

Quick Calorimeter updates: SHOE implementation and December temperature study



Calorimeter calibrations implemented in Shoe

- TACACalibrationMap.cxx : load energy (TACA_Energy_Calibration.cal) and temperature (TACA_Temperature_Calibration_perCry.cal) calibration coefficients and crystal equalization (TACA_Energy_Calibration.cal)
- **Hit level** (TACAactNtuHit.cxx class)
 - Conversion from Arduino ADC to Temperature with the proper coefficients for each crystal with the Steinhart-Hart formula
 - $$T(^{\circ}C) = \frac{1}{p0_{SH} + p1_{SH} * \ln(RT) + p2_{SH} * (\ln(RT))^3} - 273.15$$

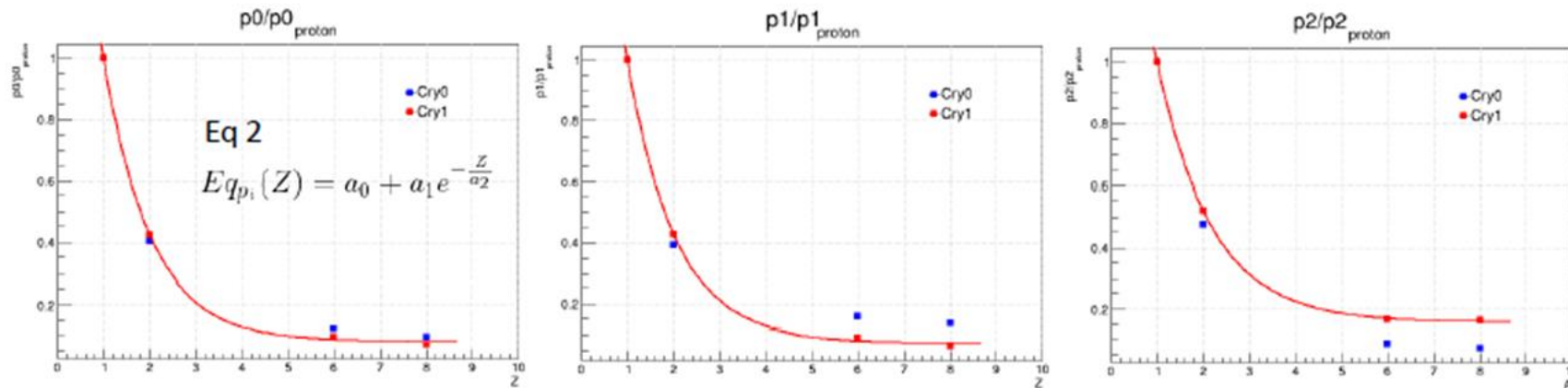
```
#crystalsN
108
#CrId p0 SH      p1 SH      p2 SH
0      0.00138867 0.000204491 1.05E-07
1      0.00138867 0.000204491 1.05E-07
```

- Equalisation of gain for each crystal (to be implemented)



Calorimeter calibration implemented in Shoe

- Cluster level:
 - Looking for the nearest TW rec point with respect to the CAL cluster centroid
 - Z estimation from this TW point both for the crystal seed and for the other crystals
 - $$E = \frac{-ADC p_1 + \sqrt{(ADC p_1)^2 - 4 ADC^2 (p_2 - p_0)}}{2 ADC (p_2 - p_0)}$$
 - p_0 , p_1 and p_2 depends on the Z of the particle



