SiPM response

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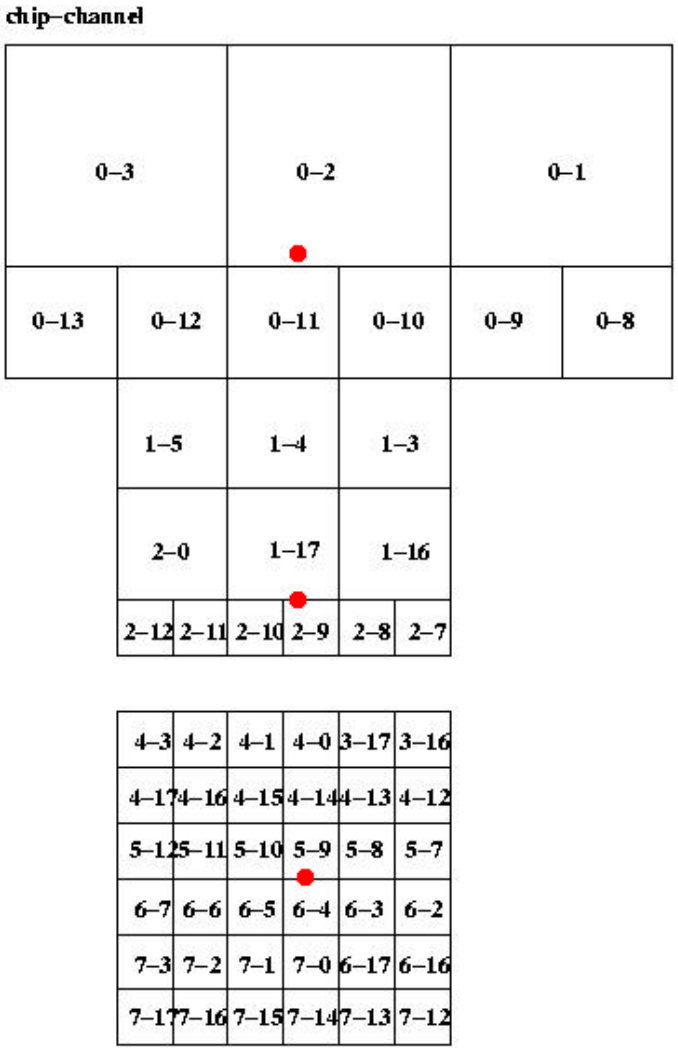
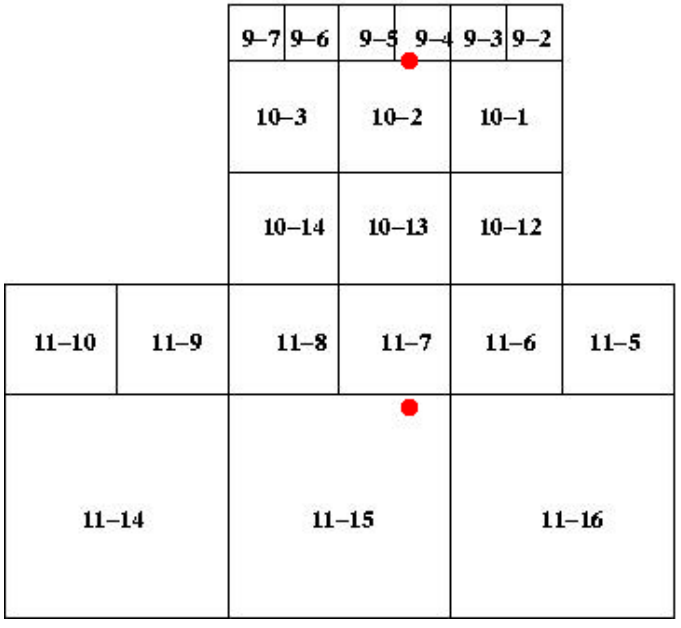
Introduction

- SiPM response depend on temperature and operating voltage
- To monitor the response there is a LED based monitoring system installed
  - Monitor stability of tile-fiber-SiPM system
  - Perform gain calibration
  - Measure SiPM response function
  - Determine intercalibration constants
- In addition to LED system, there are five temperature sensors in each module
  - Measure temperature dependence on SiPM (and PIN) response
  - Determine temperature dependent calibration constants



