

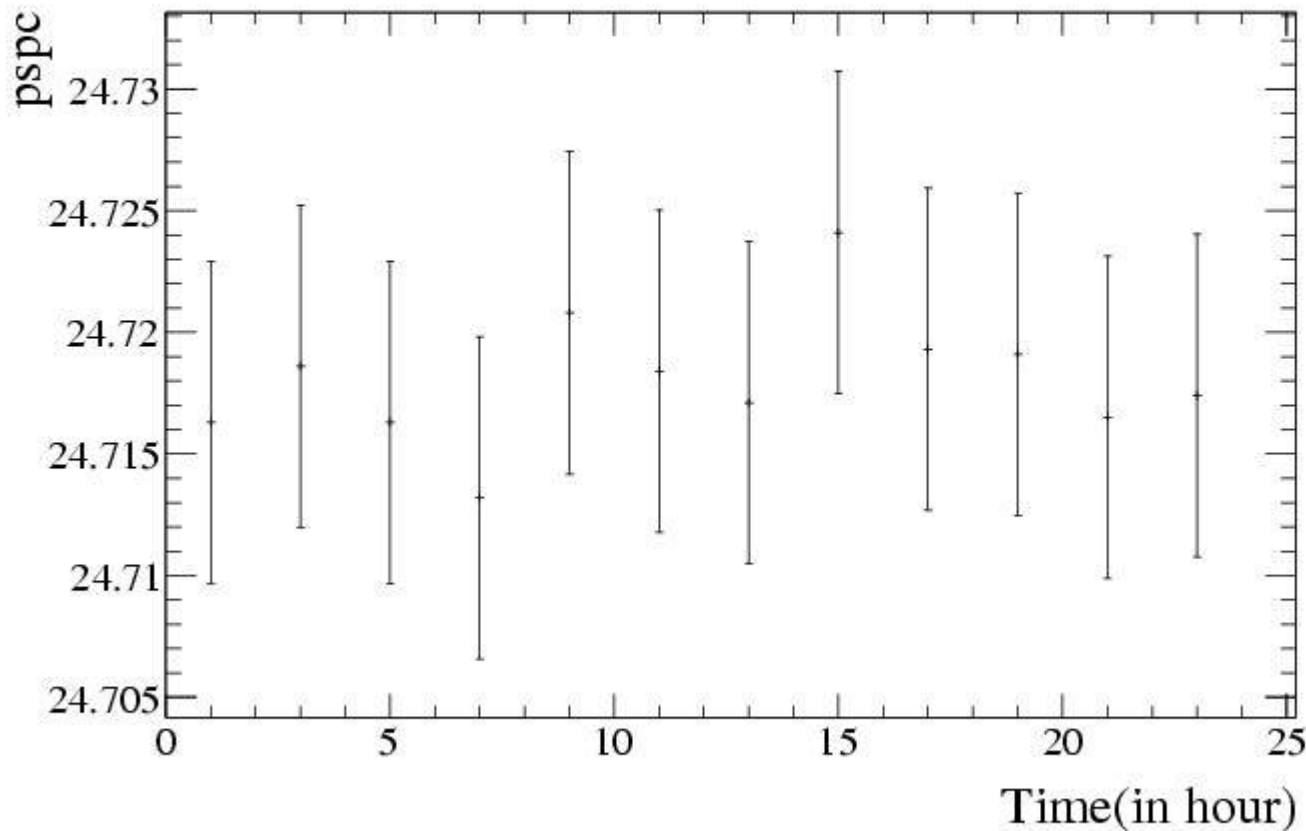
Daily evolution of time-counts relation

Mean daily evolution

- For all pad, I created 12 histograms (00-02,02-04,04-06...). In each histogram, I put the counts values of all events in the good range of hour. The data in each range come from 7 different days (08/18 to 08/24).
- I launched the program what detects the peak position.
- Next, I fitted all these histograms with linear fits.
- I plotted next the evolution of fit parameters during one week