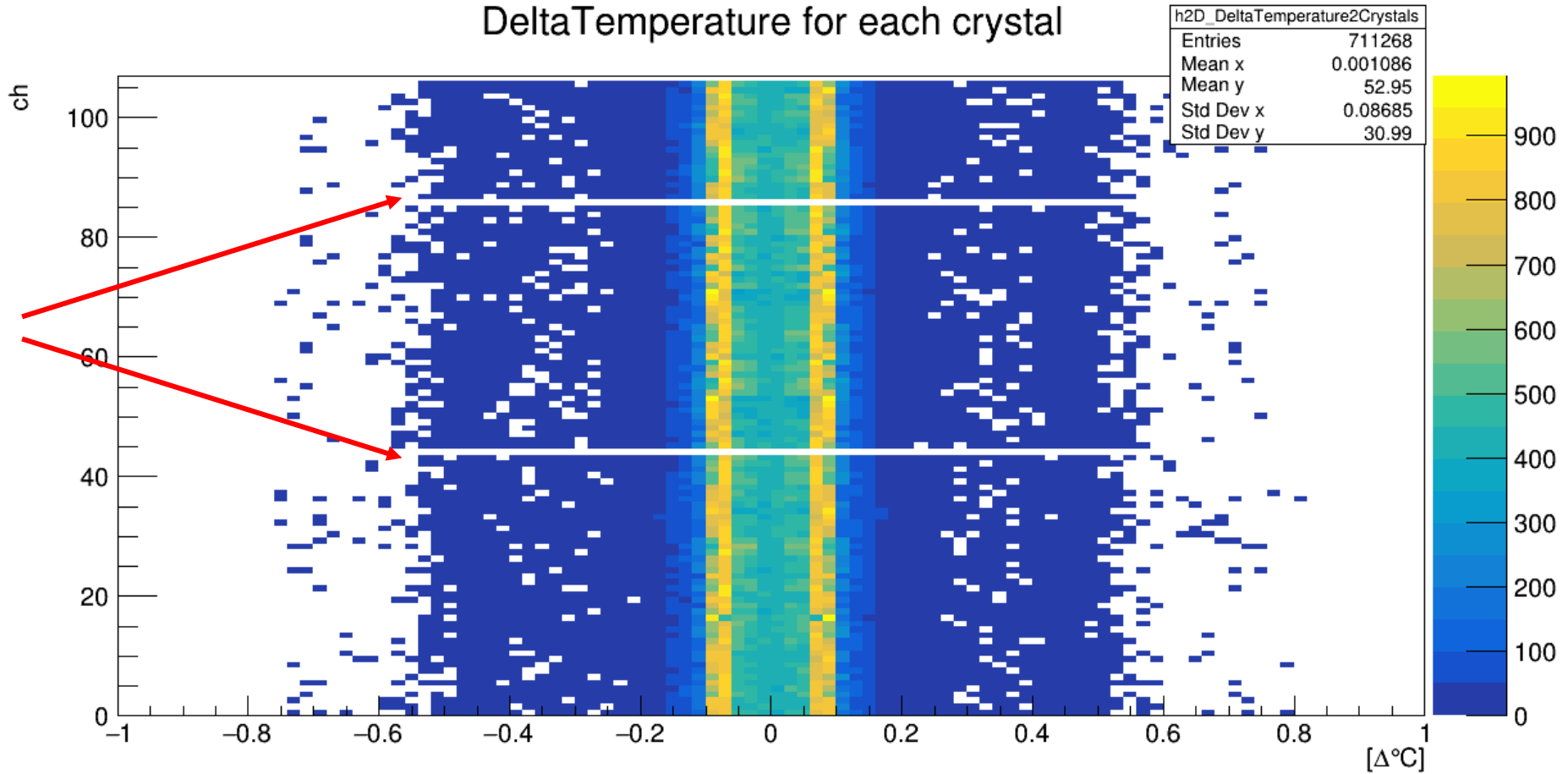
Calorimeter calibration implemented in Shoe

- In TACAactNtuClusterP.cxx (Padme clustering):
 - The p_0 , p_1 and p_2 parameters are calculated by the GetZCurve function once the Z is known
 - The conversion between ADC and energy is performed in the GetEnergy function
 - All the parameters used to performed these conversions can be found in TACA_Energy_Calibration.cal file in the folder of the corresponding experimental campaign