- Sensors are shown as red dots
- Main temperature gradient is in horisontal direction
- Use runs without cooling to get high temperature measurments points

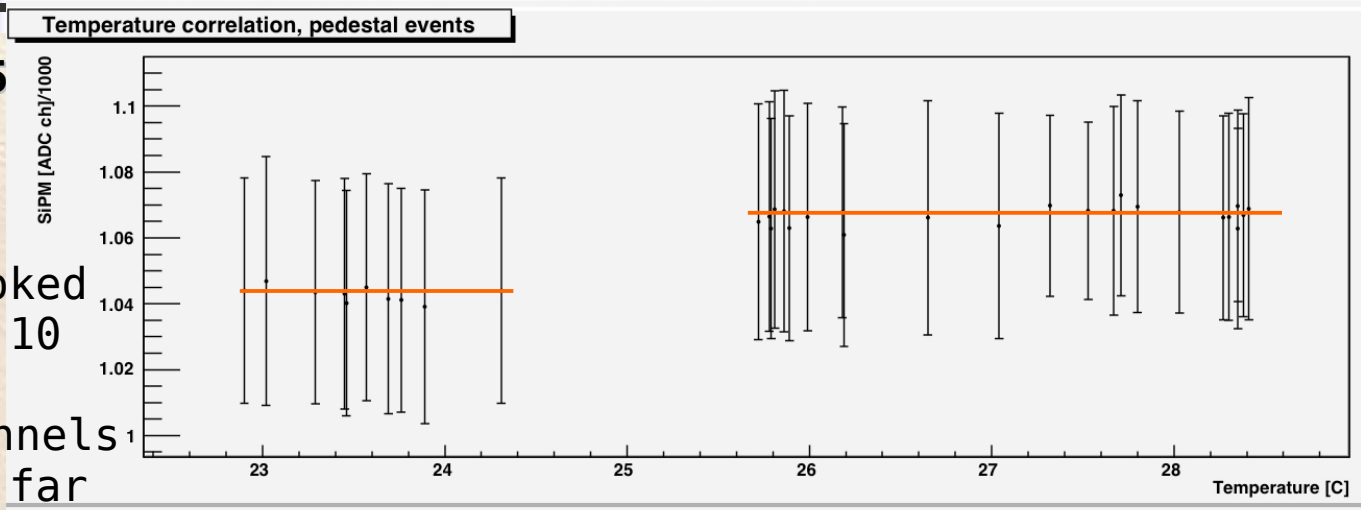


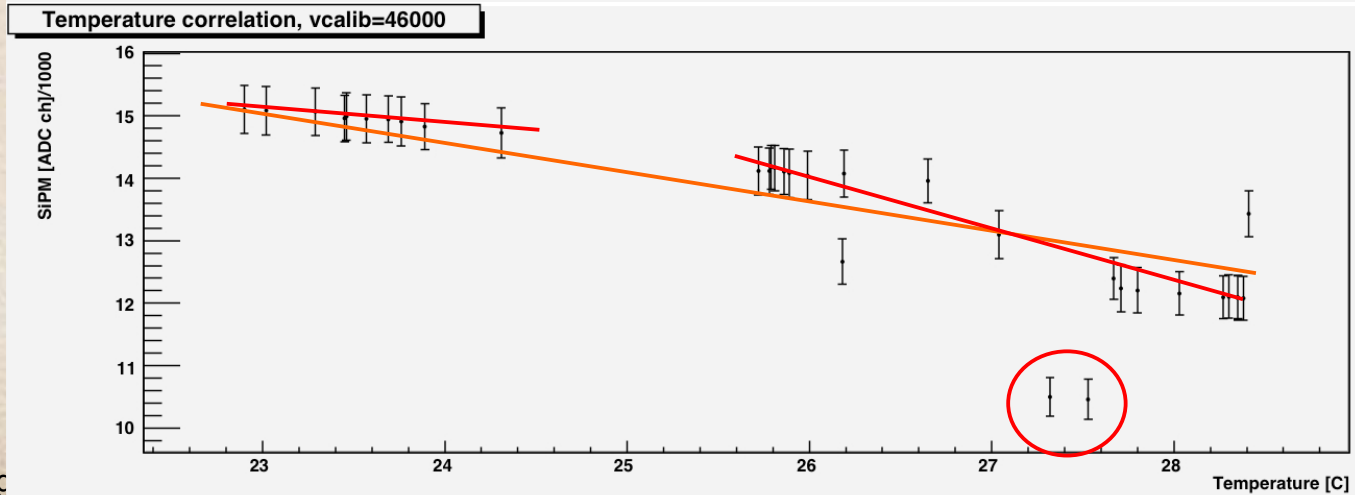
