Digital RPC-HCAL slice test studies

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and **FERMILAB**

Outline

- **General**
- **Beam profiles**
- **Detector response vs shower barycenter**
- **Misalignment**
- **Shower transverse profiles**

General

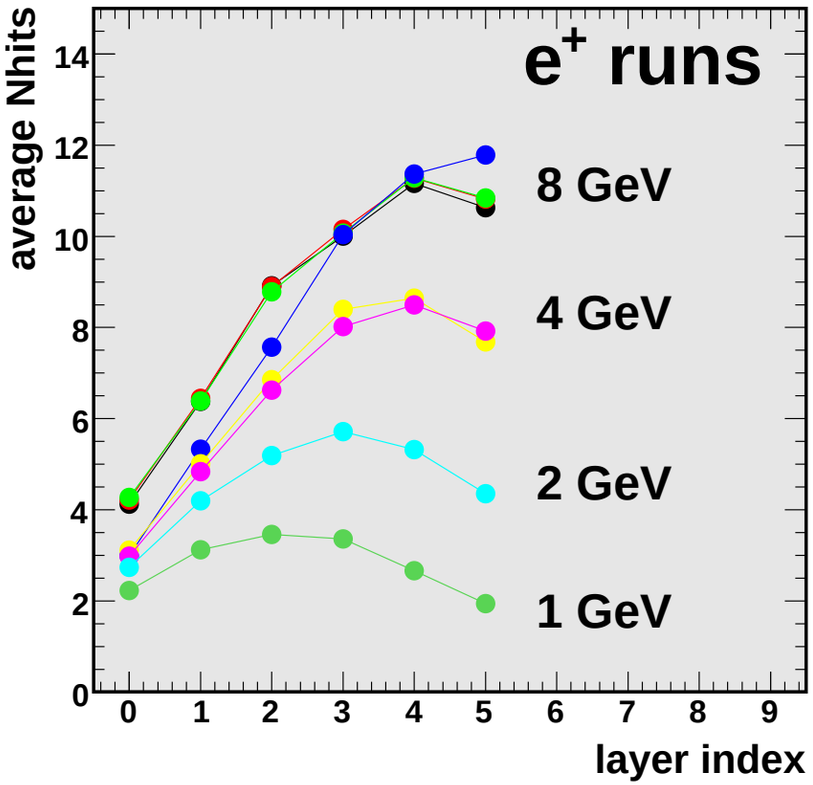
- **. reminder**

  : study with the e^+ runs,
  consider only the signal recorded from the first 6 chambers
  (6 absorber layers, 16mm steel + 4mm Cu each $\simeq 1.19X_0$ per layer)

- **. runs under study**

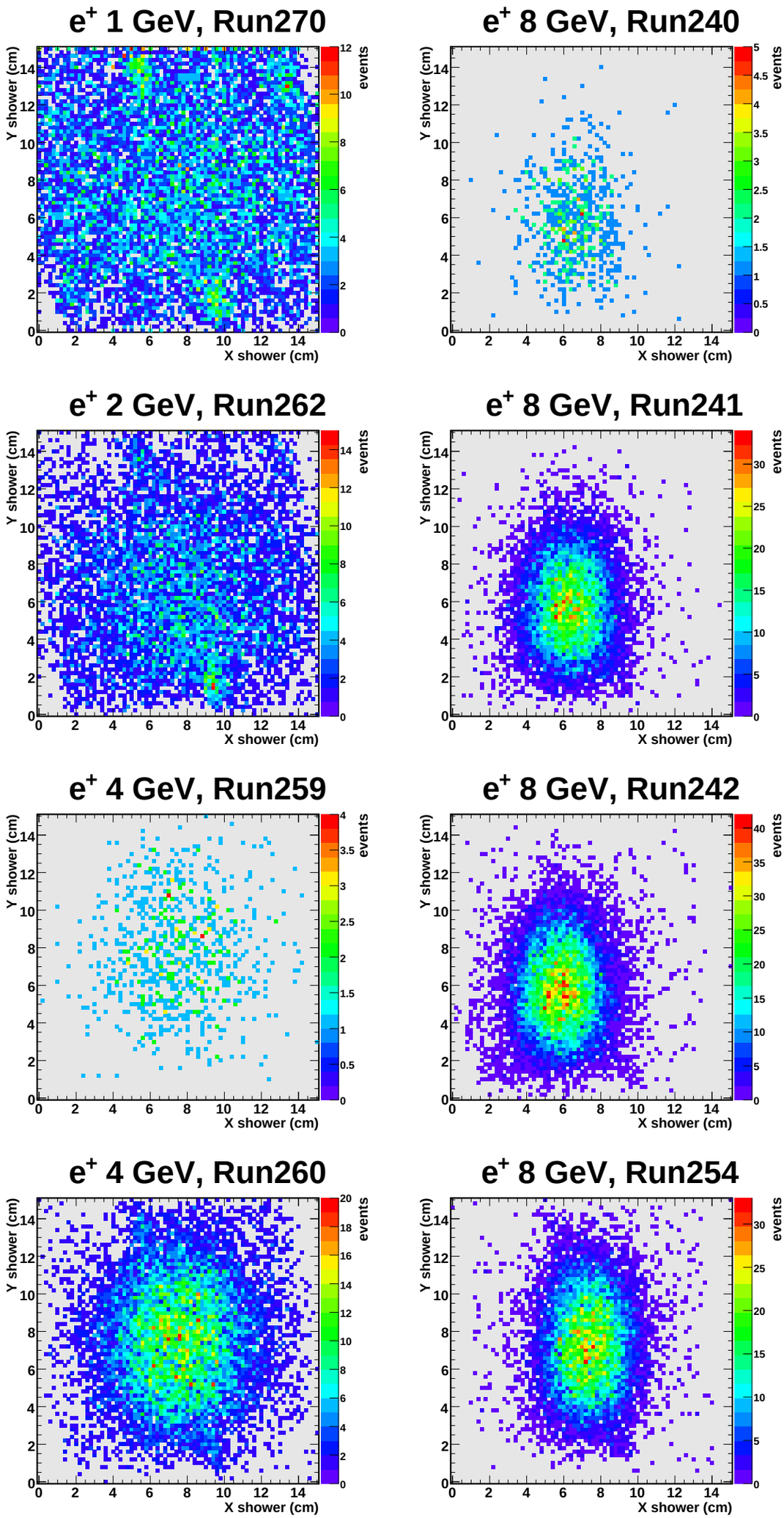
E(GeV)	e^+ run	# of events	
8	240 241 242 254	39060	(=685+10808+15279+12288)
4	259 260	13192	(=779+12413)
2	262	8636	
1	270	12097	

