

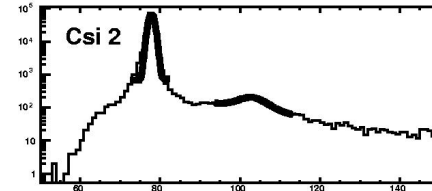
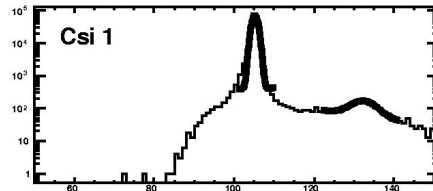
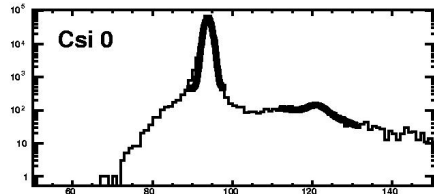


Crystal resolution using Csl data

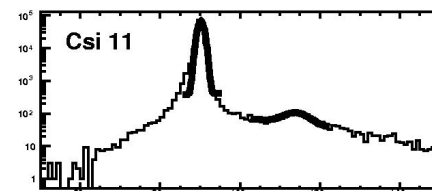
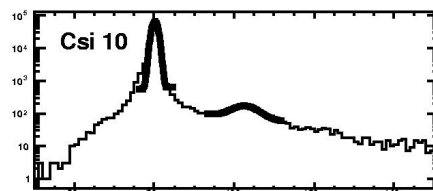
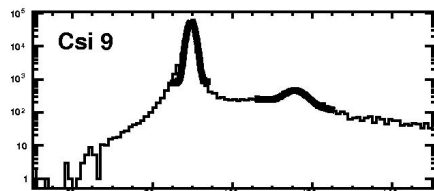
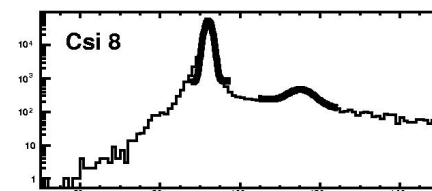
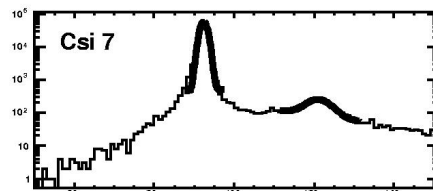
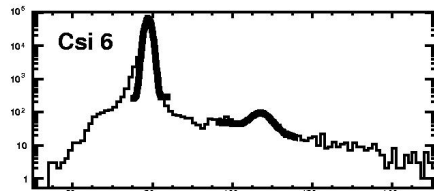
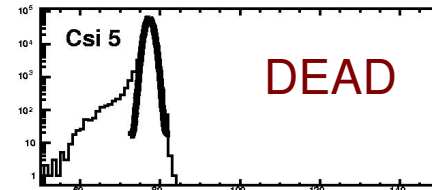
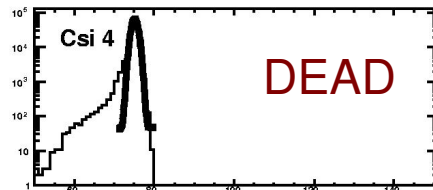
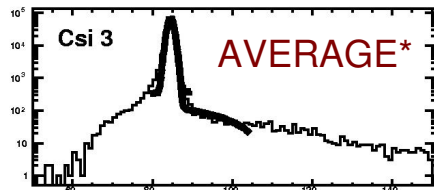
Bertrand Echenard
XV SuperB GM
Caltech - Dec 2010

Calibration

I use run 337,341,342,343,344,366,368,384 to calibrate, fit pedestal and m.i.p. with Gaussian functions



