DEEP UNDERGROUND NEUTRINO EXPERIMENT

ProtoDUNE + DUNE CISC meeting
19/09/19

Temperature analysis

Dynamic Calibration

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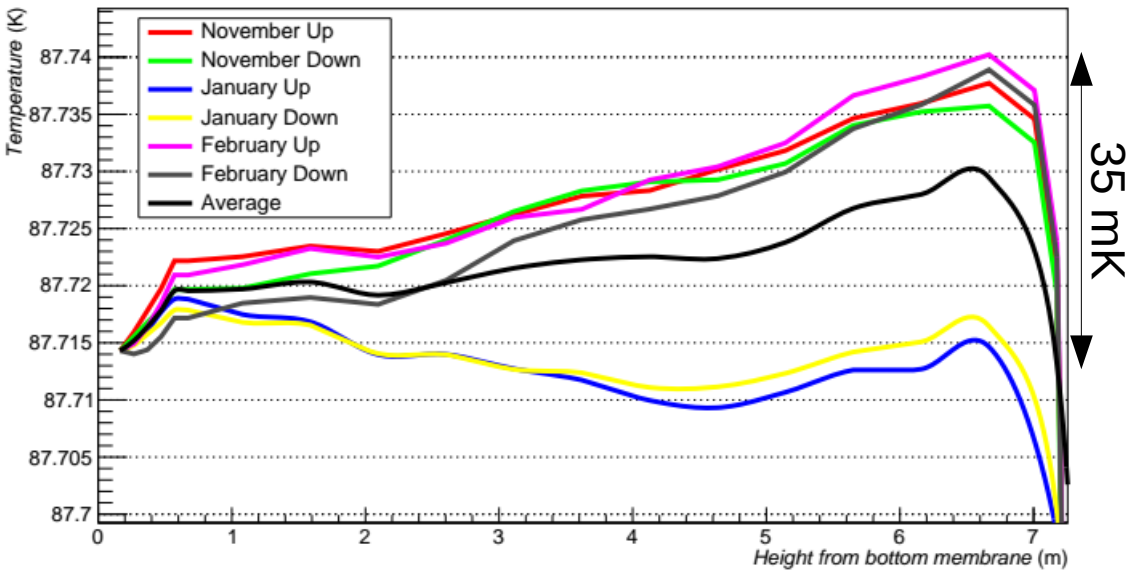
Dynamic calibration: new approach

Last week it was presented a new approach to compute dynamic profile → https://indico.fnal.gov/event/21798/contribution/1/material/slides/0.pdf

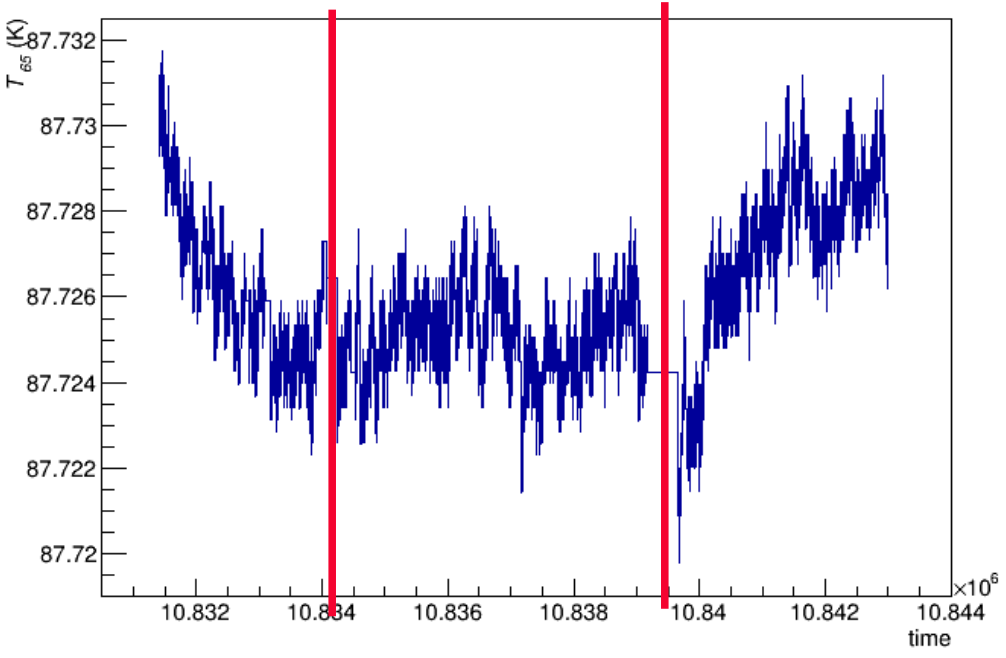
The resultant profile was strange and dispersion was too big → a review has been done