Shower longitudinal profile



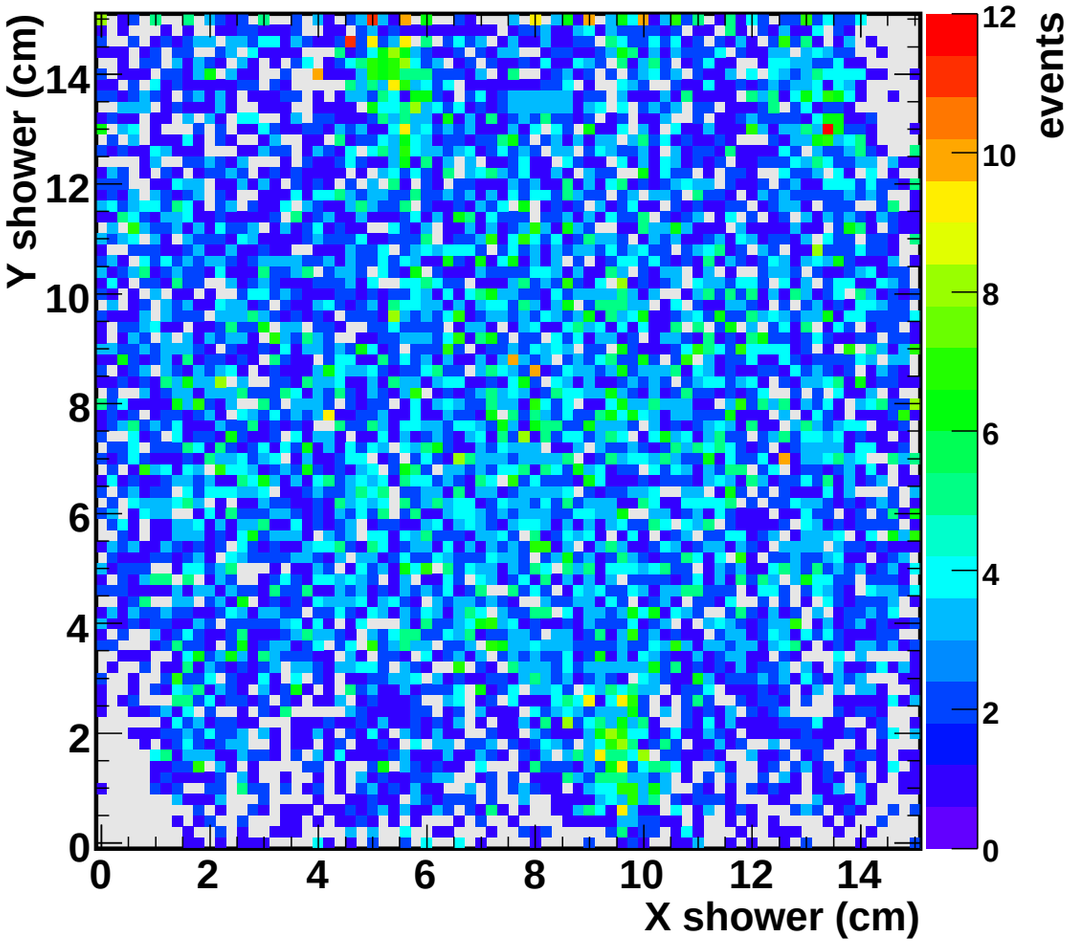
showers are not well contained (but shower maxima are, almost)

Beam profile (Nevents per 2×2 mm^2 VS shower barycenter X,Y)