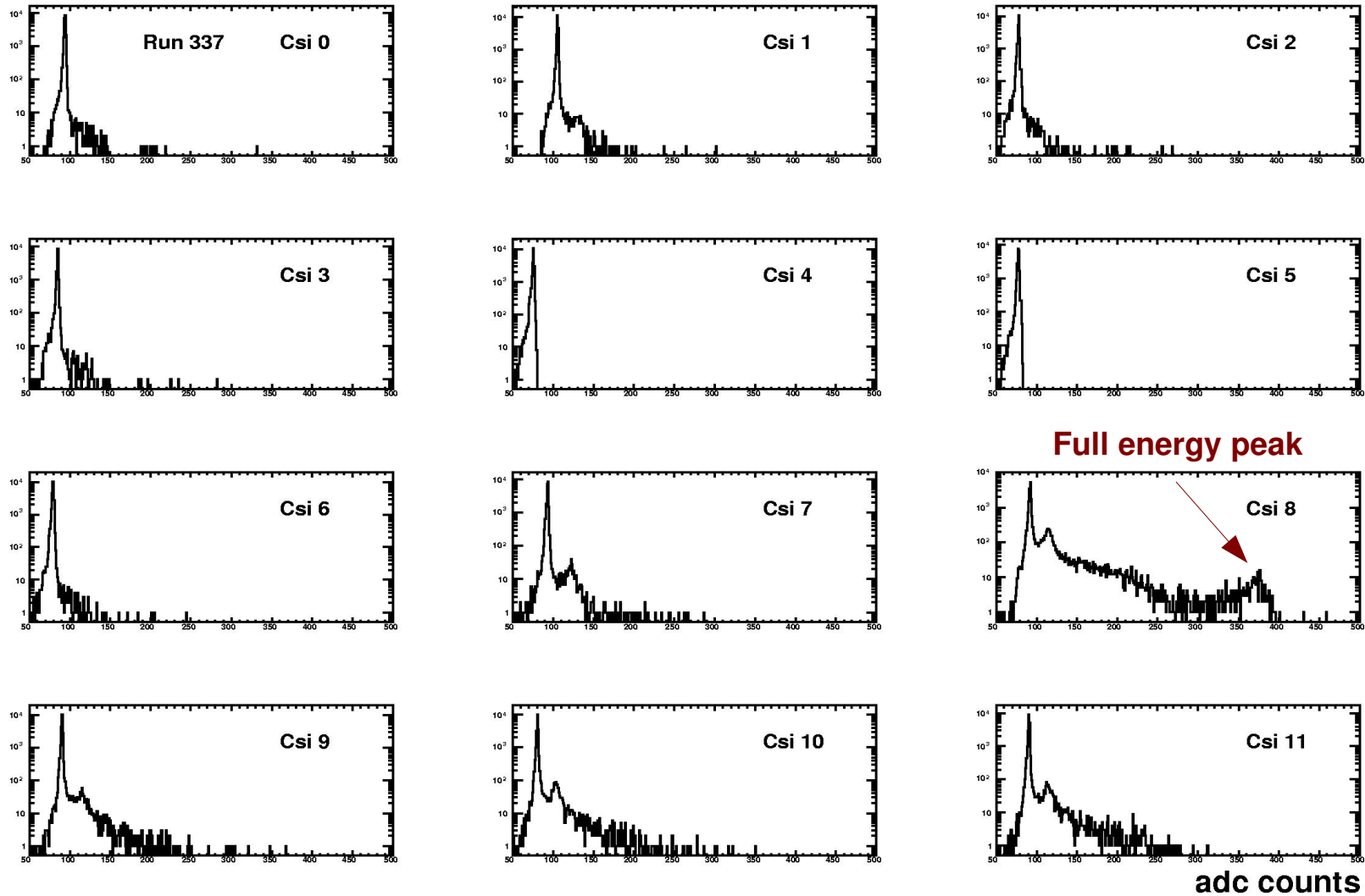
precision on mip
~ 0.2%



adc counts

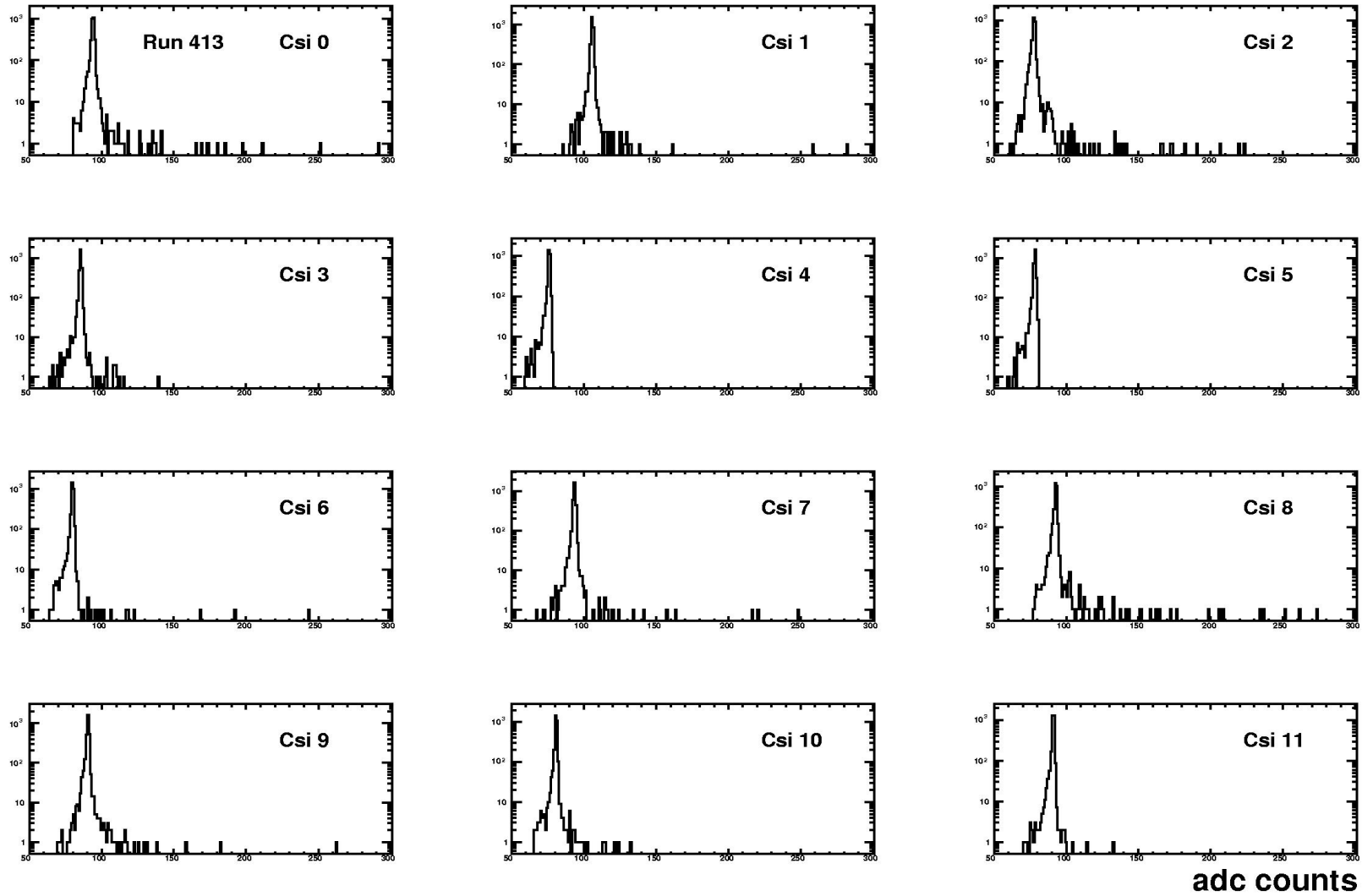
*Not enough data for crystal 3, I use an average from the other crystals