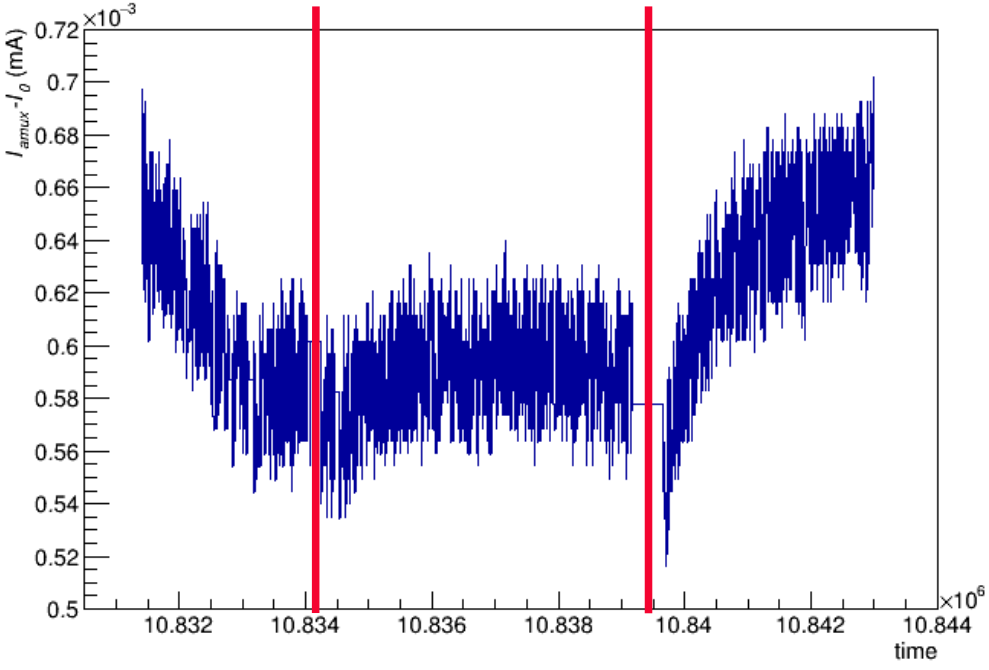


Amux current effect

Ambient temperature modify amux currents. This modification shifts sensors answer and then calibration is biased.