Mean ps per count daily evolution

ps per count in function of time for slot 4 pad 26

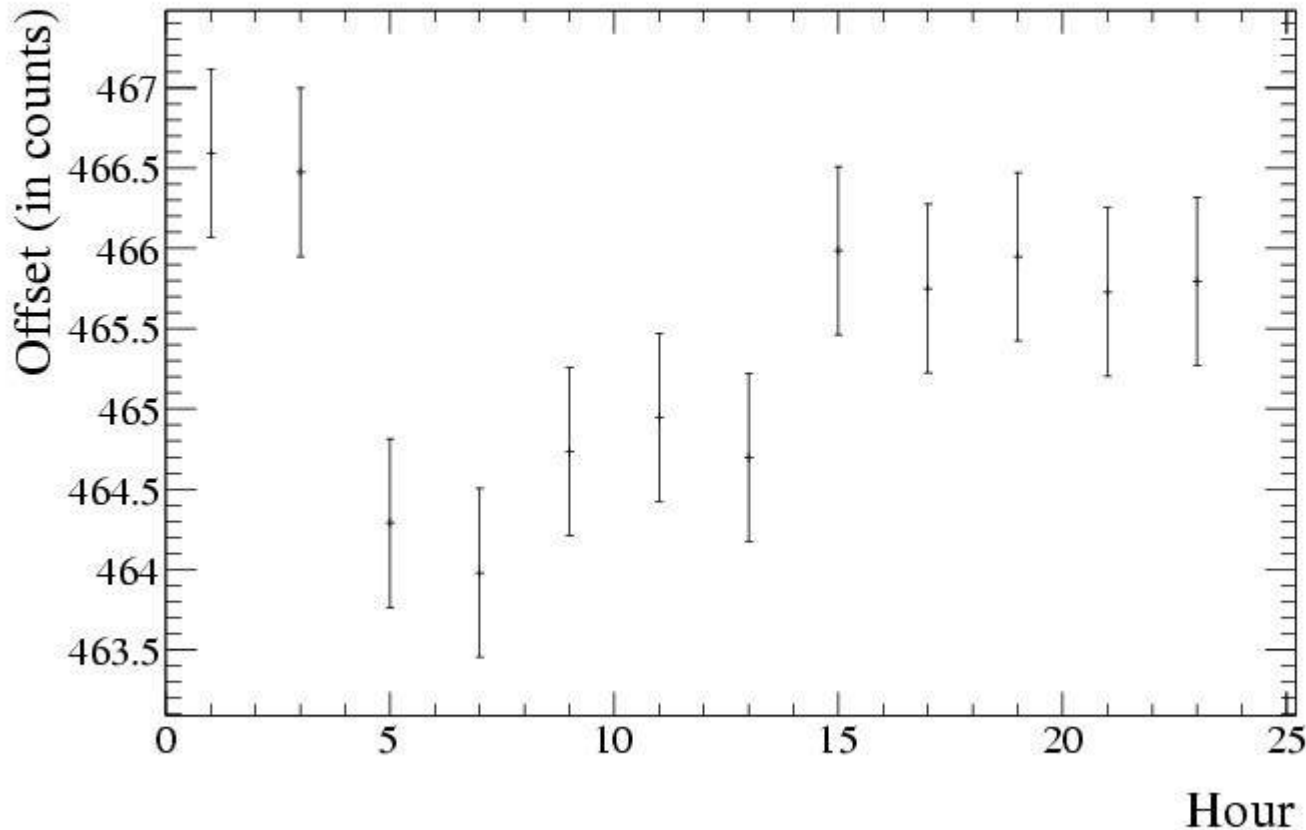


There is no regularity in evolution of ps/count. If an effect exists, it's hidden by the noise.

The variation of ps/count are lower than 0.02 ps/count. It implies only a difference of 40 ps after 2000 counts.

Mean offset daily evolution

Offset in function of time for slot 4 pad 26



We can see a regularity on the plot. There is a day-night fluctuation.

These fluctuations have an amplitude of 4 counts, so 100 ps.