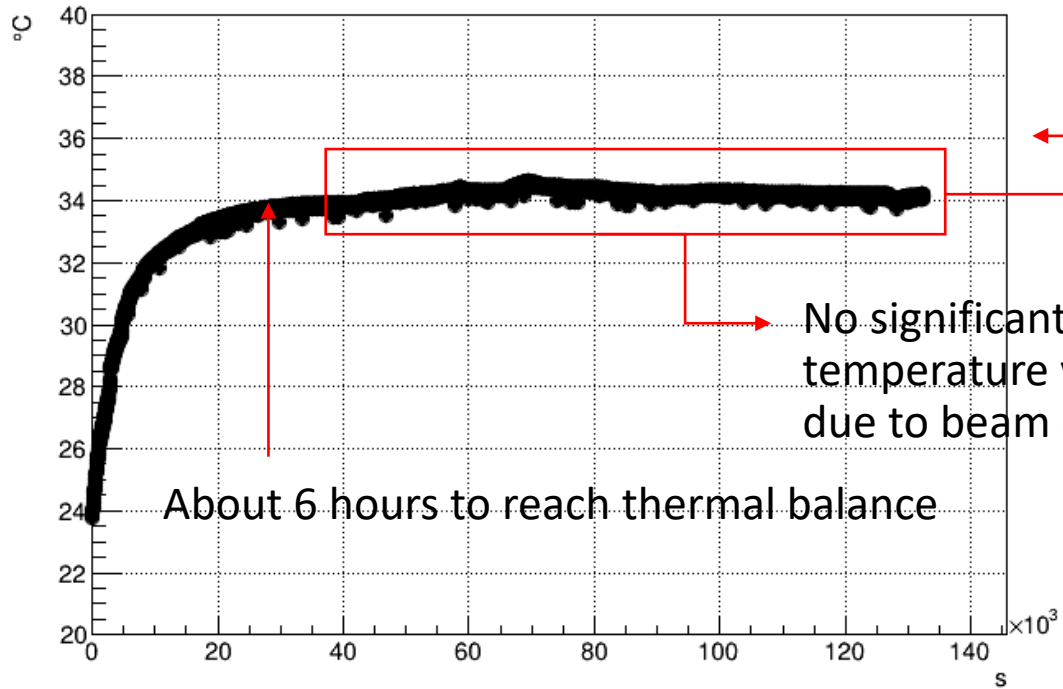
Calorimeter calibration: Temperature stability

Temperature difference between two successive Arduino readouts for each crystal (all December events)



Calorimeter calibration: Temperature stability

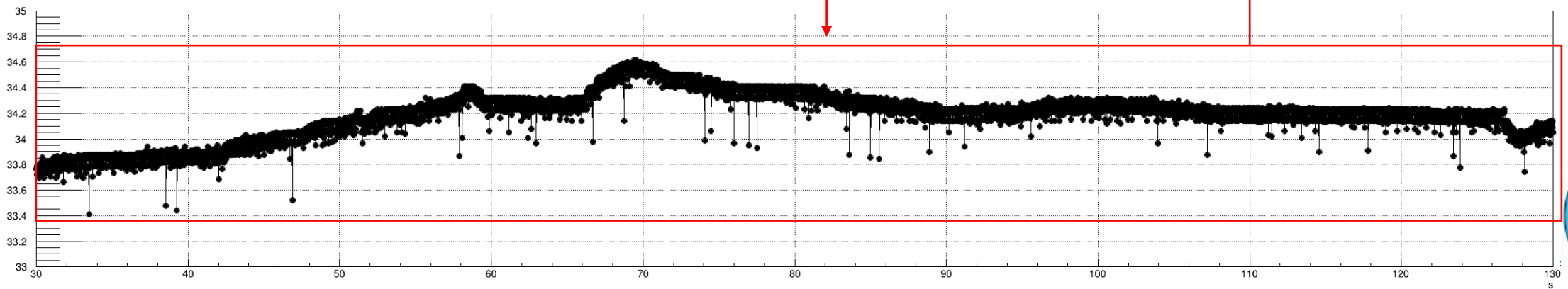
Temperature Cry 26



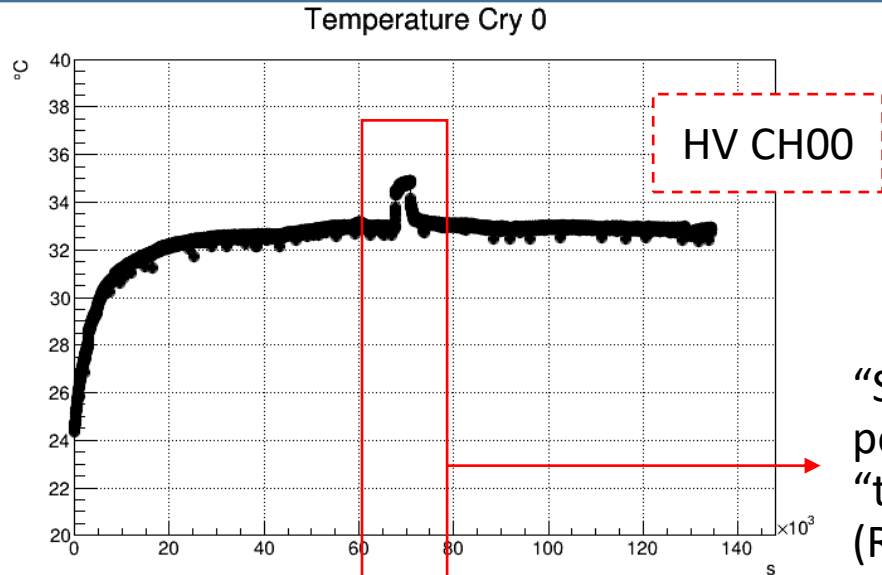
Temperature readouts for all December events