adc counts for CsI crystals, run 337



Looks ok

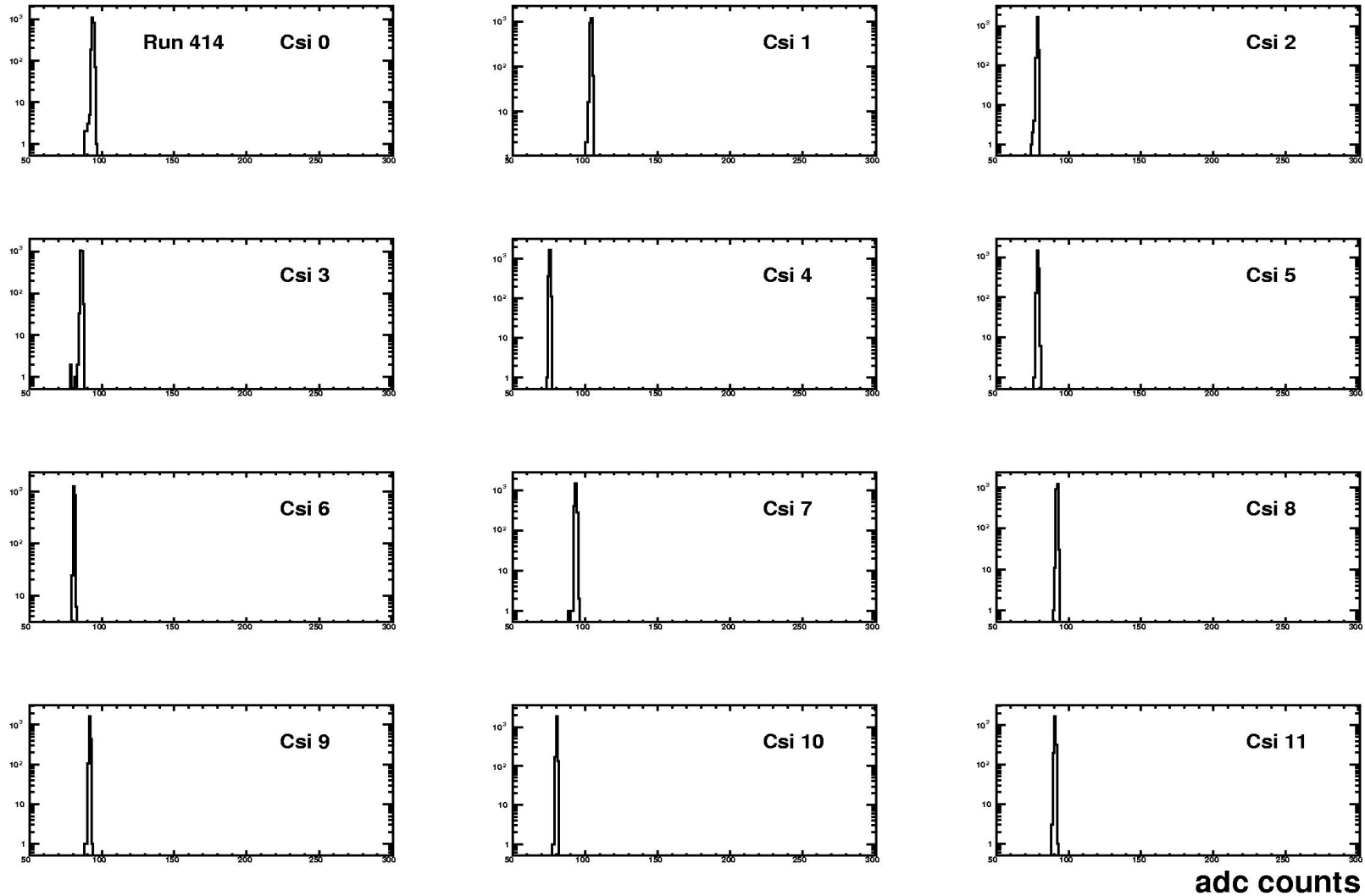
adc counts for Csi crystals, run 413



Looks fine

Now the bad news

adc counts for Csi crystals, run 414,415,416,...



**Lost the Csi data for all subsequent runs
(there was a pit access between run 413 / 414)**

Analysis on available data

Extract the resolution including Csi data with run 350/354/356/357 (based on Chih-Hsiang macro)

- 0) no Csl data
- 1) include energy from all crystals (except dead ones)
- 2) include energy from crystal only if above a certain threshold (>10 MeV*)
- 3) include only most energetic crystal if energy > 10 MeV*
- 4) veto mode, use the event only if energy in all Csi crystals < 20 MeV*
(similar result with vetoing the most energetic crystal < 10 MeV)

Fit peak with Crystal Ball function and extract resolution ($\sigma =$ core resolution)

No temperature correction, but effect should be negligible in this case

Run 350 shoots on crystal 12

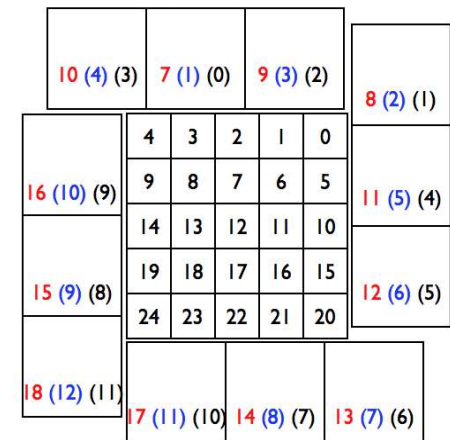
Run 354 shoots on crystal 18 (low light yield)

Run 356 shoots on crystal 8

Run 357 shoots on crystal 7

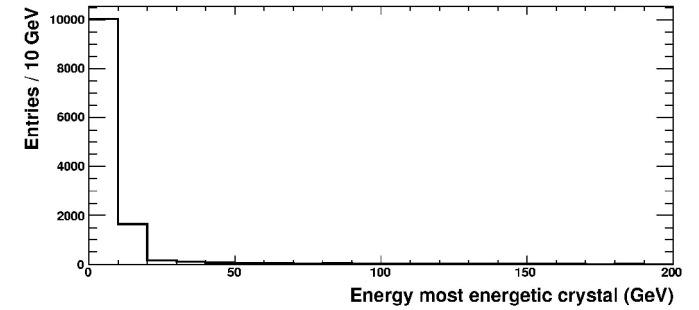
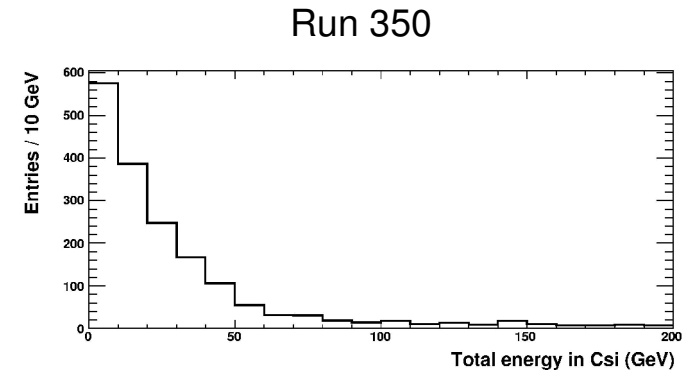
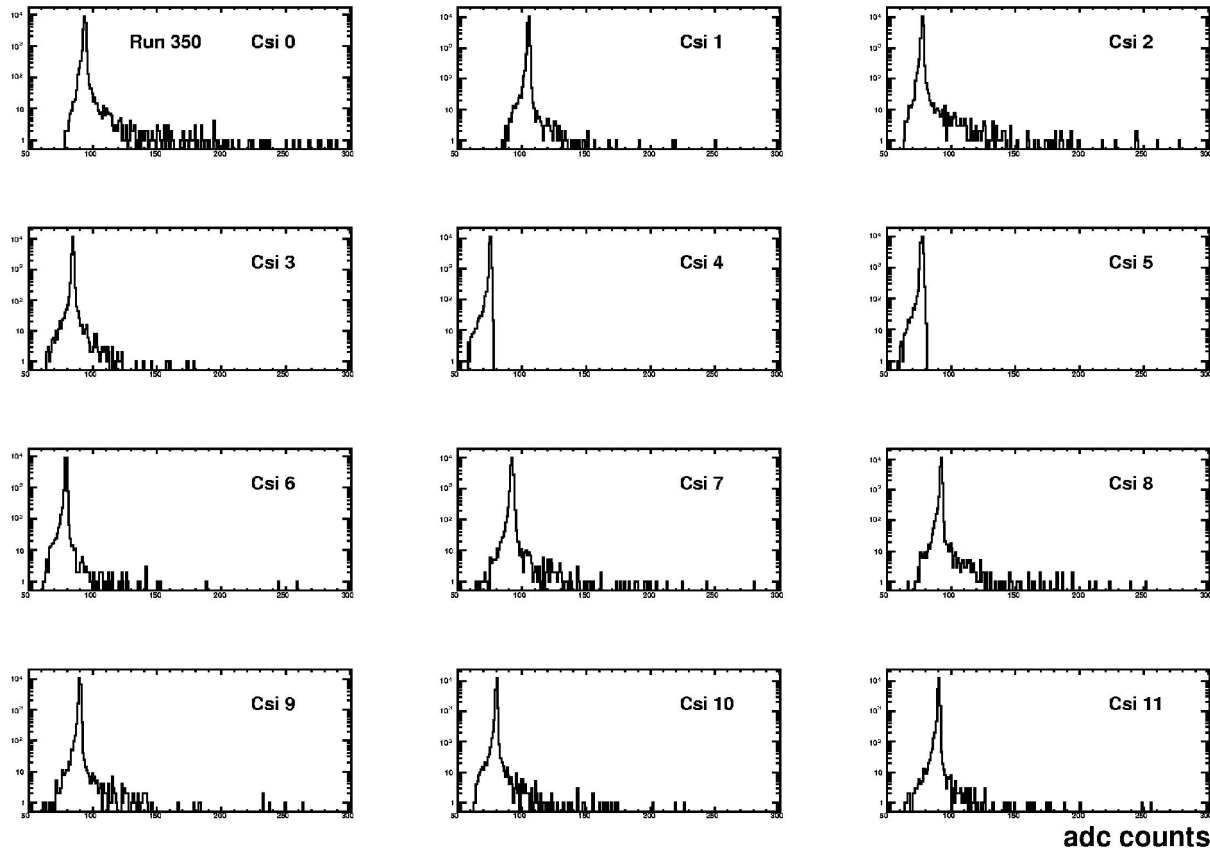
*Results not very sensitive to the precise value of limit