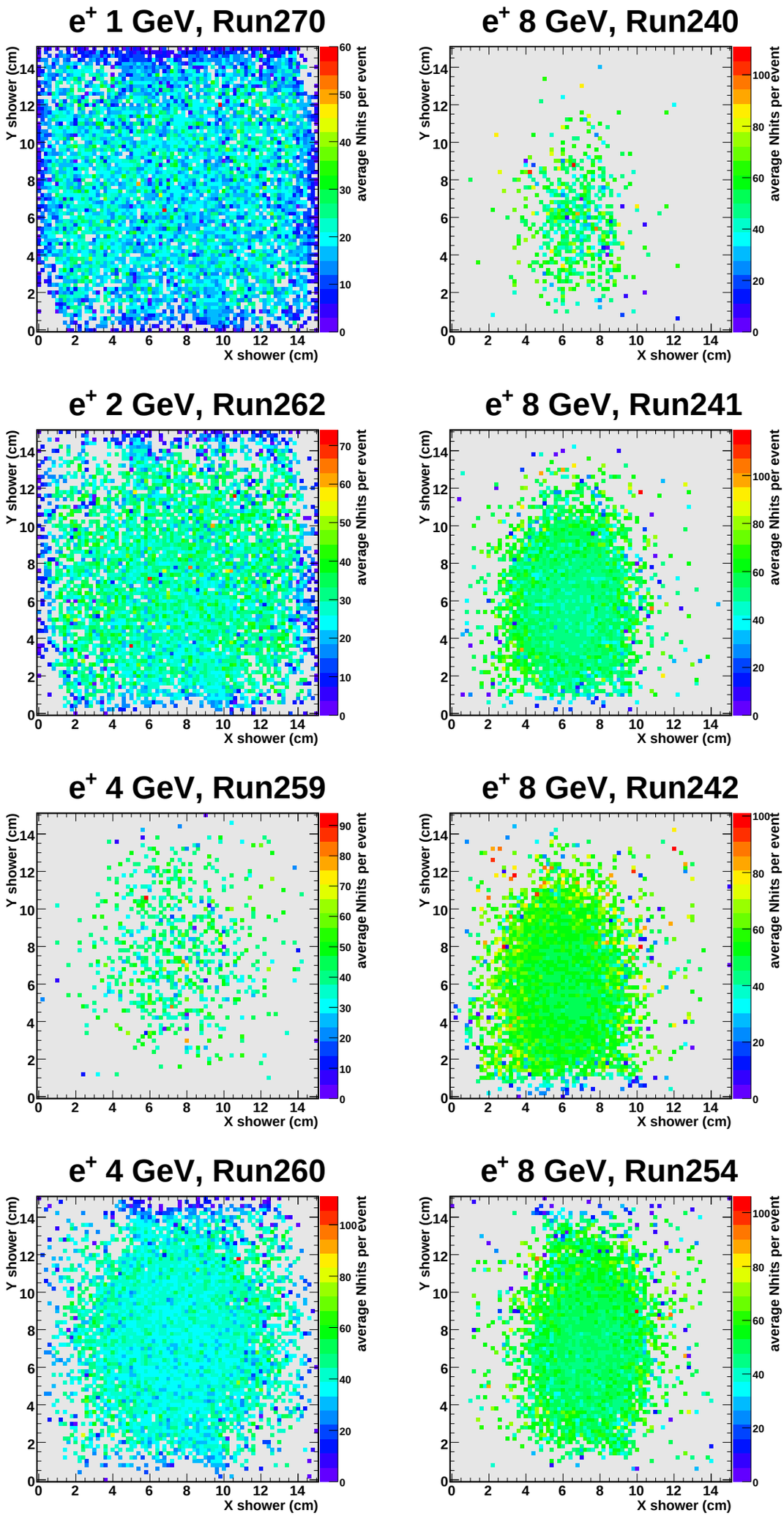


Hot/cold spots

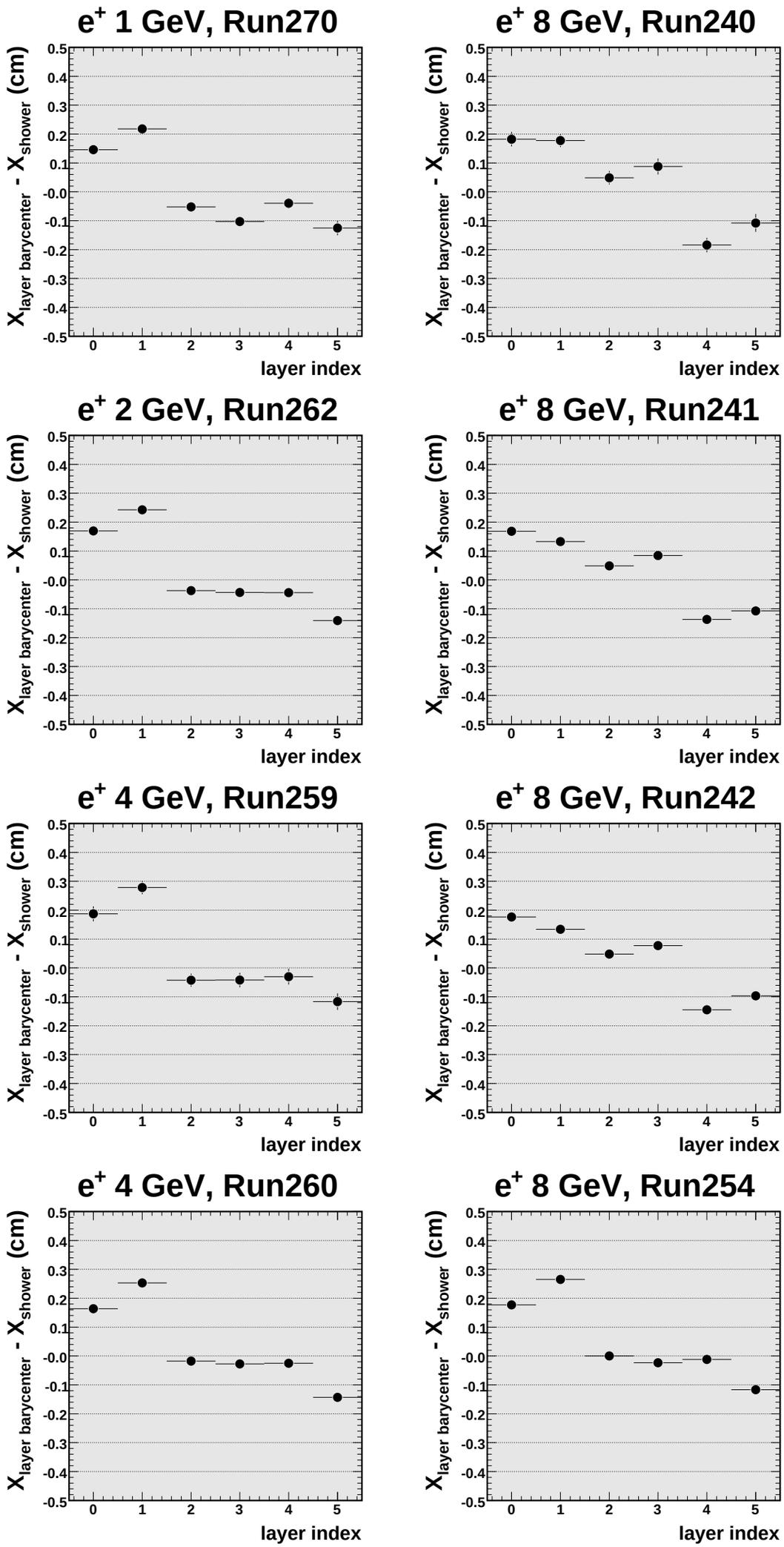
e^+ 1 GeV, Run270