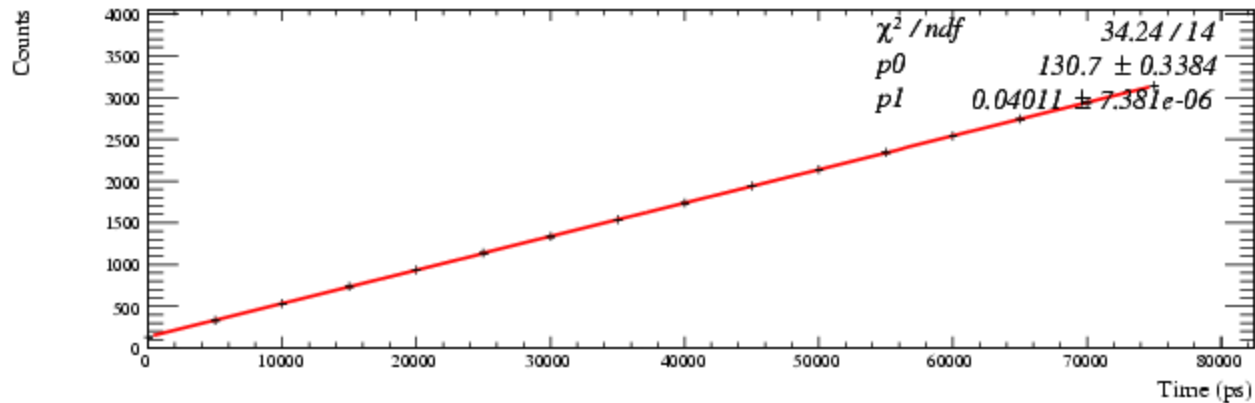
The points at 1 AM and the point at 11 PM have a too different offset. It's probably due to fluctuations on several days.

Evolution on 10 day for pad 56 of slot 3

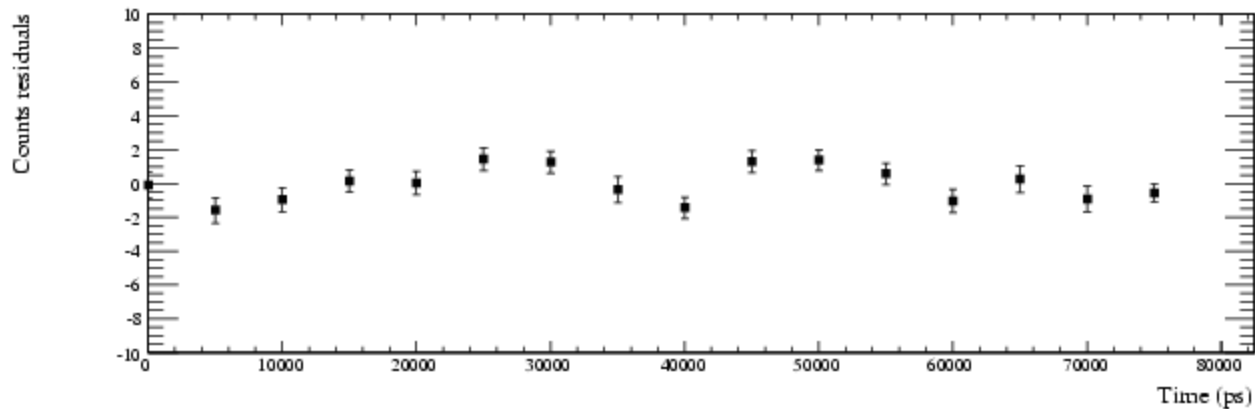
- I modified my root file generator in order to generate one histogram for one hour for the pad 56 of slot 3 (I chose it because it receives more photons than the others). I taken data between 05/19 and 05/28).
- I launched the program what detects the peak position.
- Next, I fitted all these histograms with linear and square fits.
- I plotted next the evolution of fit parameters during one week.