Reminder from February

SiPM Temperature Dependence: Module 15

Chip 5 #9

- We looked at 10 channels so far





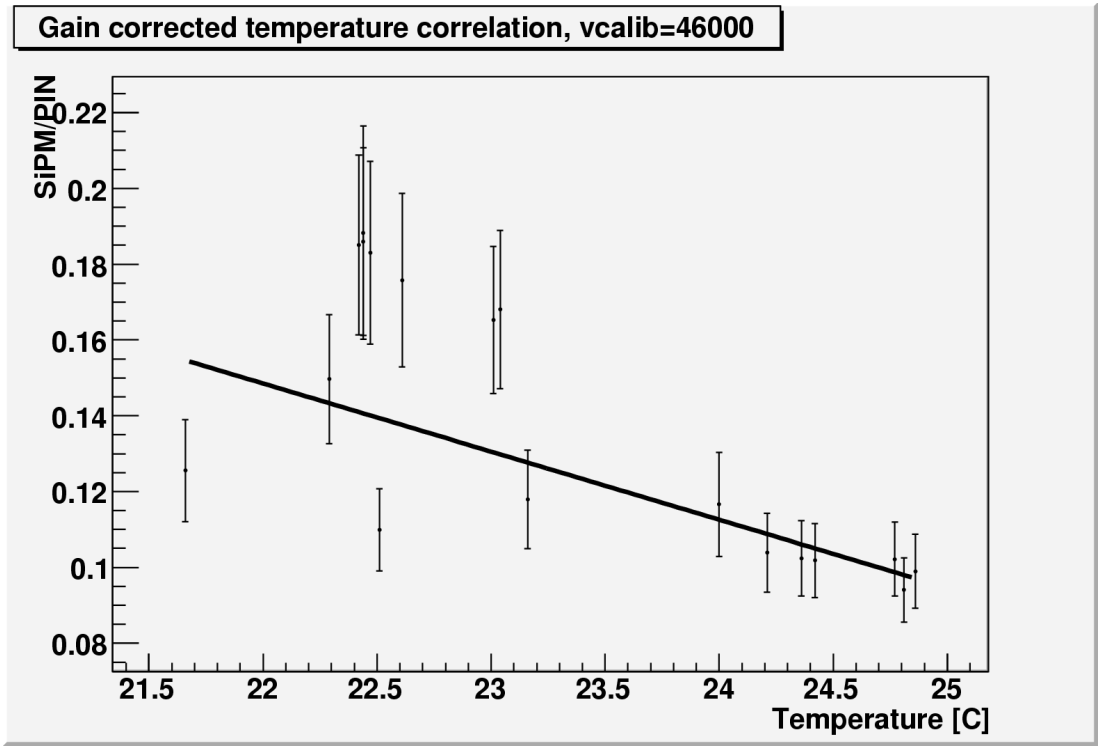
February

- Only October runs
- Runs with and without cooling
- Raw output from SiPMs and PINs