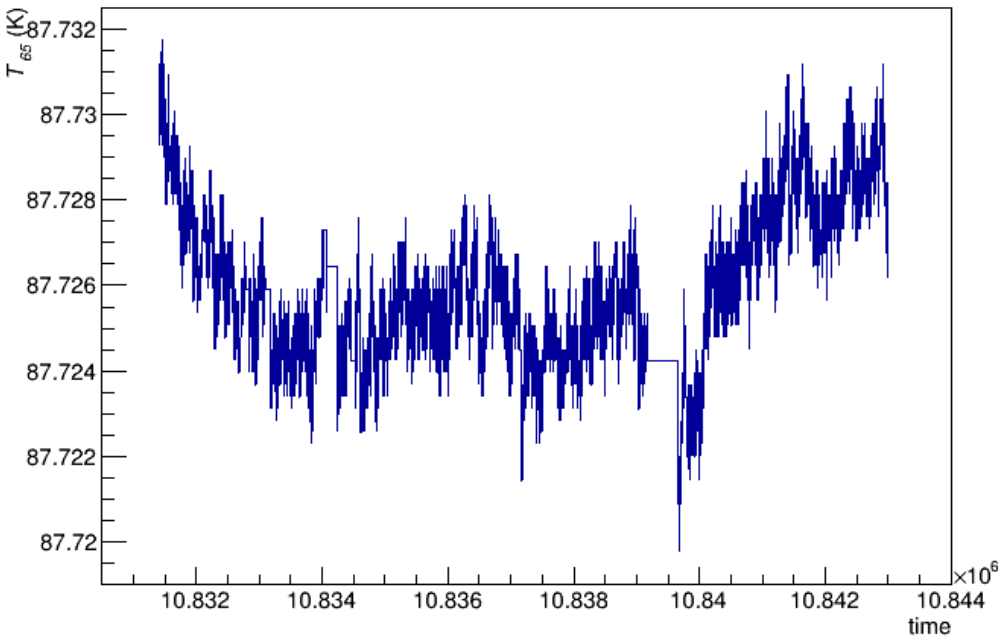
Repeat process correcting this bias (offline corrections).



