Test Beam Results: Trigger and Energy Calibration

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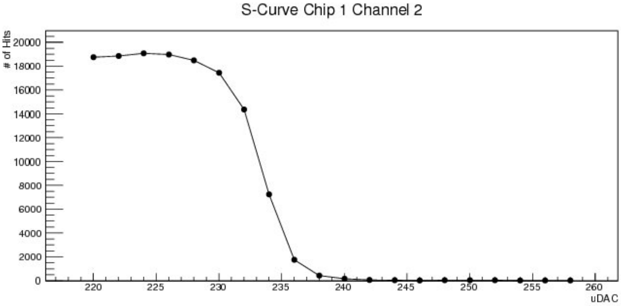
Outline

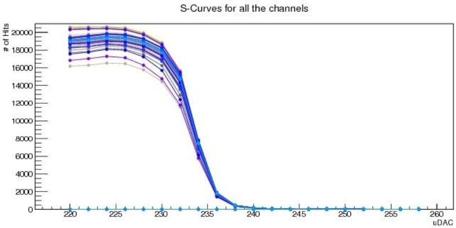
1. The Trigger Calibration
2. Calibration Procedure
3. Conclusion and Outlook

S-Curves



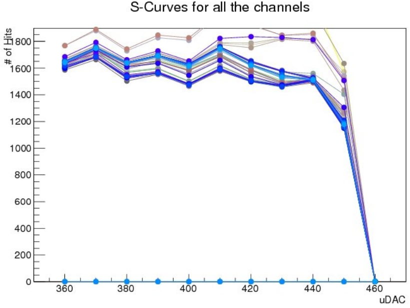
1. To start the data taking we should set the trigger threshold just above the noise.
2. To choose the good DAC value link to this threshold we plot S-Curves.
3. We choose the DAC value in order to not trigger on the noise.

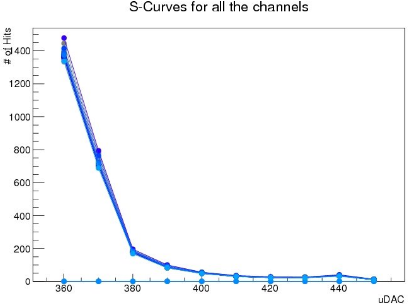
S-Curves



1. We plot the S-Curve for all the channel.
2. The criteria to choose the DAC value was: $N(uDAC) < 1\,\% \times N(220)$
3. Like the channel by channel adjustment is to small we had to choose one DAC value by ASIC.

S-Curves for higher gain





For higher gain value (0.4 pF) the variation of the threshold between DIFs was to high to take data.

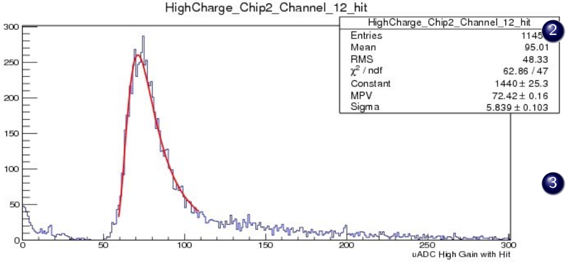
The MIP Calibration

Goals of the MIP Calibration

The calibration process goal is to equalize the response of all the pads.

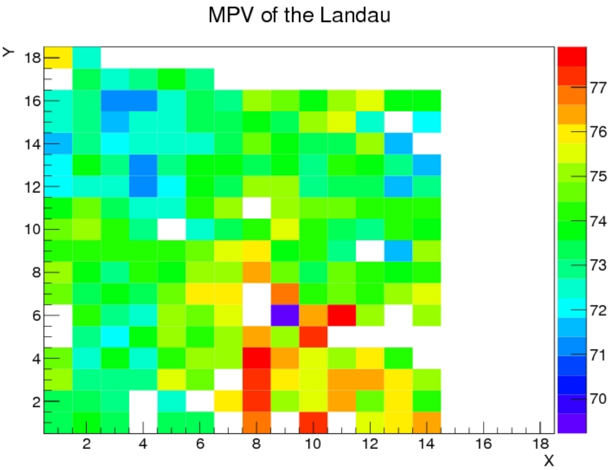
1. For that we want to find the relation:
   electronic signal (ADC units)$\Longleftrightarrow$ energy units (MIP units).
2. First the pedestal is subtracted from the results to have the actual signal value.
3. We can take all the events because at the test beam energy electrons act like MIP particles.

MIP Calibration Algorithm



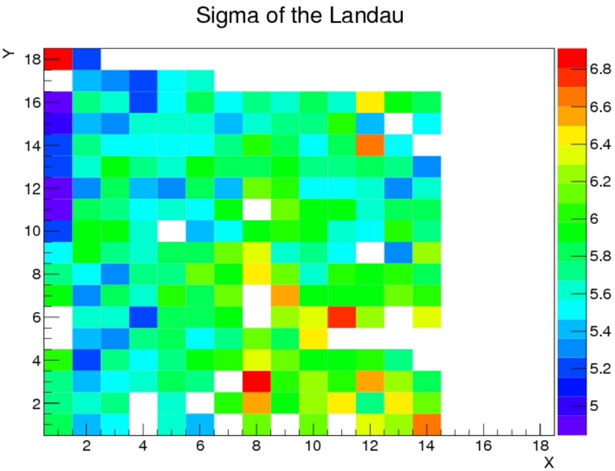
1. Each pad is fitted by a Landau distribution.
2. The MPV of the Landau defines the calibration constant.
3. The fitting range is fixed (60 - 120 ADC units).
4. For each pad the pedestal value is subtracted.

The MPV map



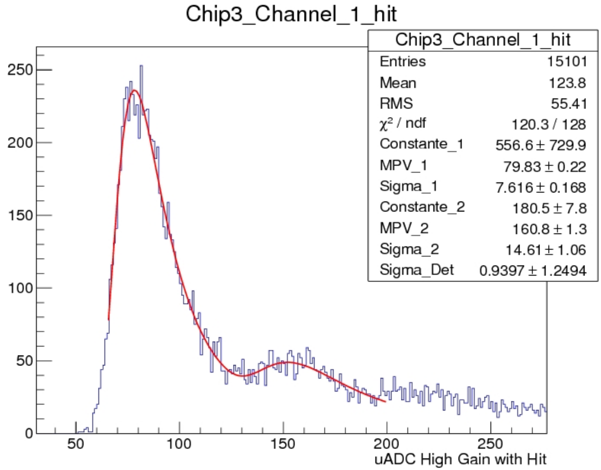
The mean MPV for the dif0 is $74 \pm 4(5\%)\ uADC$. From the simulation $1\ MIP = 0.095\ MeV$.

The Sigma map



The mean Sigma for the dif0 is $5.8 \pm 1(17\%)\ uADC$.

Fitting the MIPs



We also fit the second MIP pic, but calculate the convolution of two Landaus is very long ...

Conclusion

1. We have the calibration constants of the SiW-ECAL prototype for each pads.
2. But we use a fast method.
3. We can make a better method by using only the MIP-like events (straight line) and fitting with a Landau convoluted with a Gaussian.
4. But this take more time and need more statistics.