Now

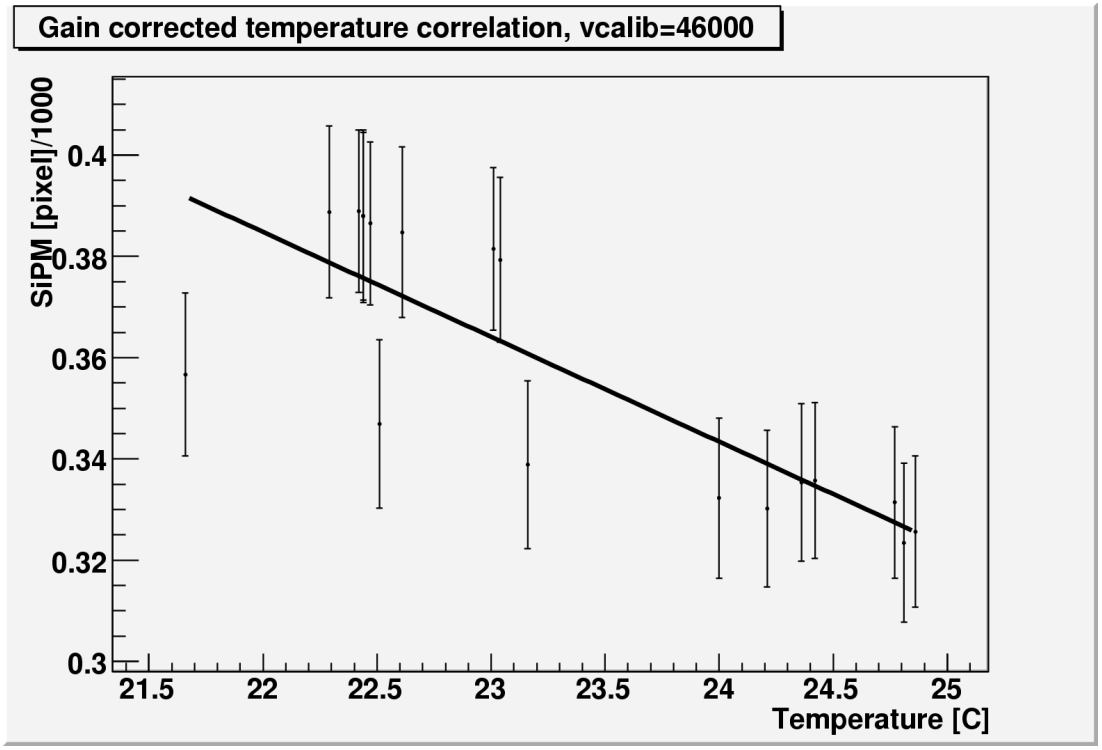
- August/September and October runs
- Only runs with cooling
- Gain corrected output from SiPMs and PINs

SiPM/PIN, August/September and October runs



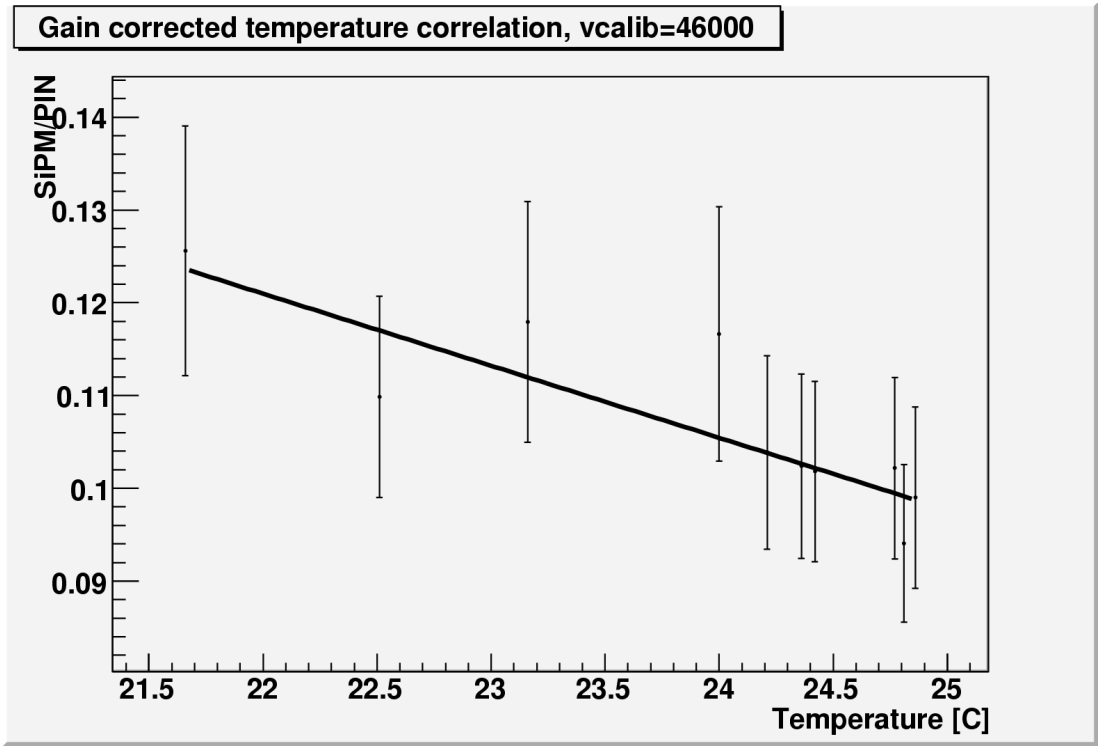
- Look first at SiPM/PIN for all runs at a fixed vcalib value
- Does not look to good...
- Could look like the points fall into two separate sets