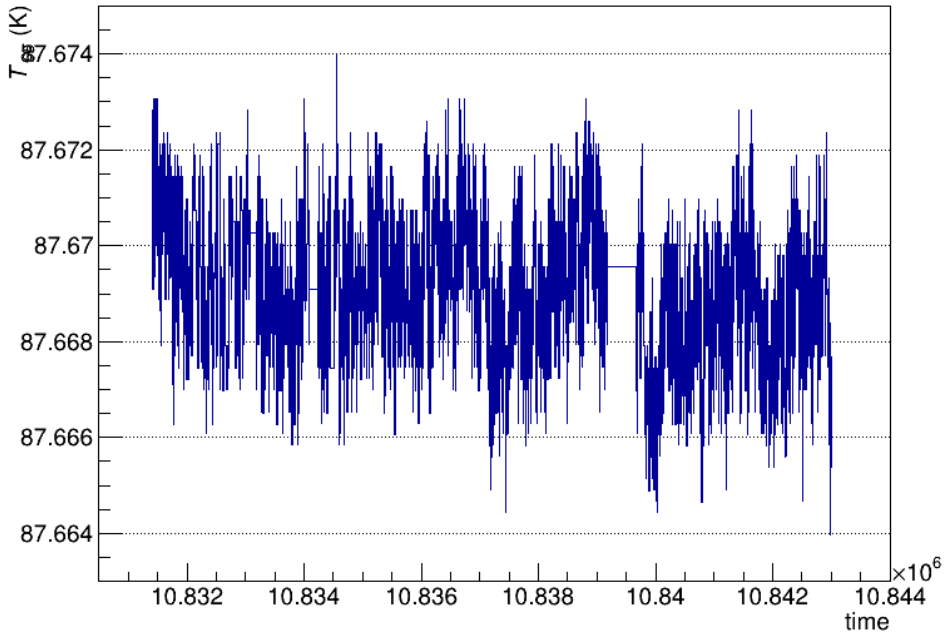


Amux current effect

Without corrections

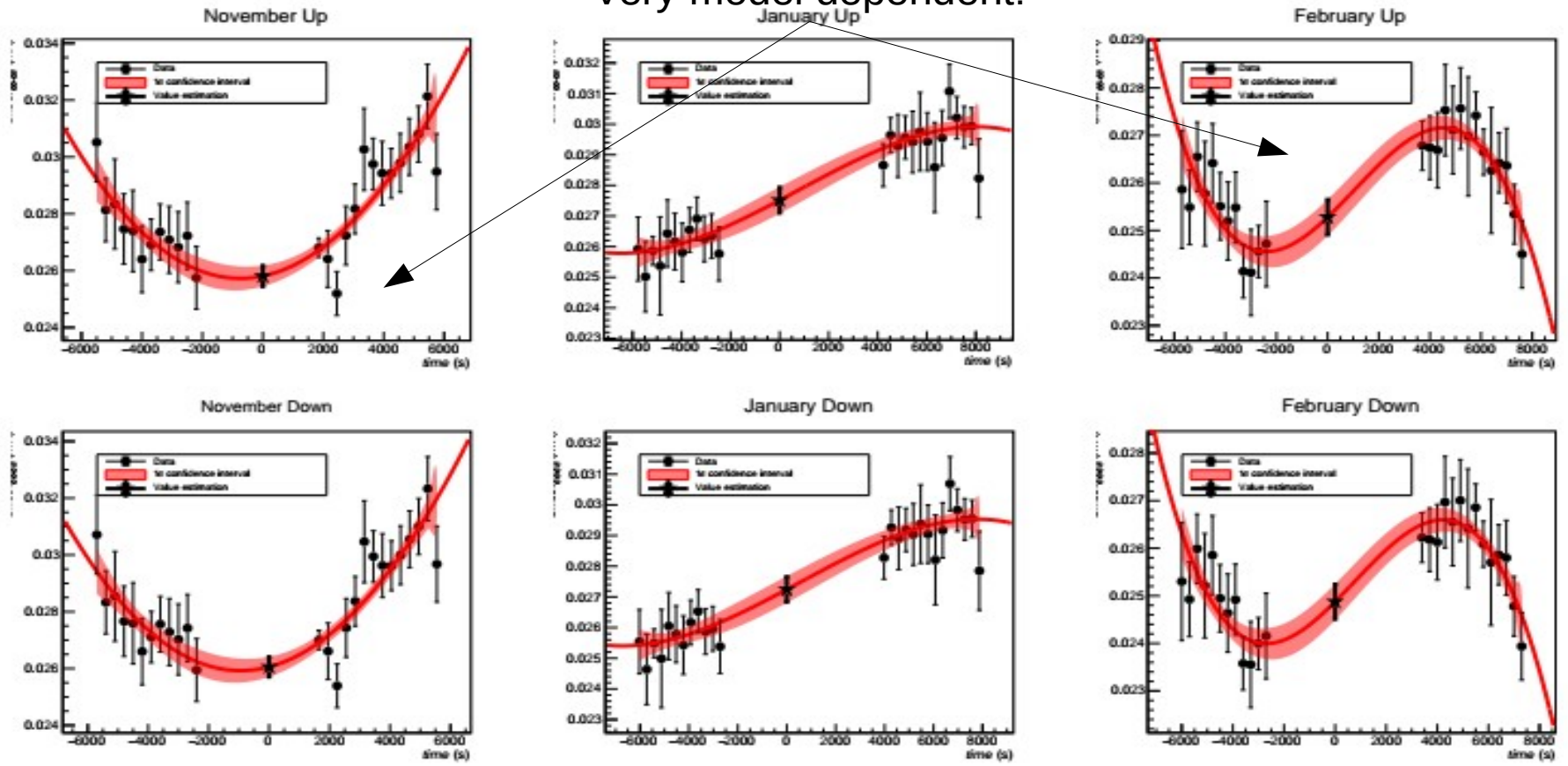


With corrections



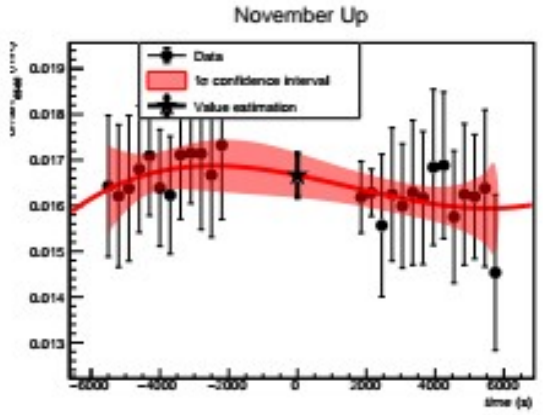
Fit example (before)