Crystal layout viewed from upstream of the beam



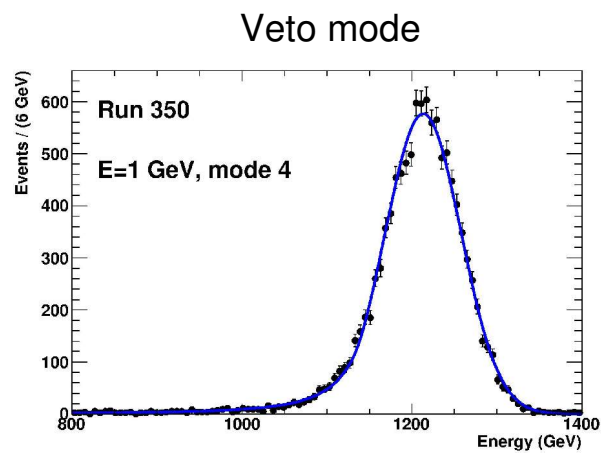
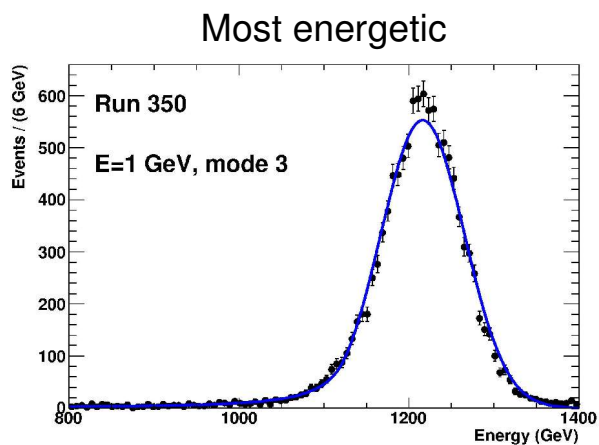
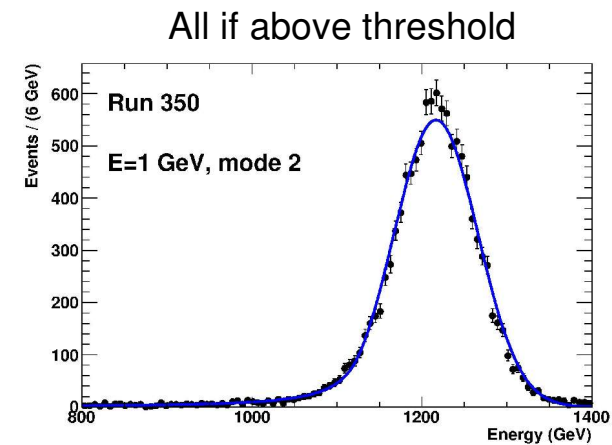
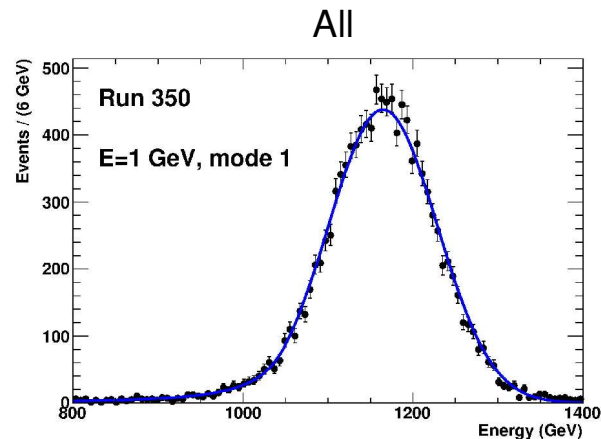
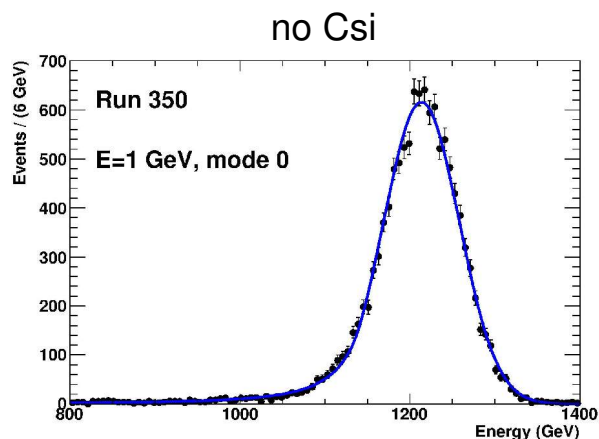
Red: ADC channel # Blue: Inverter box # Black: software channel # = ADC minus 7