SiPM, August/September and October runs



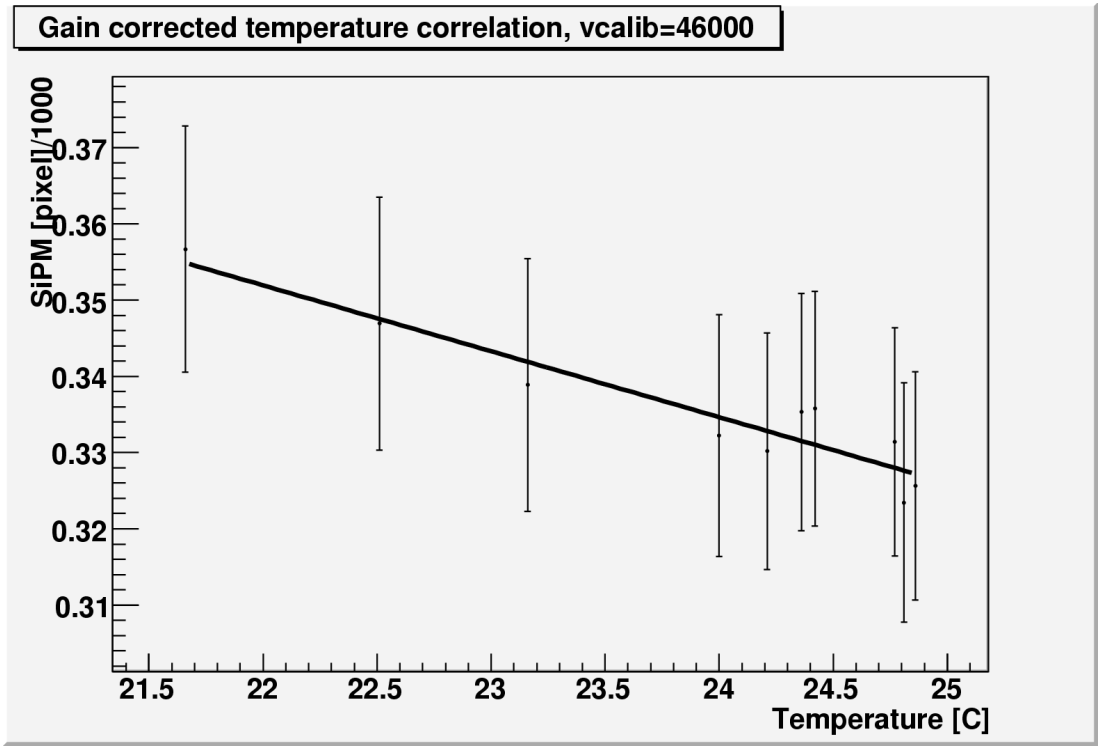
- Focus on only SiPM response
- Grouping is more clear now

