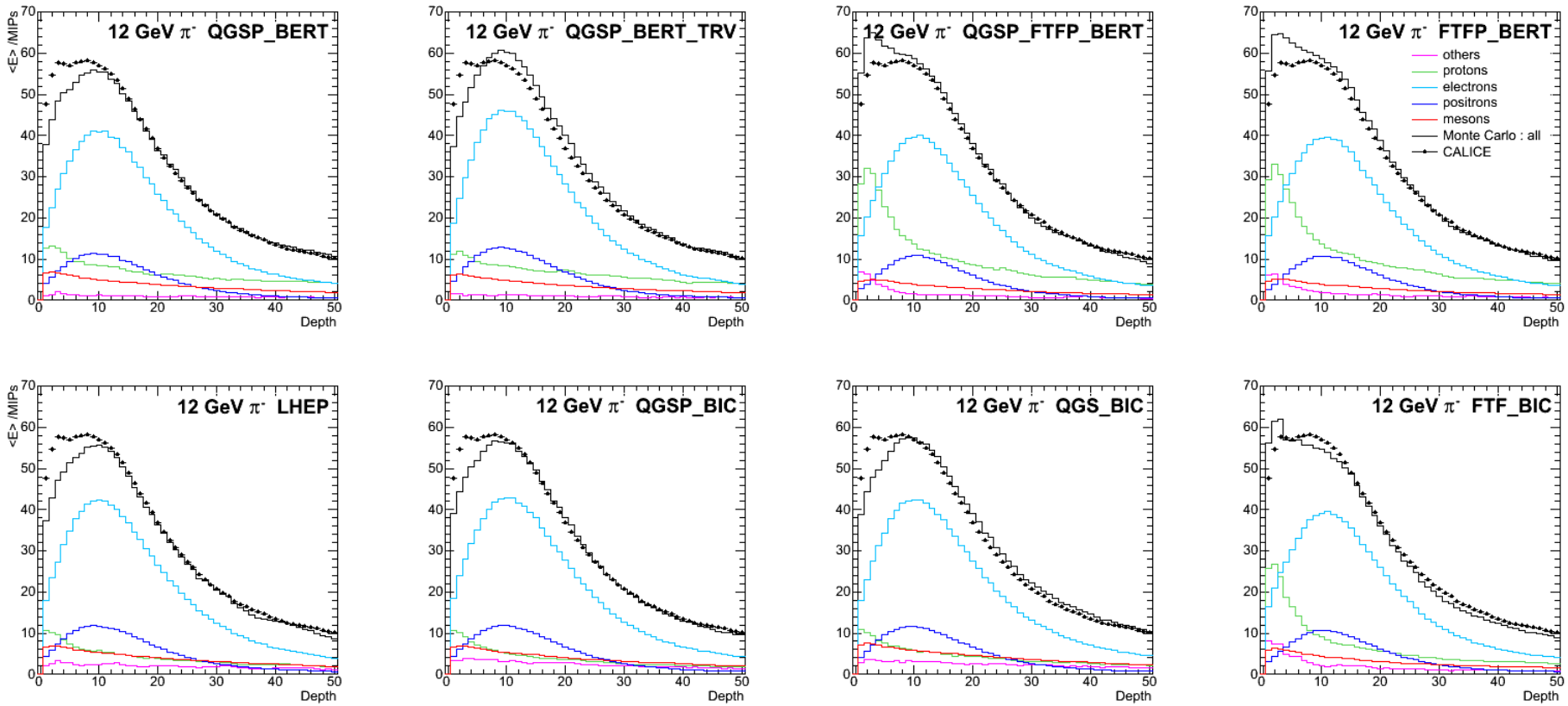






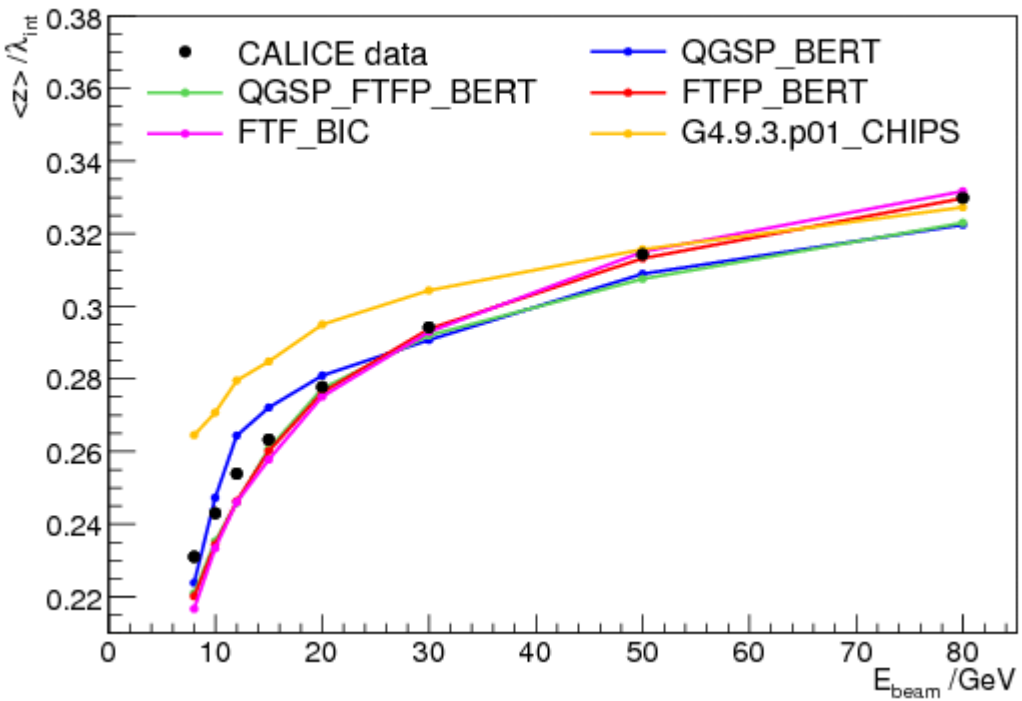


Old version in units of (pseudo-)layers



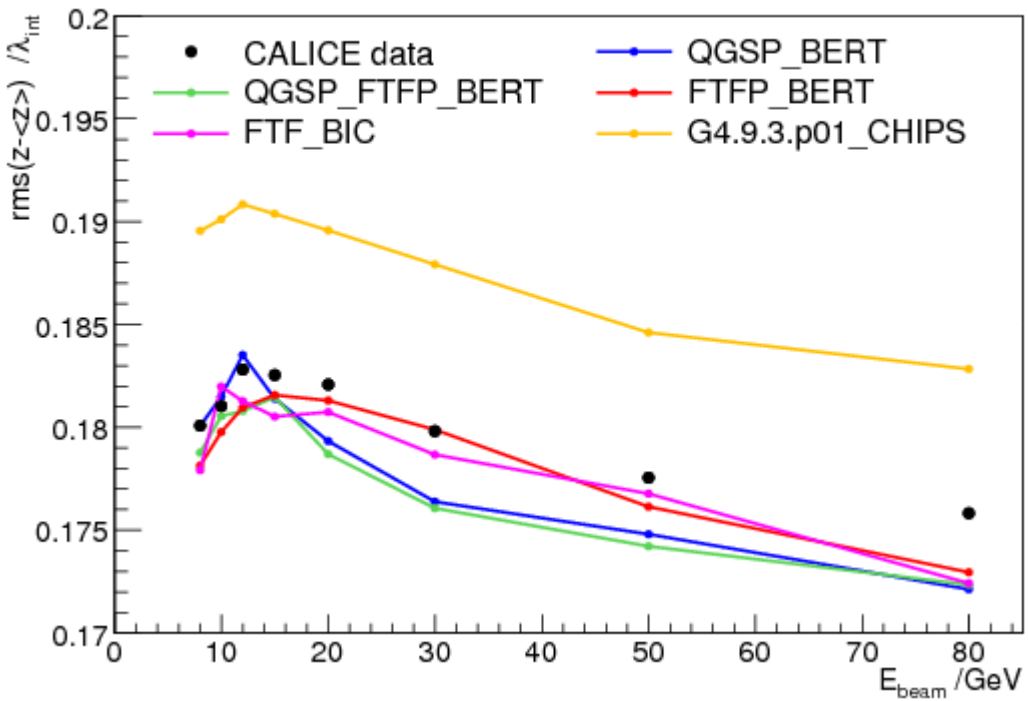
Mean shower depth

Derive moments from these distributions…

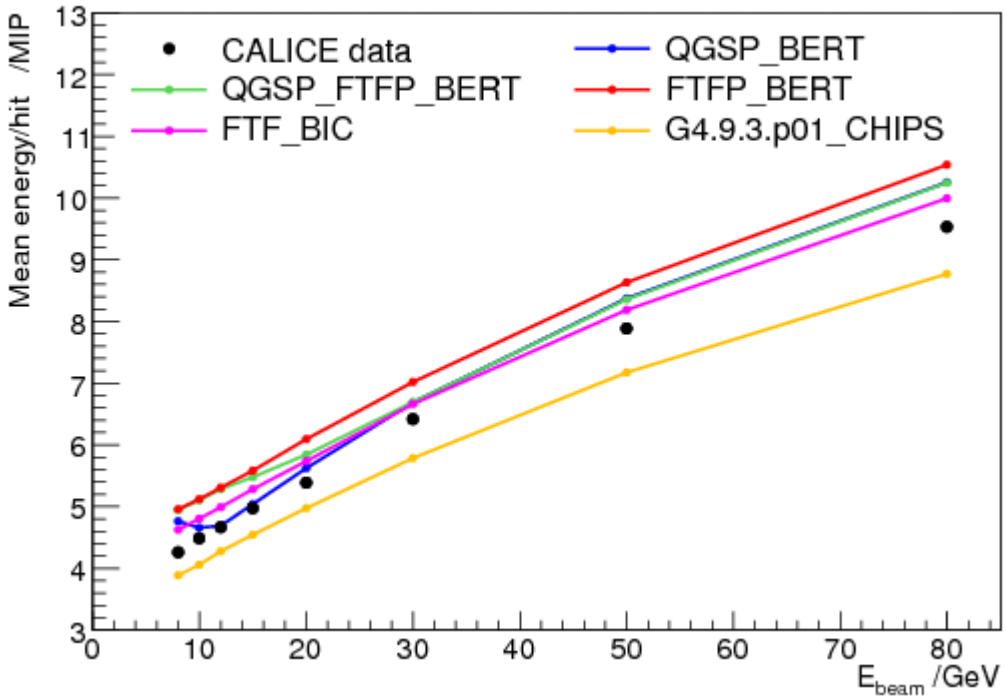


r.m.s. about the mean

FTF models favoured by our data, while CHIPS is way off.



One other plot we could include



Shows the mean energy per hit, i.e. $\langle E_{Ecal} \rangle / \langle N_{hits} \rangle$

A bit nervous about presenting distributions for number of hits because of noise, crosstalk etc.

But maybe safe enough for pions (though not for electrons)