Run 350 with Csi Data



Not much energy in CsI crystals, noise dominates

Run 350 with Csi Data

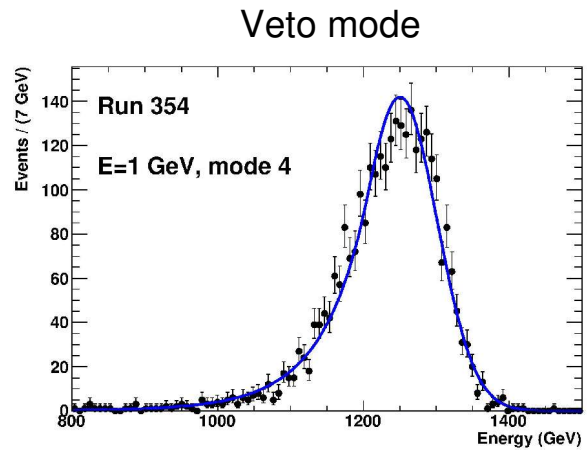
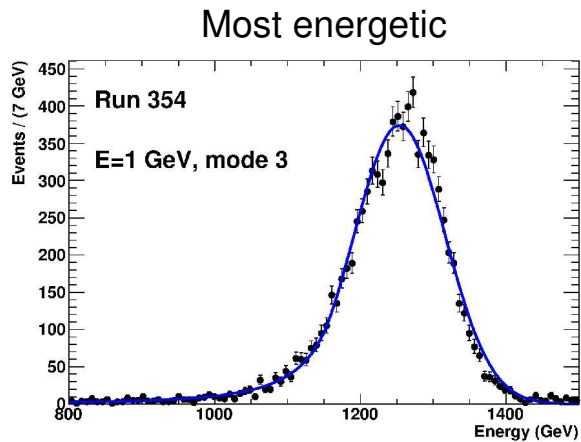
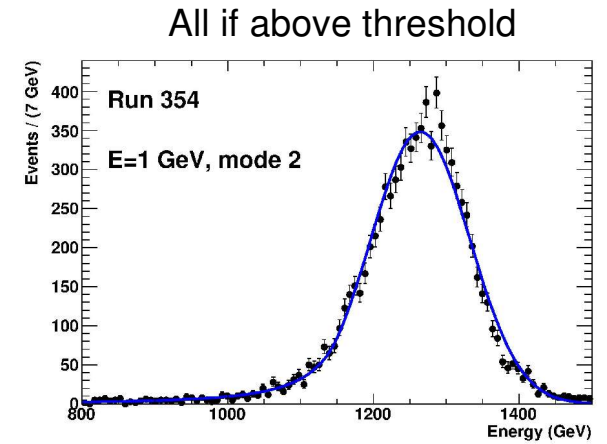
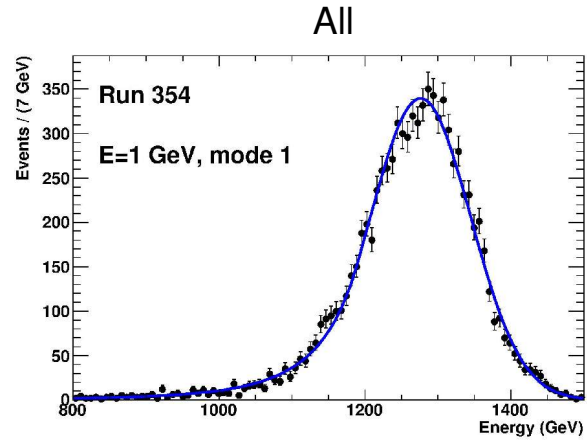
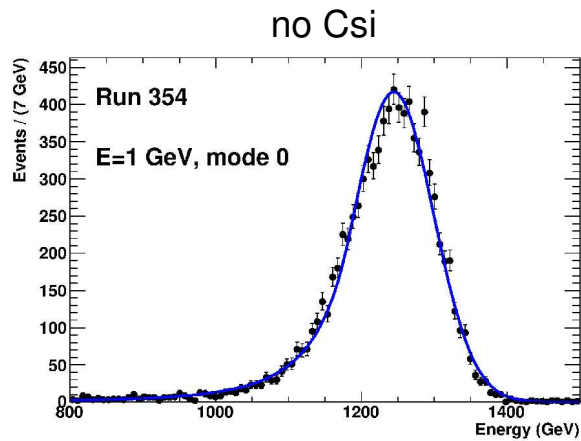


Mode	Core resolution
0	$3.66 \pm 0.03 \%$
1	$5.48 \pm 0.06 \%$
2	$4.04 \pm 0.04 \%$
3	$4.03 \pm 0.04 \%$
4	$3.66 \pm 0.04 \%$

There is a non-negligible systematic coming from definition of fit range

No gain including Csi data, either worse or has a neutral effect on the resolution

Run 354 with Csi Data (low light yield)

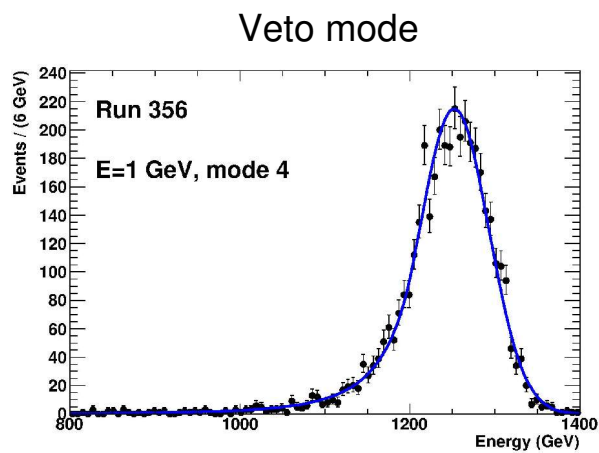
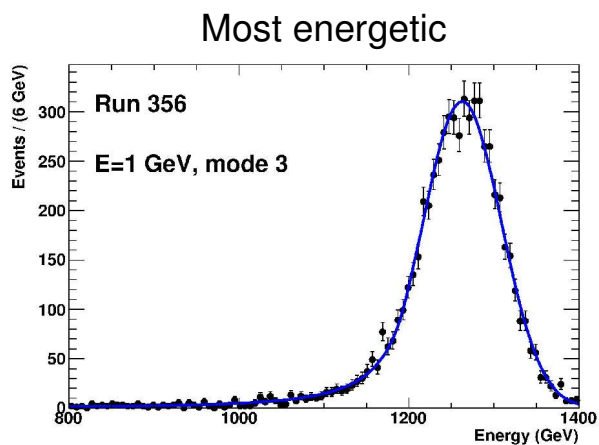
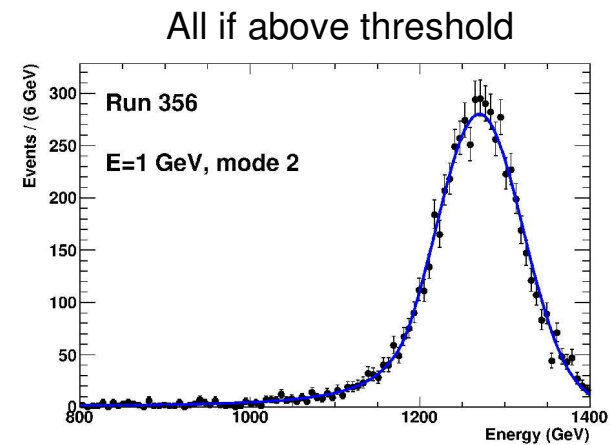
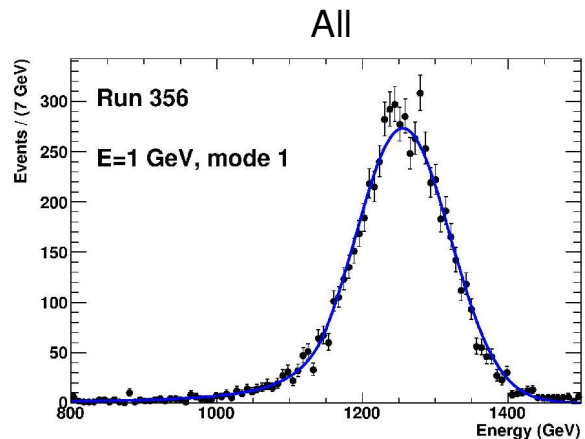
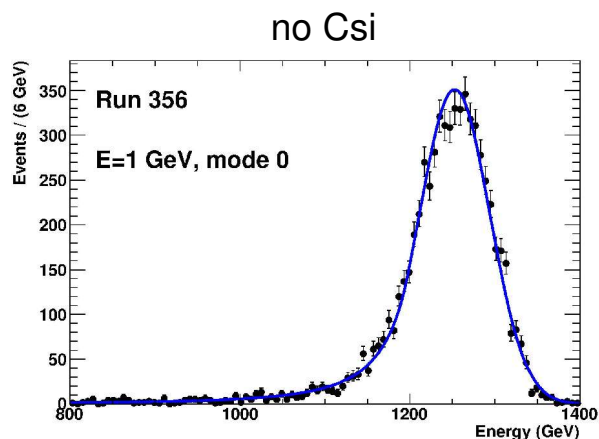