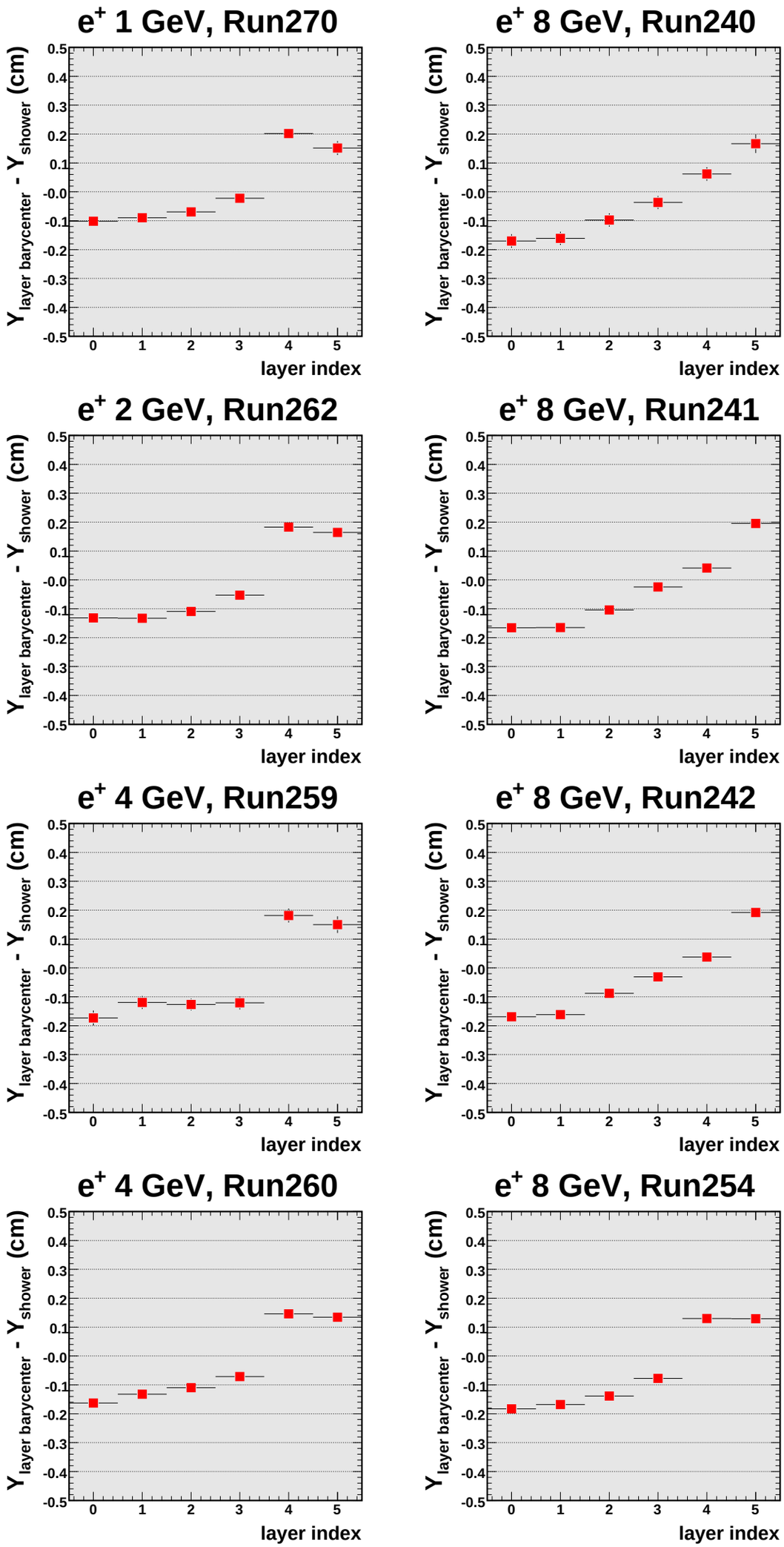
Detector response (average Nhits per event VS shower barycenter X,Y)