SiPM/PIN, August/September runs



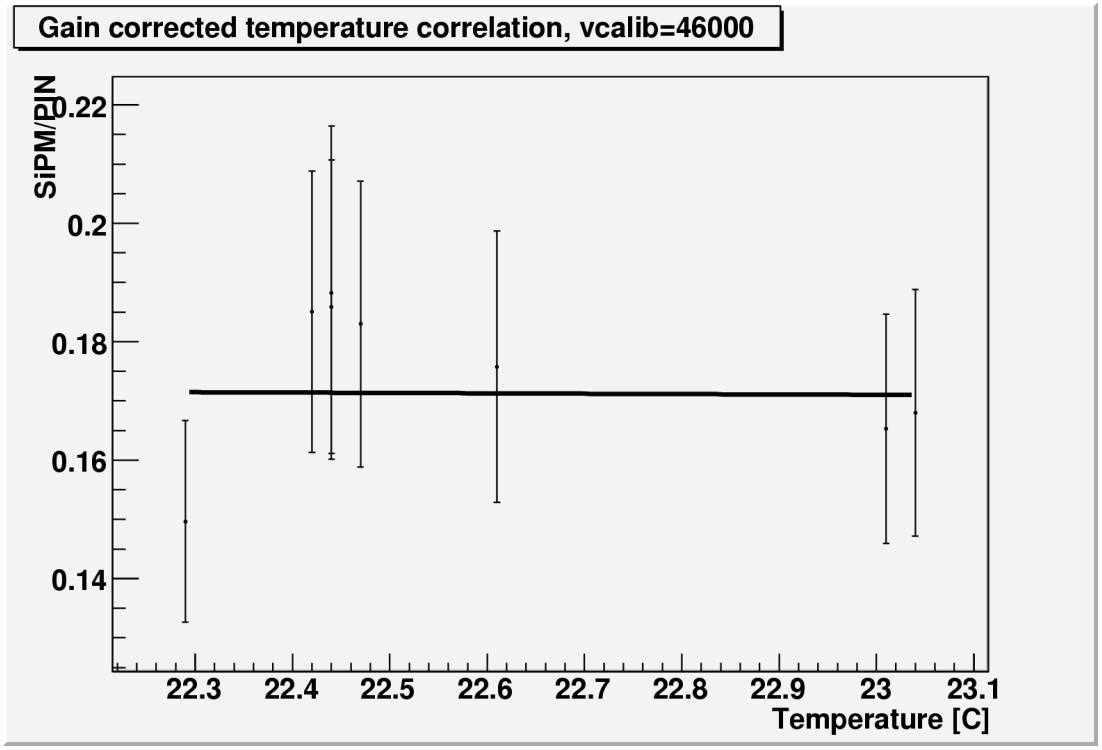
- When considering only the runs from Ausgust/September, all points fall nicely on a straight line

SiPM response, August/September runs



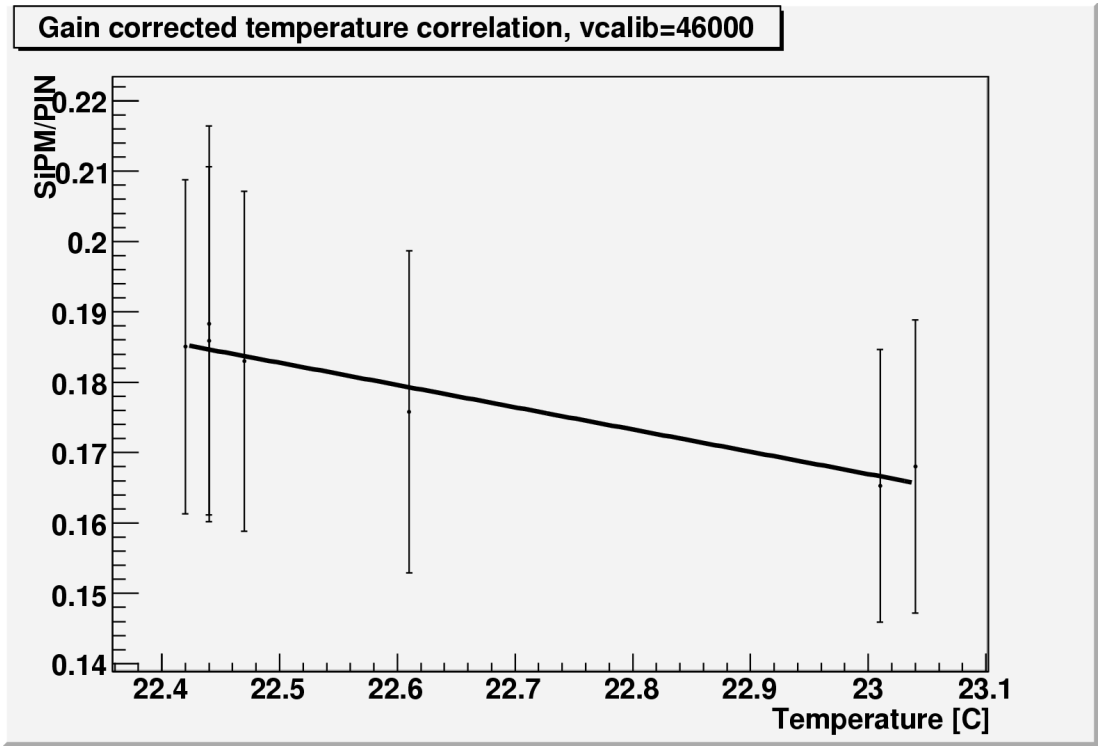
- Fit is even better than for SiPM/PIN
- Now errors appears to be too large