Mode	Core resolution
0	$4.40 \pm 0.07 \%$
1	$5.39 \pm 0.07 \%$
2	$5.37 \pm 0.07 \%$
3	$4.99 \pm 0.07 \%$
4	$4.09 \pm 0.12 \%$

There is a non-negligible systematic coming from definition of fit range

Small improvement in veto mode but larger statistical uncertainties

Run 356 with Csi Data



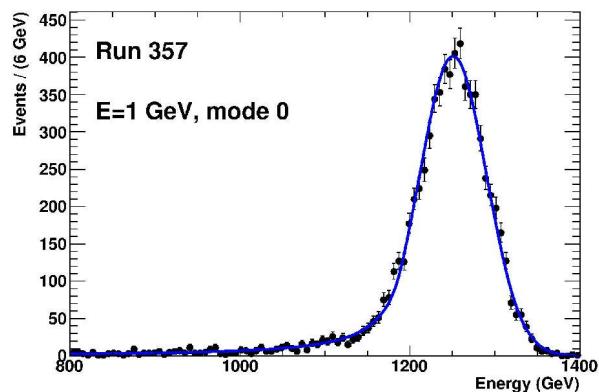
Mode	Core resolution
0	$3.30 \pm 0.05 \%$
1	$5.18 \pm 0.06 \%$
2	$4.06 \pm 0.06 \%$
3	$3.66 \pm 0.06 \%$
4	$3.25 \pm 0.06 \%$

There is a non-negligible systematic coming from definition of fit range

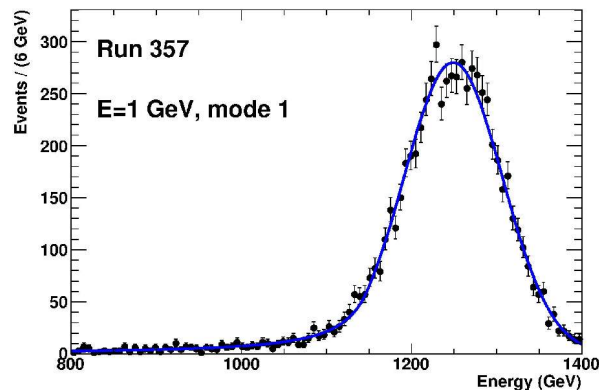
Slight improvement but within statistical uncertainties

Run 357 with Csi Data

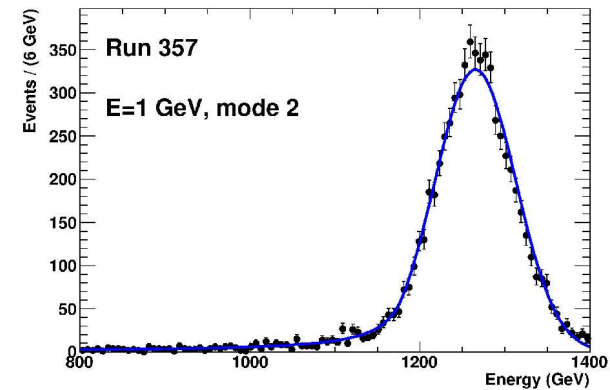
no Csi



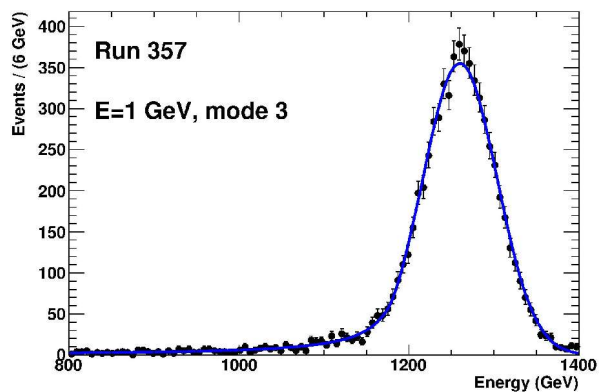
All



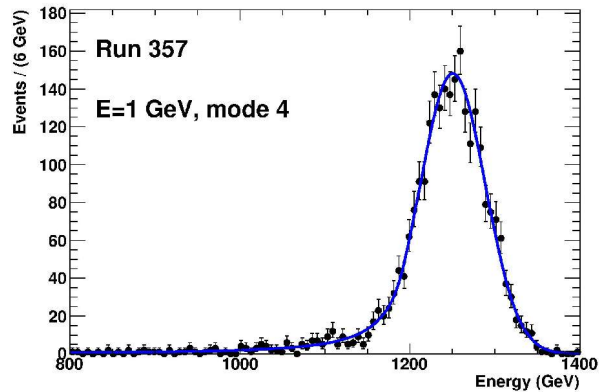
All if above threshold



Most energetic



Veto mode



Mode	Core resolution
0	$3.14 \pm 0.05 \%$
1	$4.63 \pm 0.06 \%$
2	$3.76 \pm 0.04 \%$
3	$3.46 \pm 0.04 \%$
4	$3.05 \pm 0.04 \%$