Misalignment along X



Misalignment along Y



Event selection

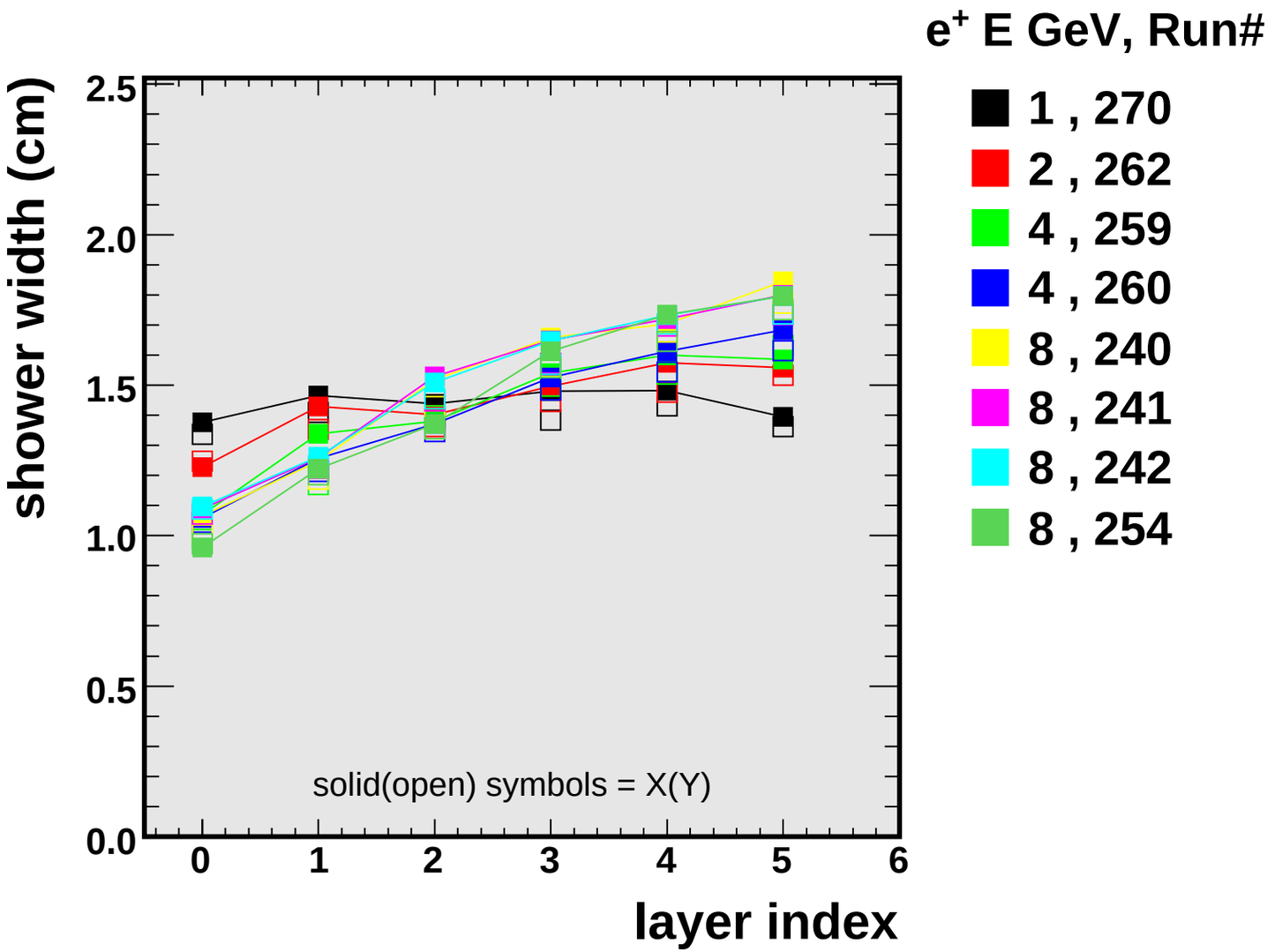
- **· cuts/corrections**

  : correct for misalignment

  : require Nhits>15

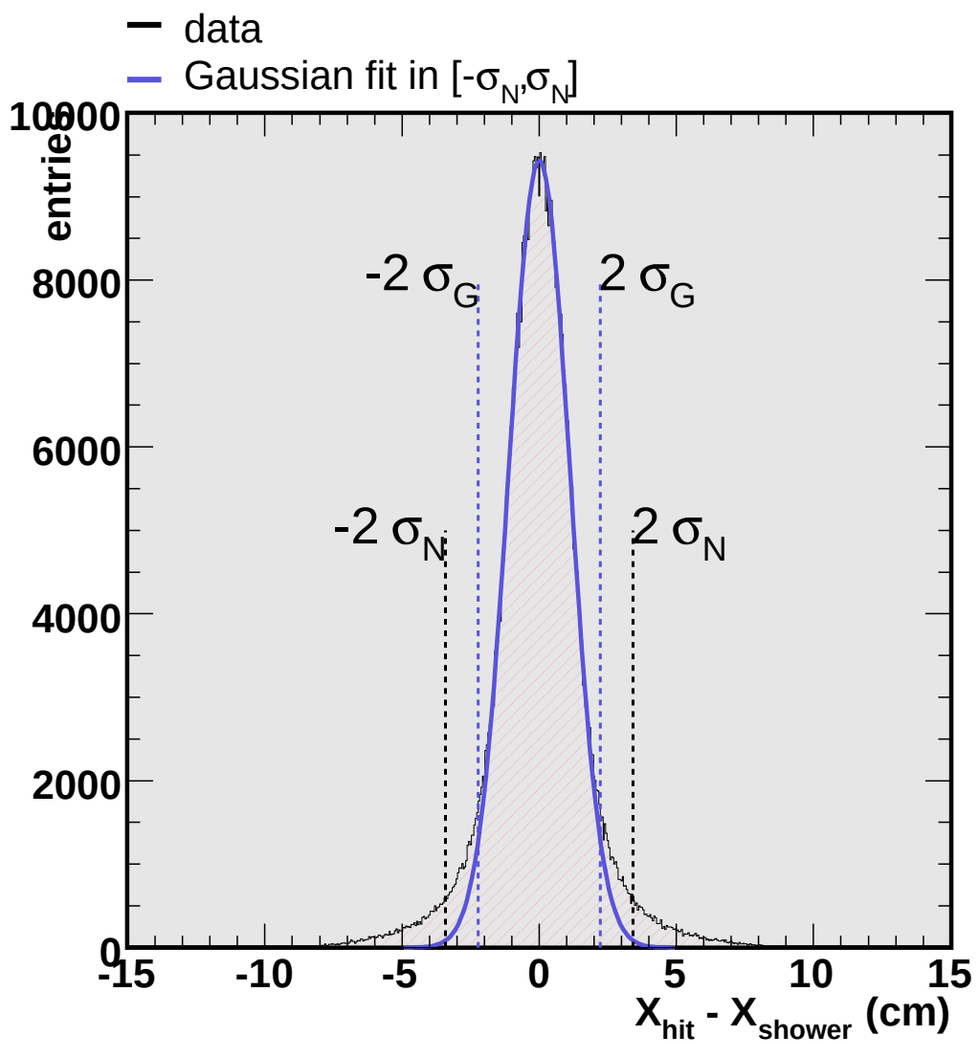
  : require shower barycenter X and Y in [2cm,13cm]