Linear fit of peaks

Counts in function of time for the pad 56 in slot 3 switch on TDC 2 channel 4

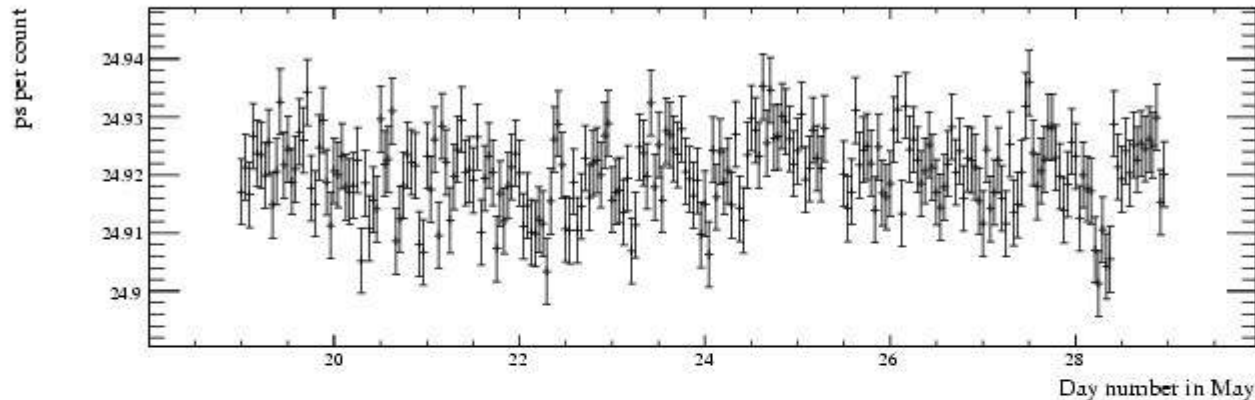


Counts residuals in function of time for the pad 56 in slot 3 switch on TDC 2 channel 4



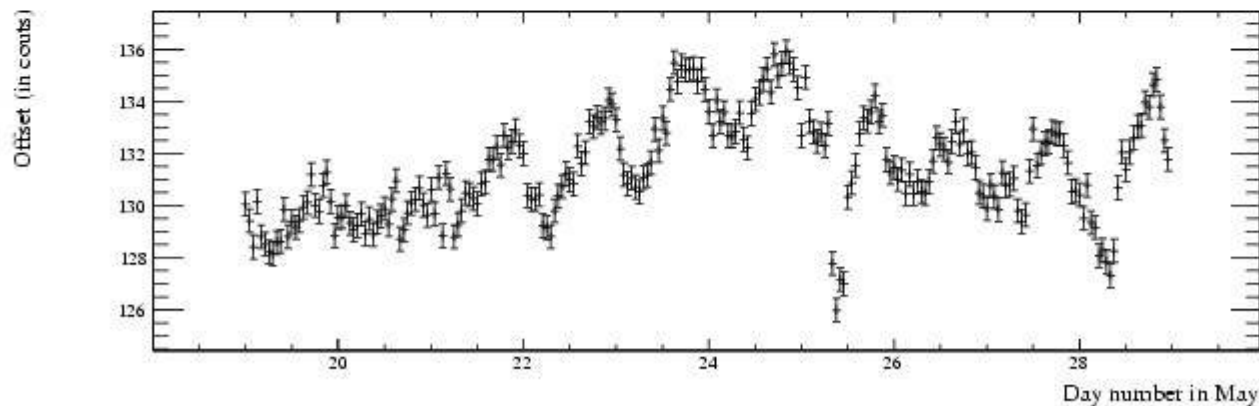
Evolution of linear fit parameter

Evolution of pspc on slot 3 pad 56



It's very hard to see a regularity on the ps per count evolution. There is probably something between the 4th day and the 6th day.