There is a non-negligible systematic coming from definition of fit range

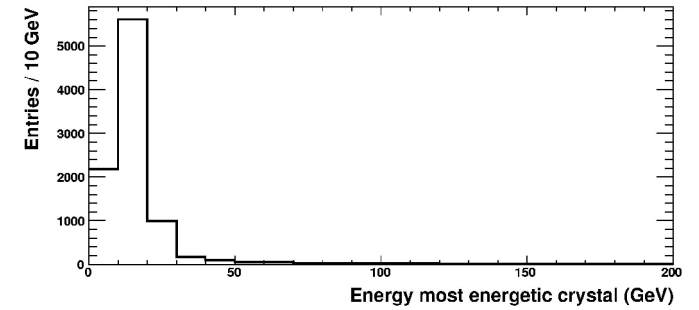
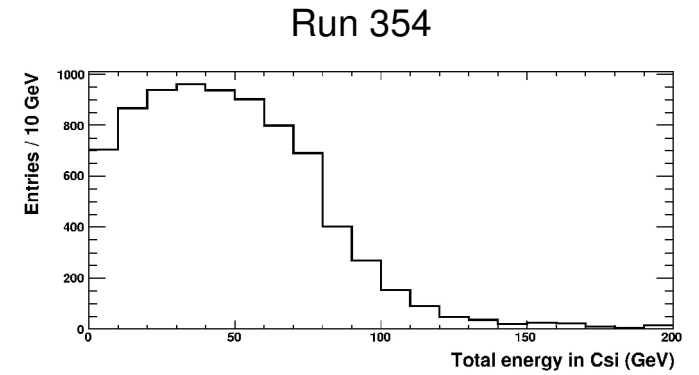
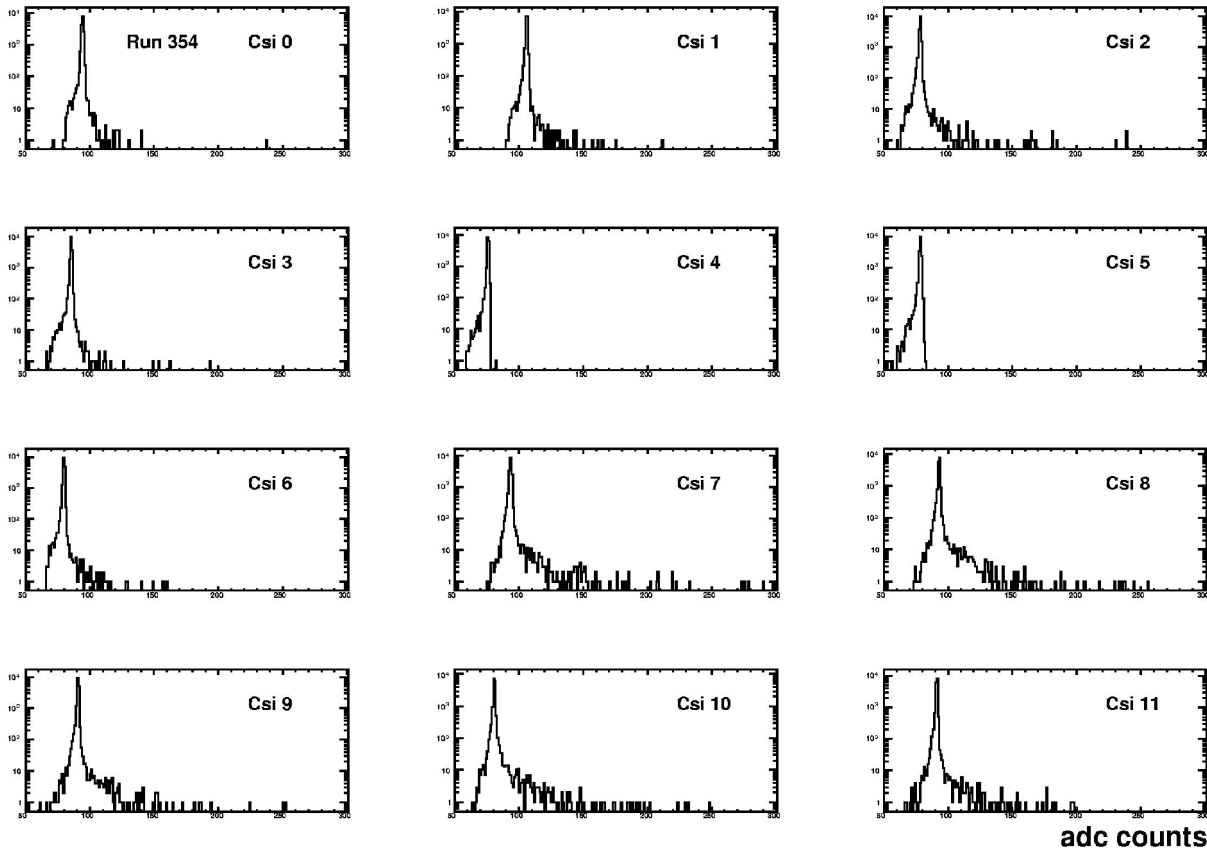
Slight improvement in veto mode

Conclusions

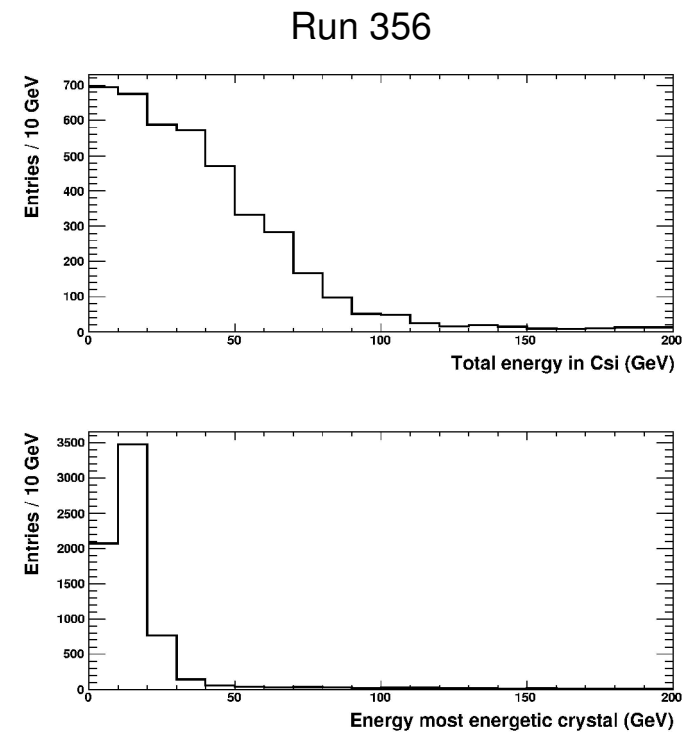
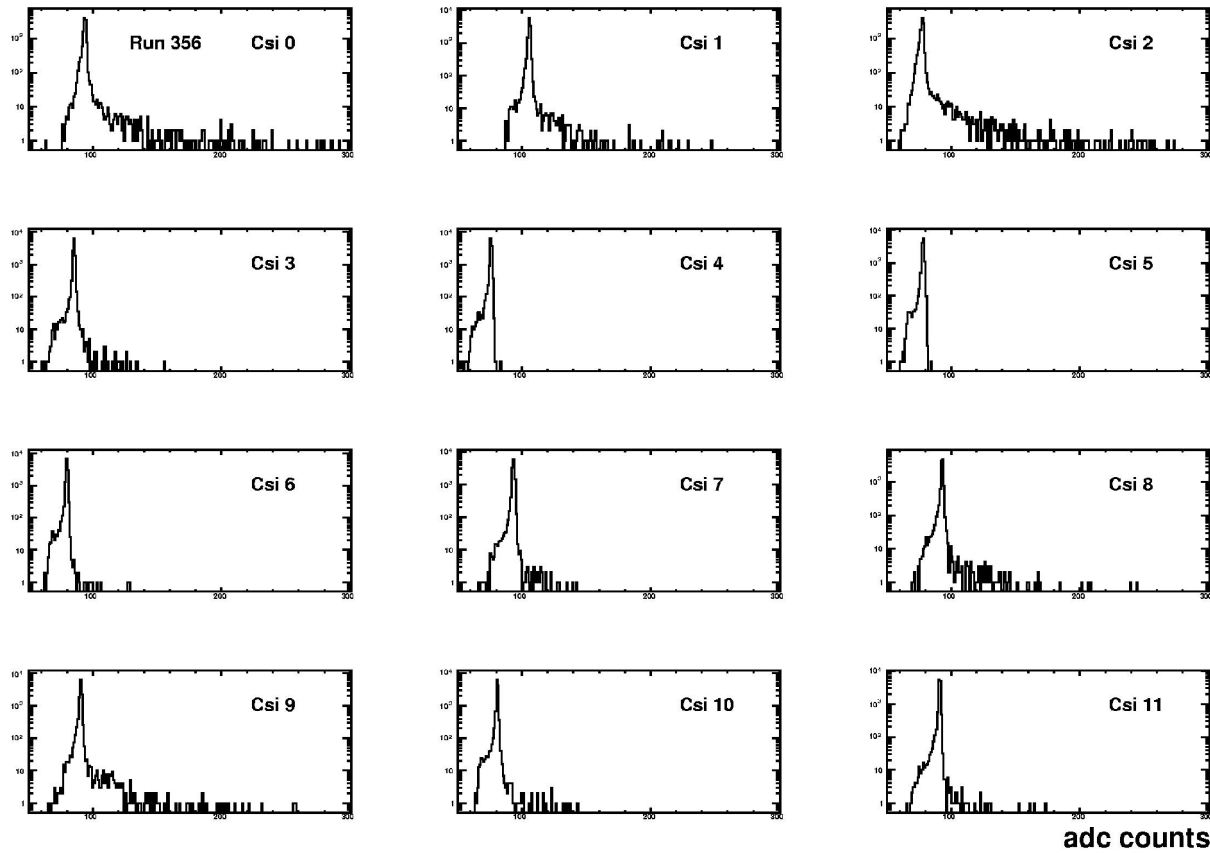
- Csl data lost for interesting runs (high energy).
- Need to check after each run the Csl information next test beam (monitoring plot).
- Need to improve the noise to be really useful.
- For low energy runs, including Csl information can slightly improve the energy resolution for showers near the boundaries of the matrix.