Shower development

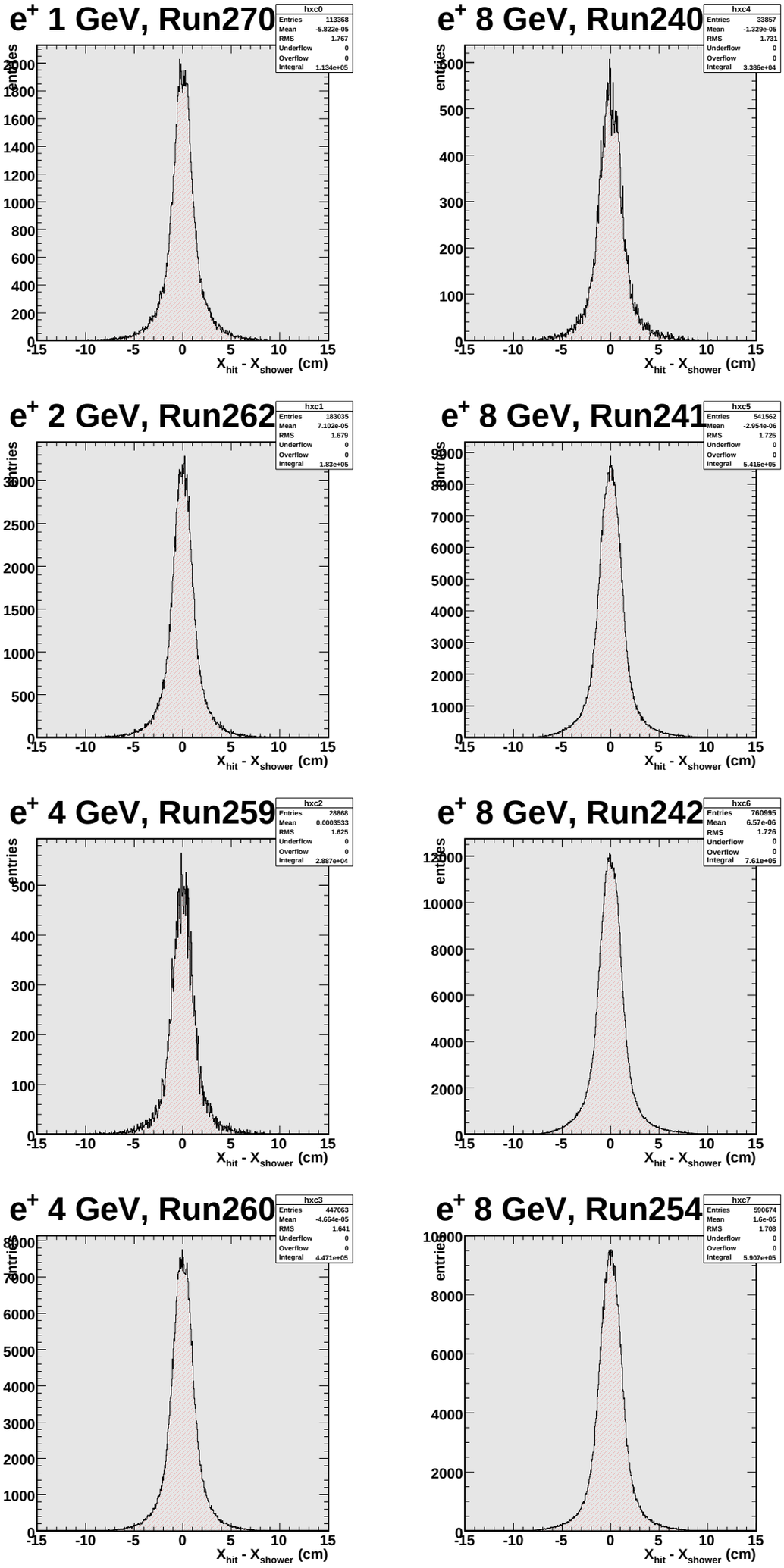


"width" = std.deviation of distribution $X_{\mathrm{hit}} - X_{\mathrm{layer\ barycenter}}$