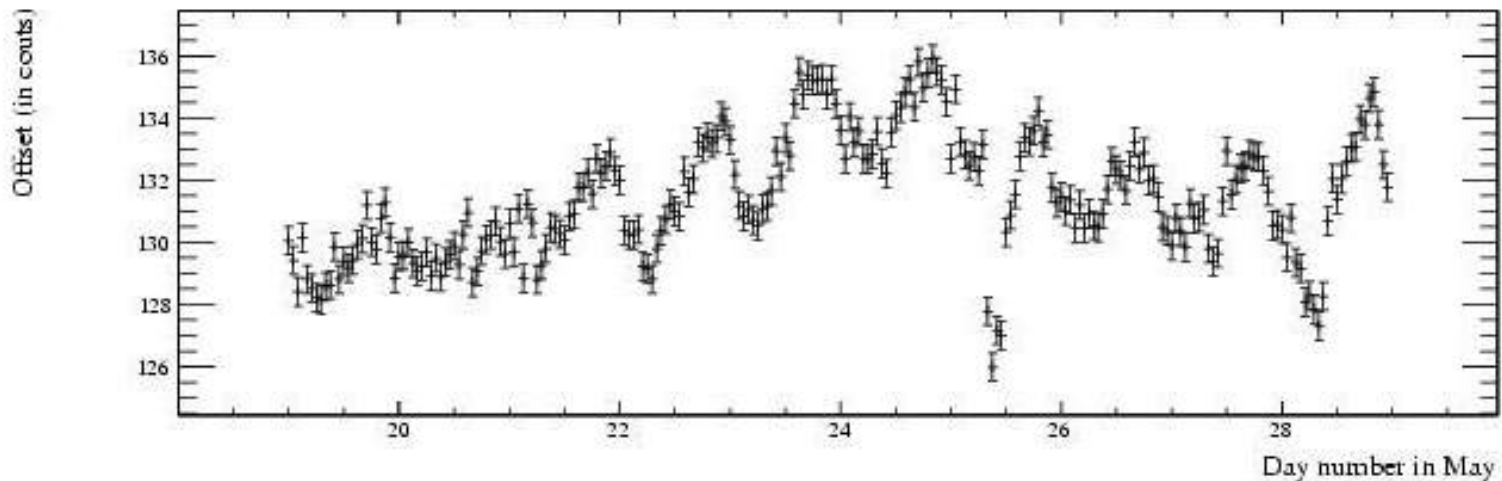
Evolution of offset on slot 3 pad 56



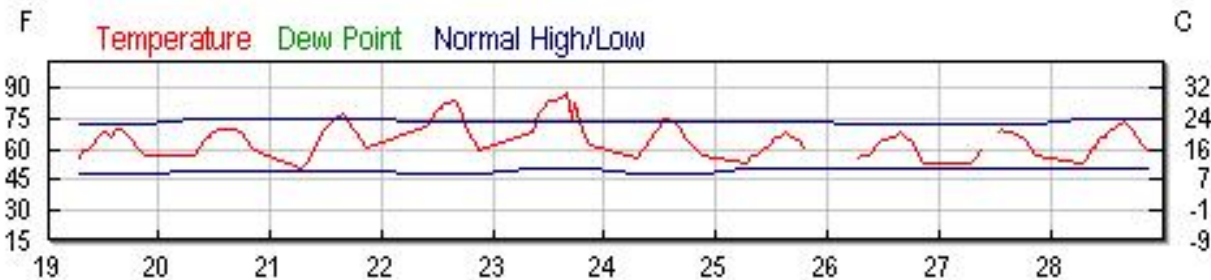
There is clearly an addition of two effects: day-night variation and a global evolution. It would be interesting to know if this evolution is linked with the temperature.

Relation between temperature and offset

Evolution of offset on slot 3 pad 56



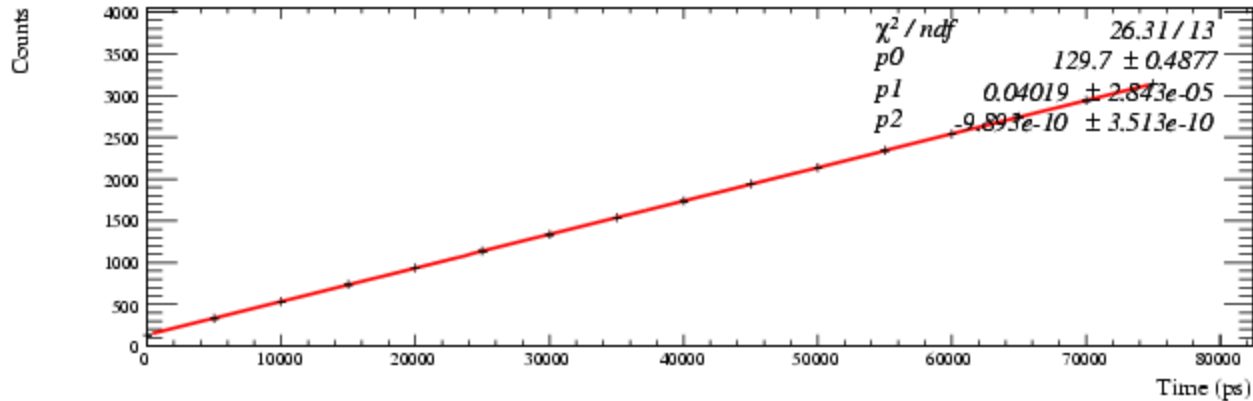
NB: This graph come from a meteo website. Temperature was mesured in Palo Alto.