Additional material

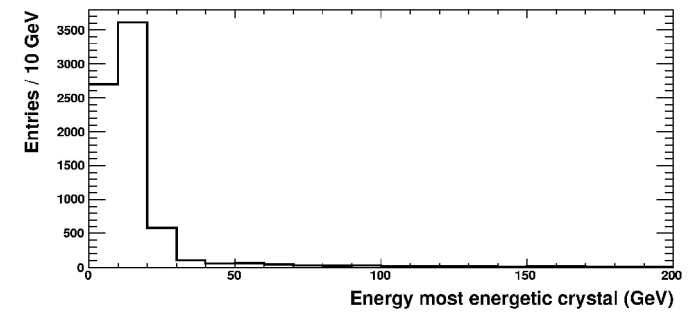
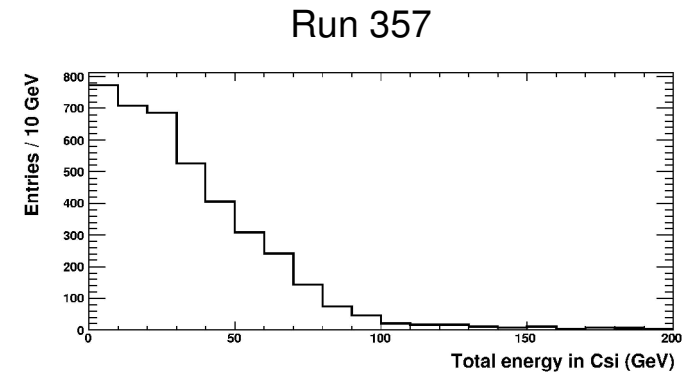
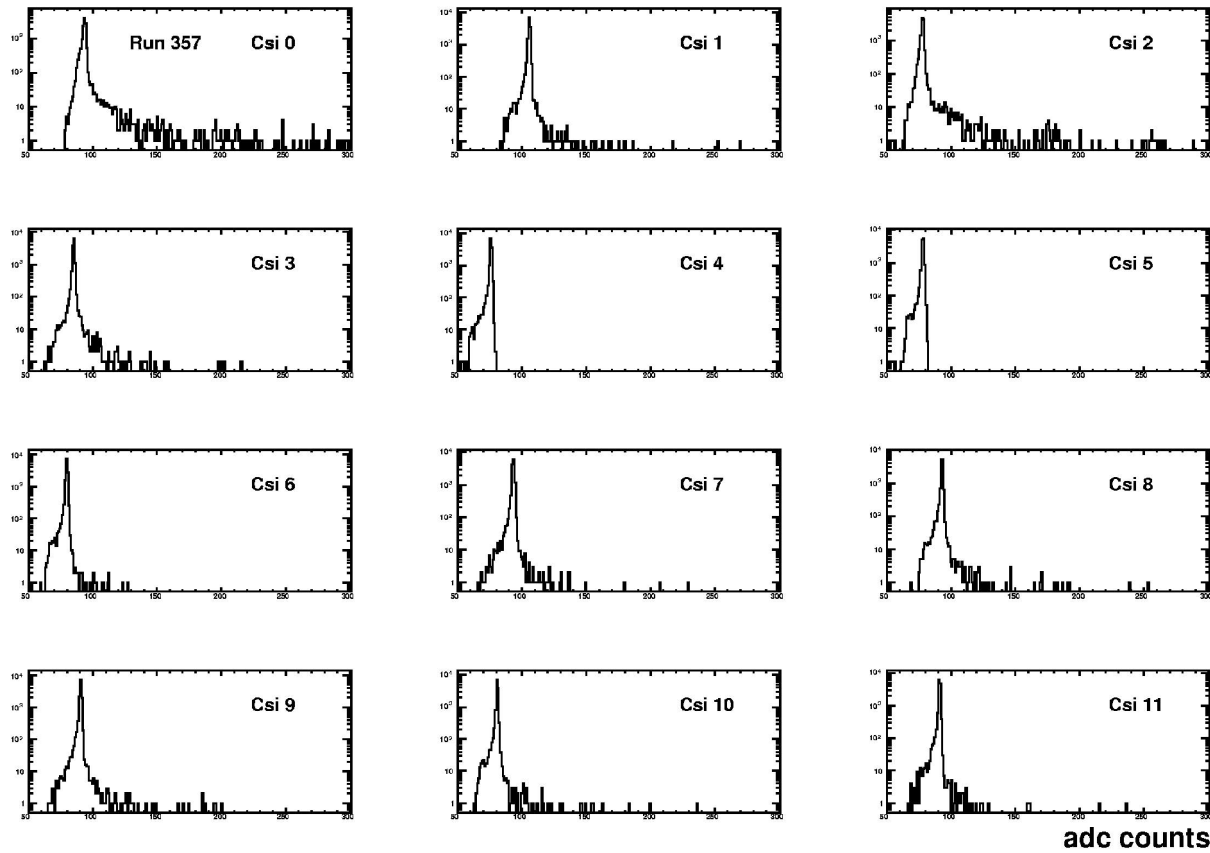
Run 354 with Csi Data



Run 356 with Csi Data



Run 357 with Csi Data



adc counts