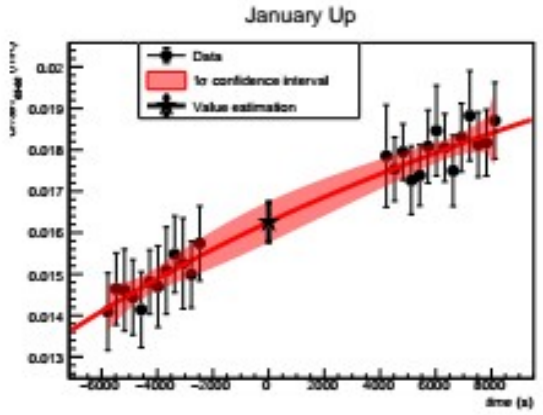
Very model dependent!

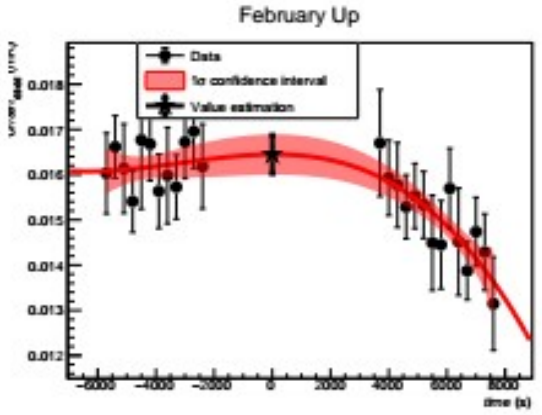


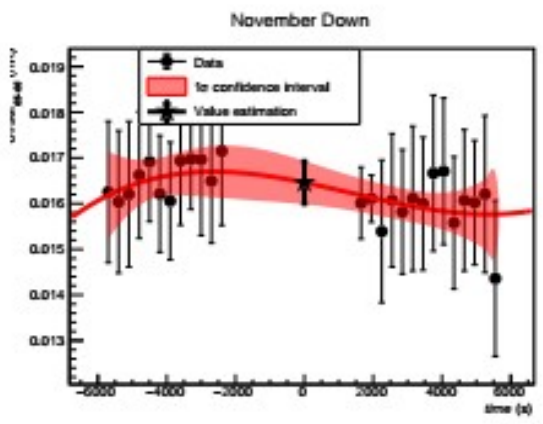
Fit example (after)