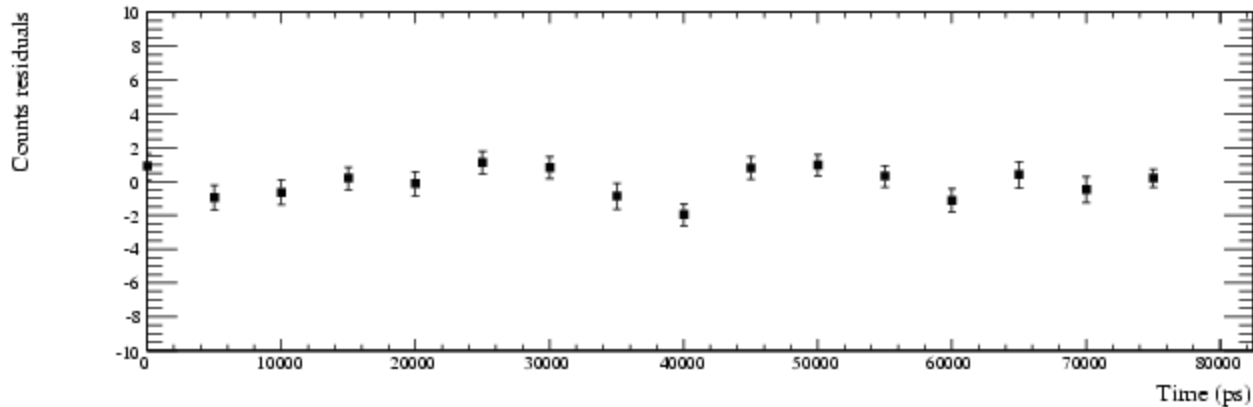
The relation is not perfect. But the temperature in the bulding is not the same because of lot of reasons (thermal inertial of the building, door open or not...).

Square fit of peaks

Counts in function of time for the pad 56 in slot 3 switch on TDC 2 channel 4

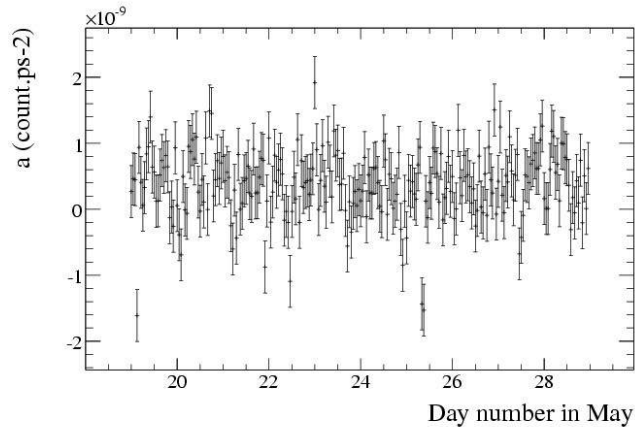


Counts residuals in function of time for the pad 56 in slot 3 switch on TDC 2 channel 4



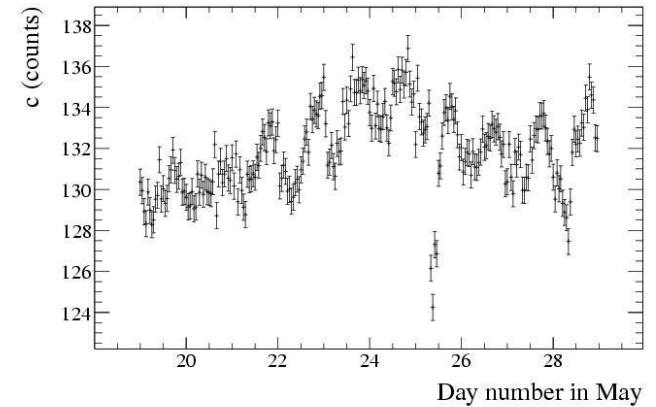
Evolution of the constant coefficient of the square fit