All readouts in thermal balance plateau are between 33.6 and 34.6 C

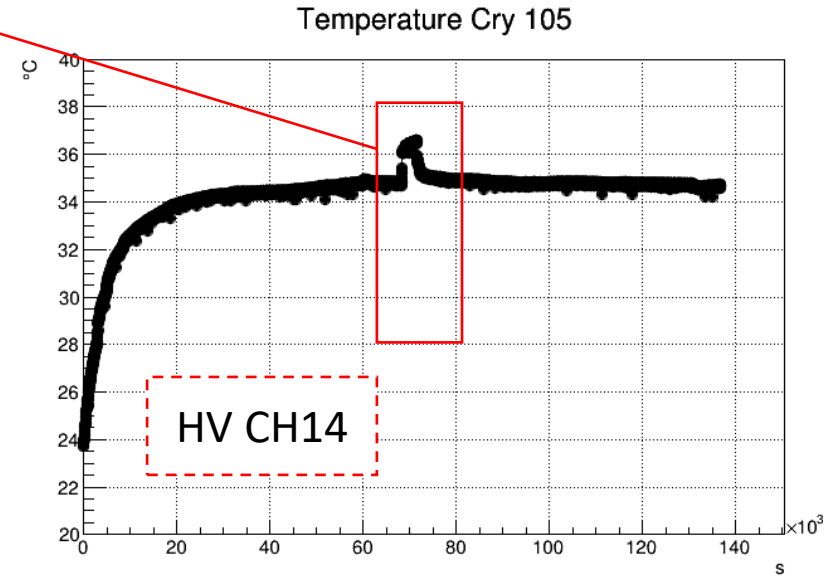
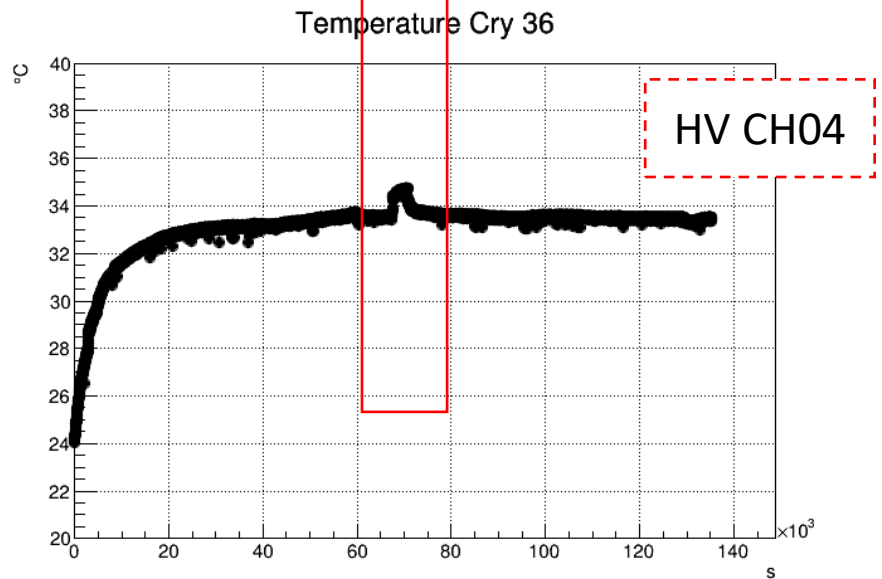
Temperature Cry 26



Calorimeter calibration: Temperature stability



“Spike” shown in all crystals powered by same HW channel (15 crystals with spike)



Next Steps

- 32 new crystal glued in new year, 32 more next week
- Climate chamber calibration for modules from 8 to 12
- Apply temperature correction to energy calibration function