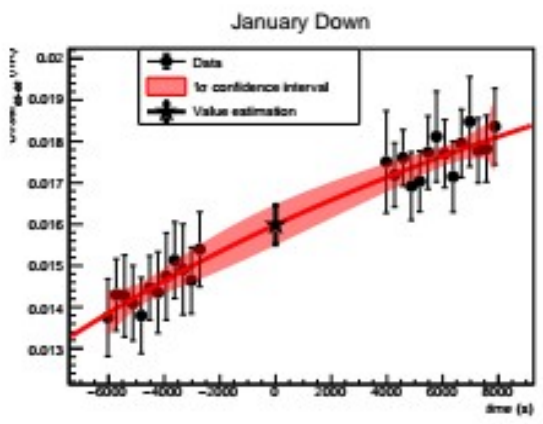
Shofter behaviour

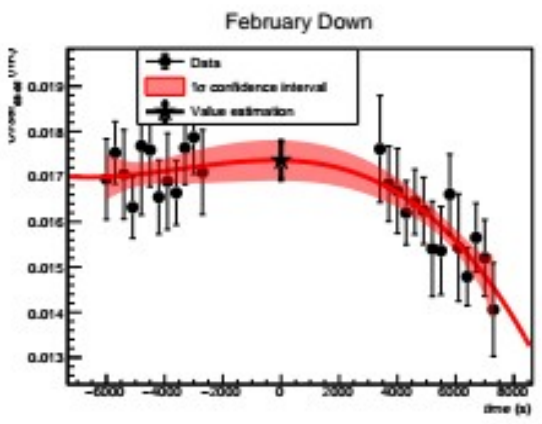






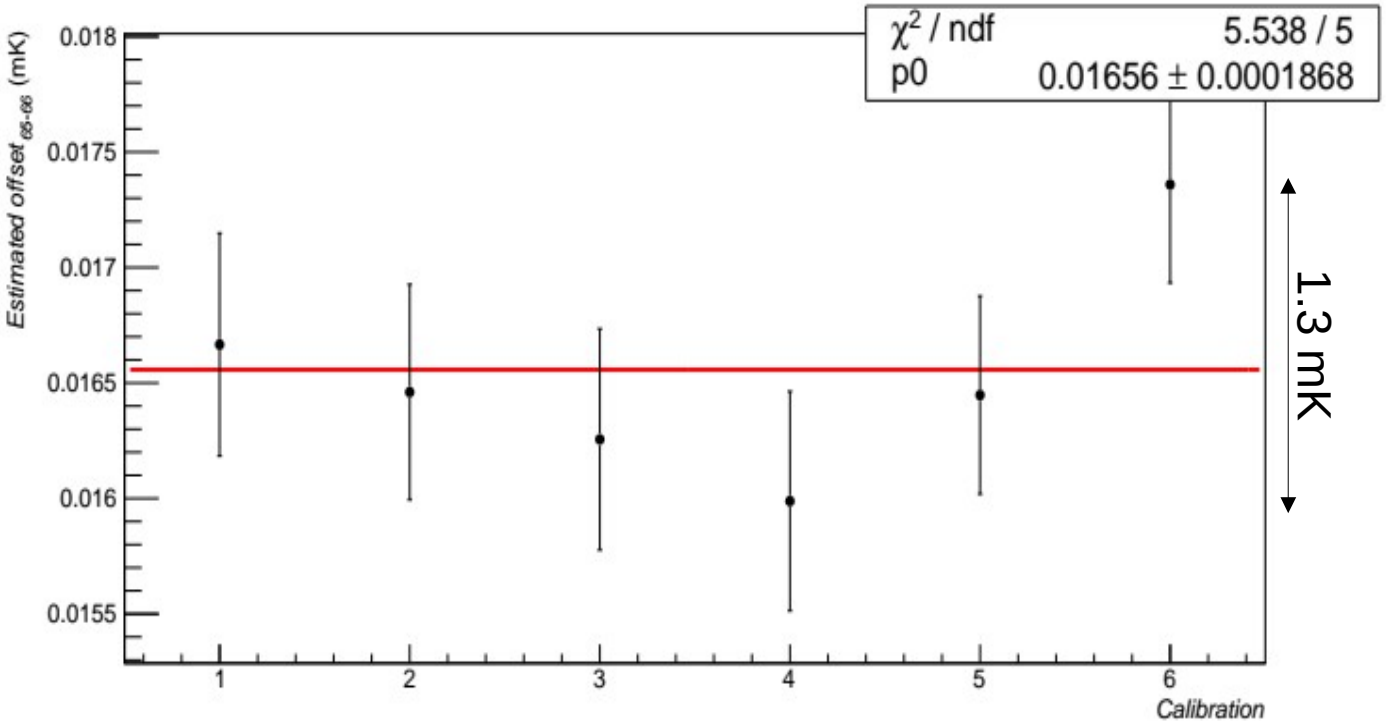