Evolution of a for square fit on slot 3 pad 56

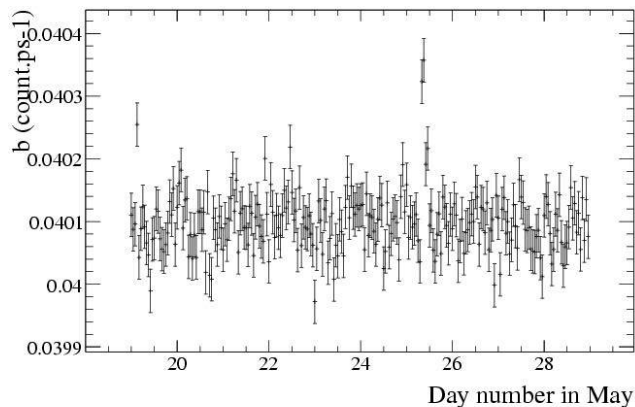


$$counts = a.t^2 + b.t + c$$

Evolution of c for square fit on slot 3 pad 56



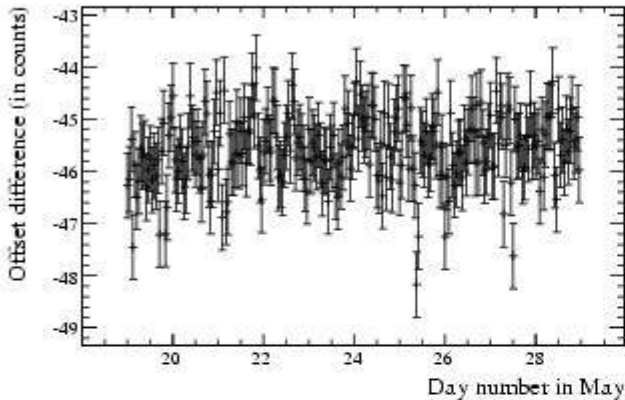
Evolution of b for square fit on slot 3 pad 56



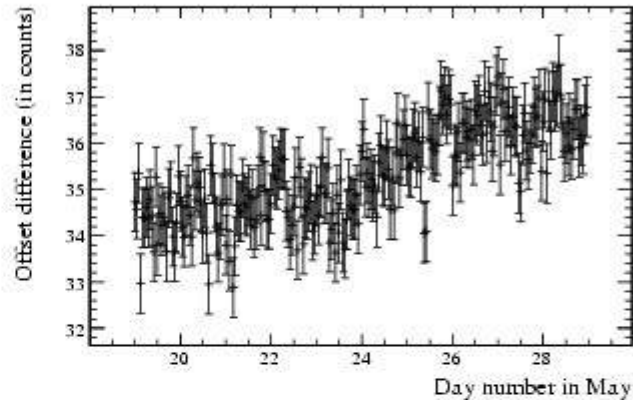
- The fluctuations on a and b are hidden in the noise, if they exist.
- On c, we can see the same evolution than for the offset in the linear fit, but the results is more noisy. It's not so easy to see the day evolution.

Correlation of pad evolution of different pad

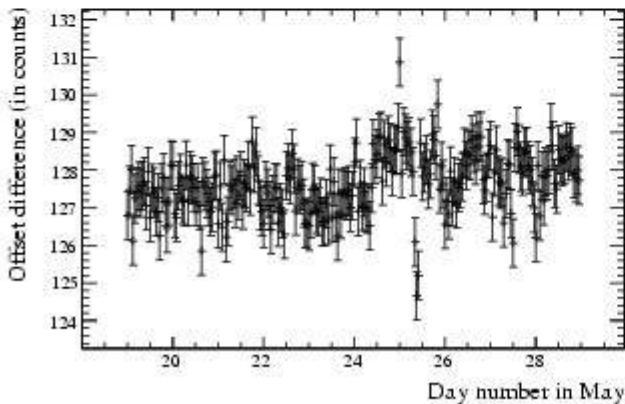
Difference of offset between s3p56 (rdc2) and s2p44 (rdc1)



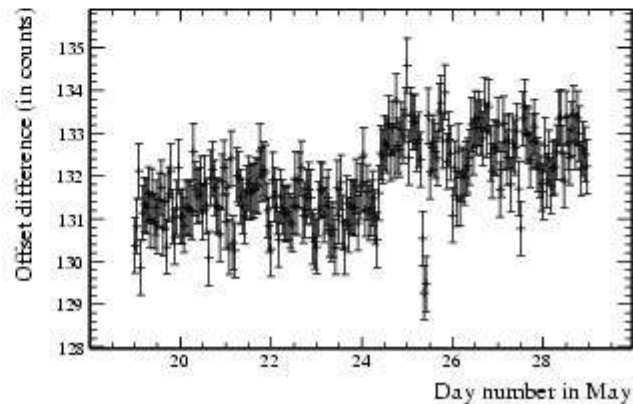
Difference of offset between s3p56 (rdc2) and s4p30 (rdc3)



Difference of offset between s3p56 (rdc2) and s5p30 (rdc7)