SiPM/PIN, October runs



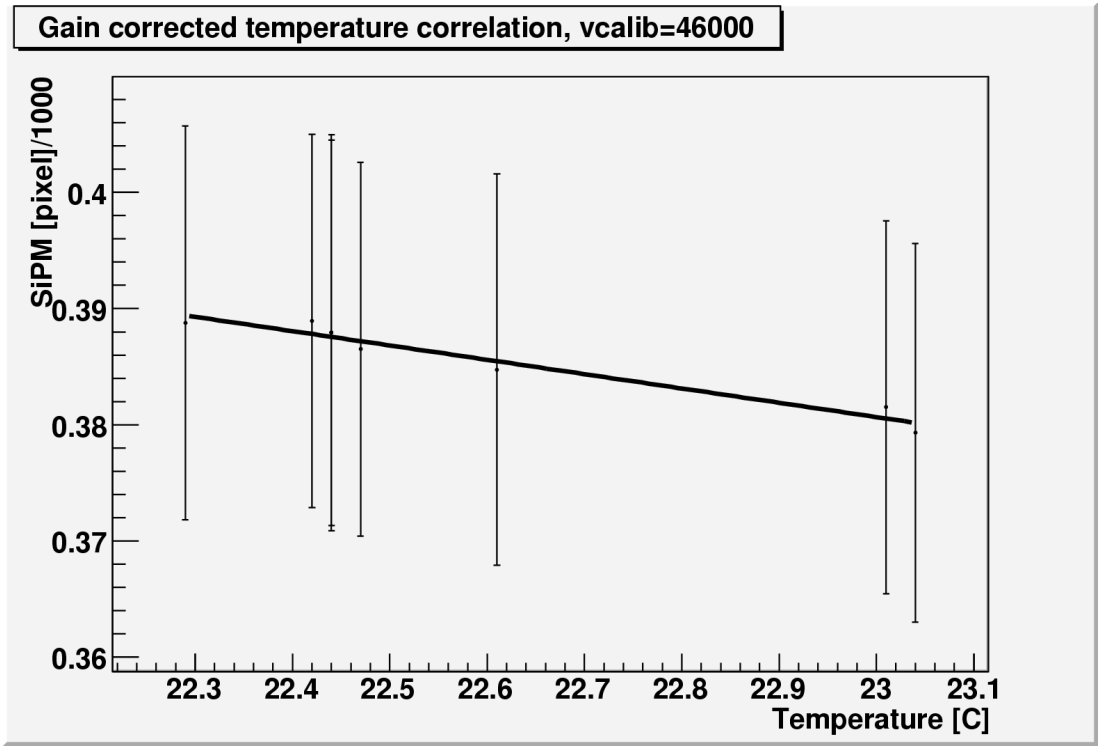
- For the October runs the linear fit does not look at all as good as it did for the August/September runs...
- ...but it is really only one point which is off (Run300622)

SiPM/PIN, October runs



- If we redo the fit without the "bad" point, we find a very good match to a linear fit also for October runs
- Is the "bad" point a fluctuation, or was something different in this run?

SiPM response, October runs



- When considering only SiPM response, all points (including Run300622) falls nicely on the linear fit
- Thus the problem/difference with Run300622 must somehow be related to the PIN diode, not the SiPM.

Conclusions

- The gain corrected temperature dependence on the SiPM response can be fitted with a linear function, but August/September runs and October runs do not agree
- In October we have idenitified one run which deviates a lot form the linear fit
  - need to understand what is special about this run