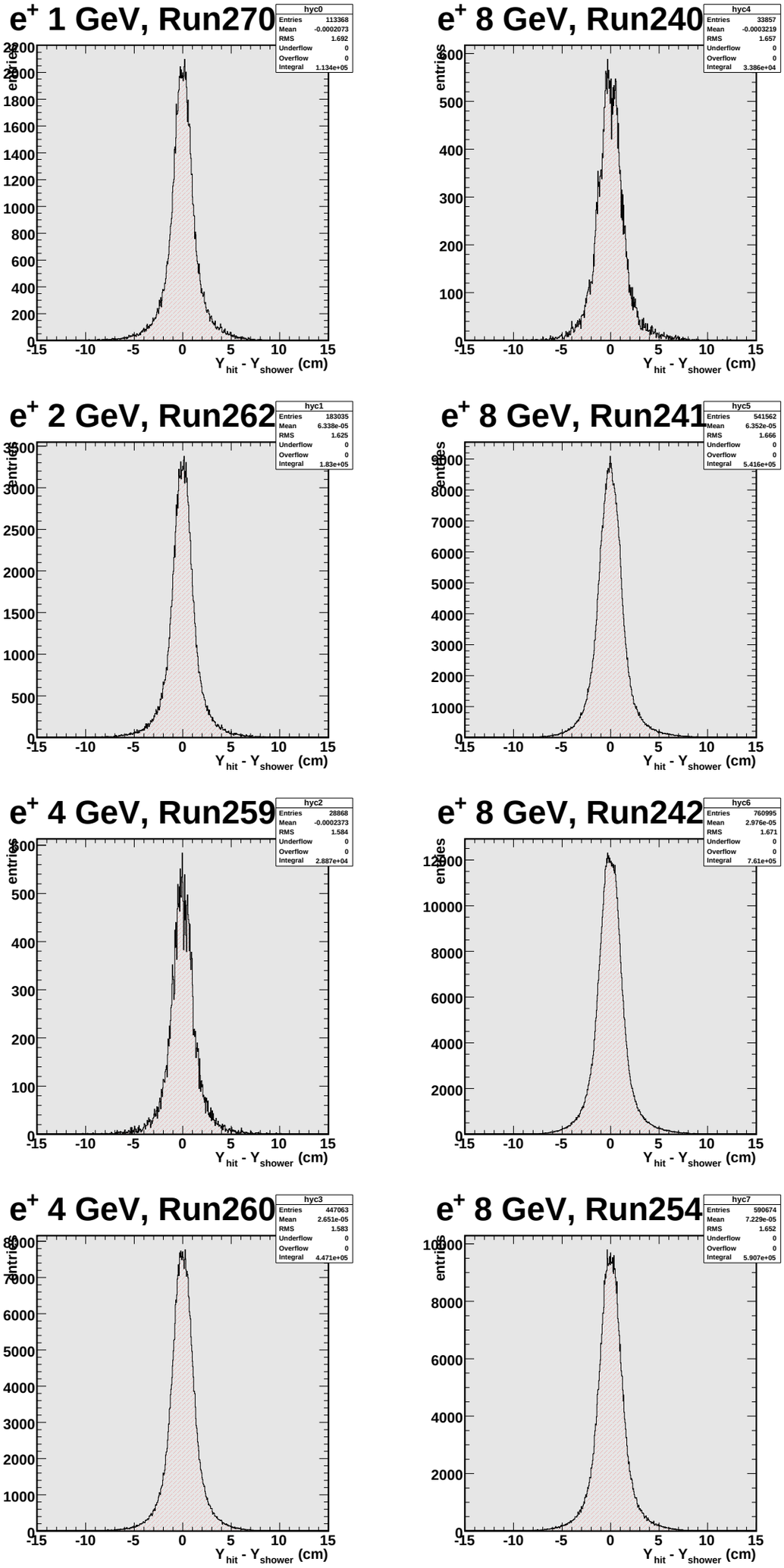
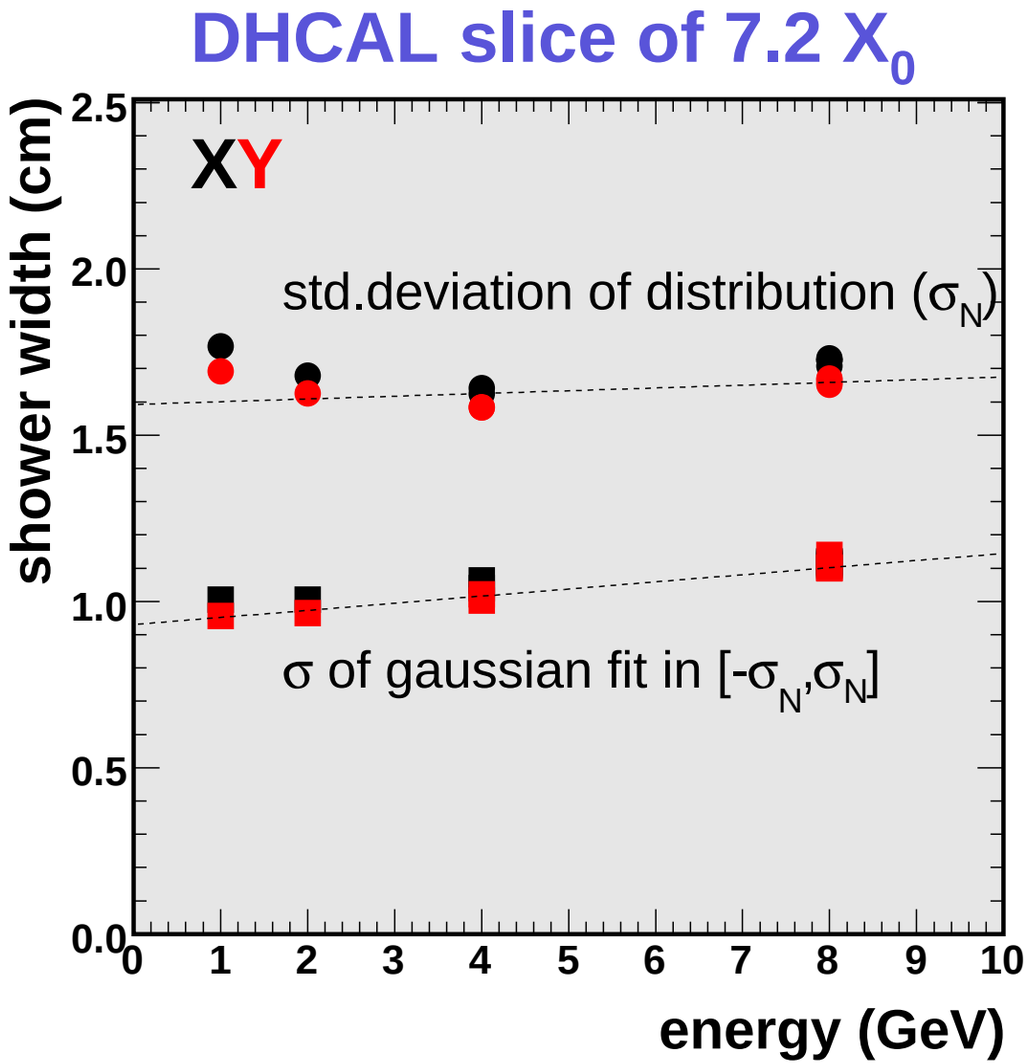
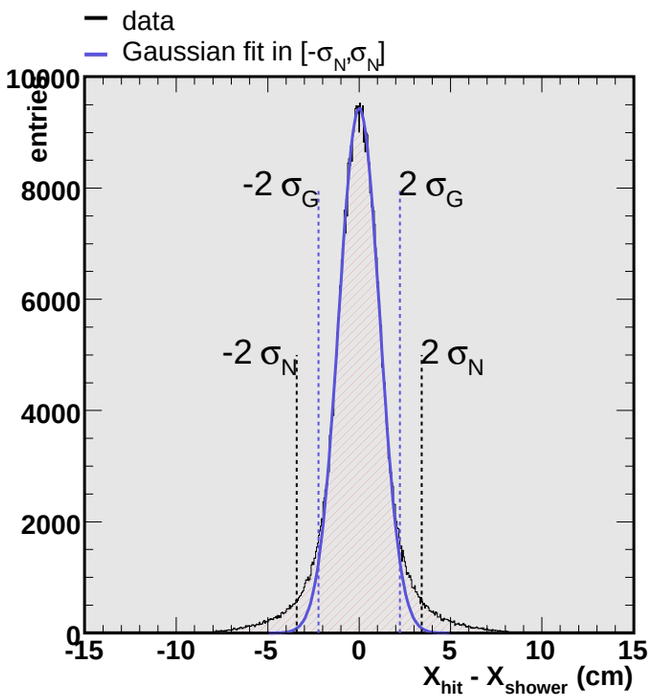
Shower profile - example



Shower profile X (distribution $X_{hit} - X_{shower}$)



Shower profile Y (distribution $Y_{hit} - Y_{shower}$)



Shower width vs incident energy