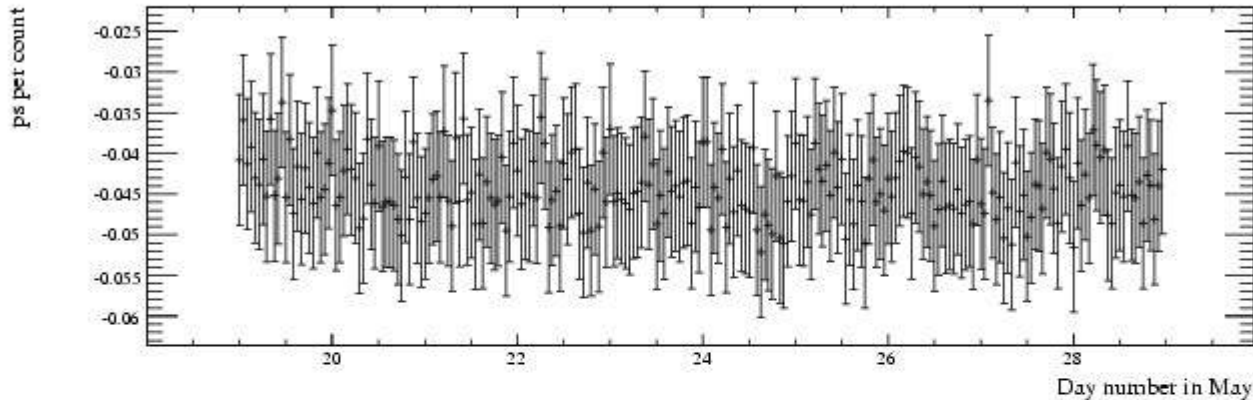
Difference of offset between s3p56 (rdc2) and s5p29 (rdc7)



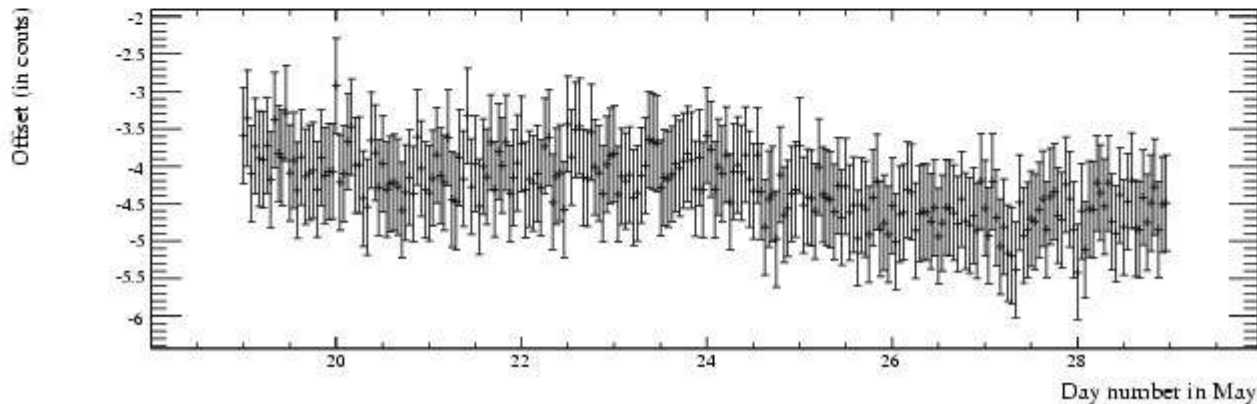
The offset evolution is not exactly the same for all pad. The amplitude of these variation is more little than amplitude of global evolution. The difference is about 3 counts (->75 ps).

Correlation between pads in the same TDC

Evolution of difference of pspc between s5p29 and s5p30



Evolution of difference of offset between s5p29 and s5p30



The offset difference between two pads of the same TDC is not steady. It's tends to indicate that there is a drift in a same TDC.

Conclusion

- The ps/count value seems to be rather steady. The fluctuation during 10 day have an amplitude of about 0.003 counts. It's implies an uncertainty of 60 ps after 2000 counts. It's probably not necessary to calibrate it often.
- The offset value is not so steady. The fluctuation on 10 day are around 10 counts. It implies an uncertainty of 250 ps. These fluctuation are sometimes very important in only one hour. We need to find a method to correct it.