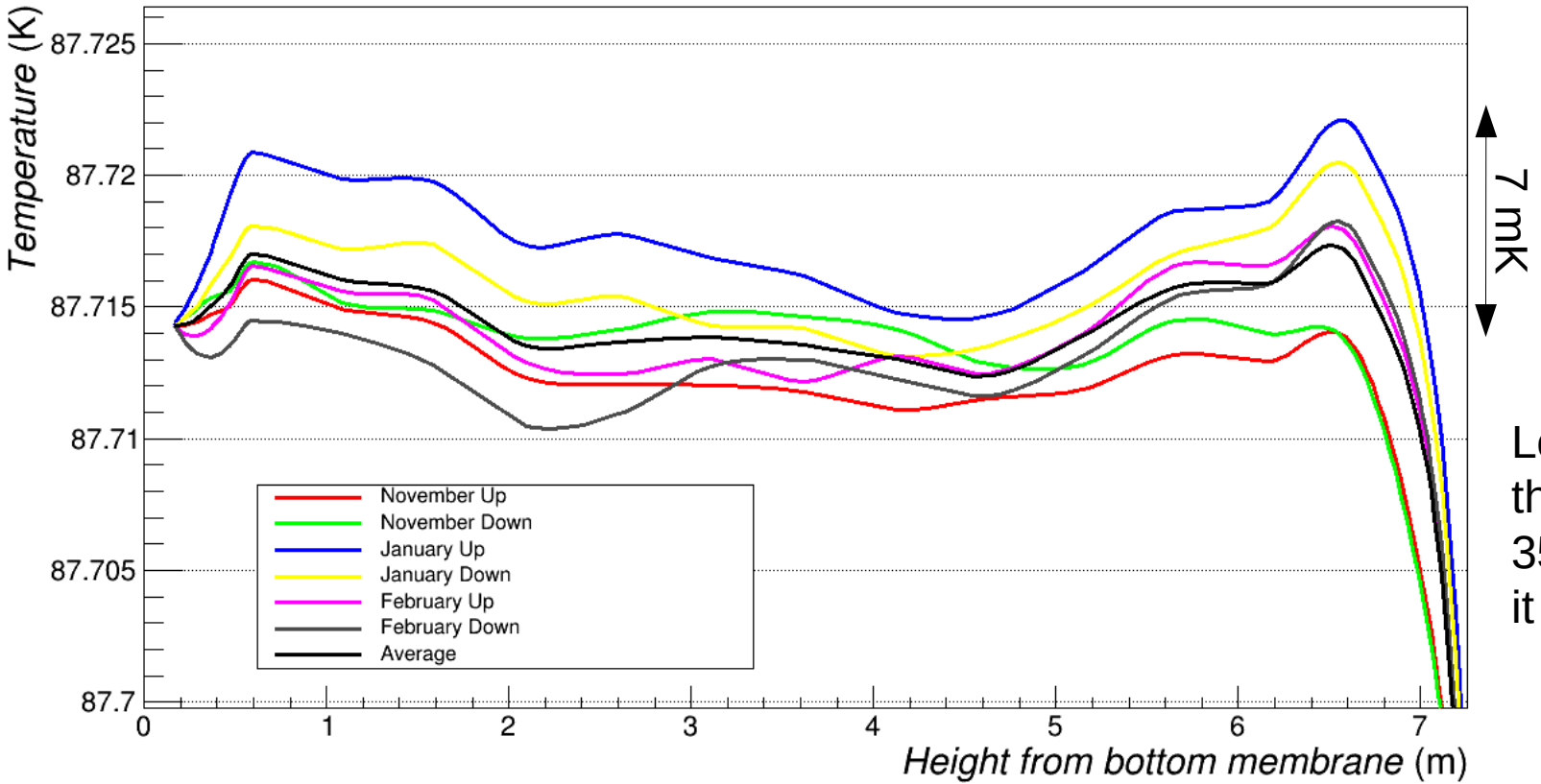


Fit dispersion

In general fit behaviour is smoother after offline corrections and dispersion has been reduced

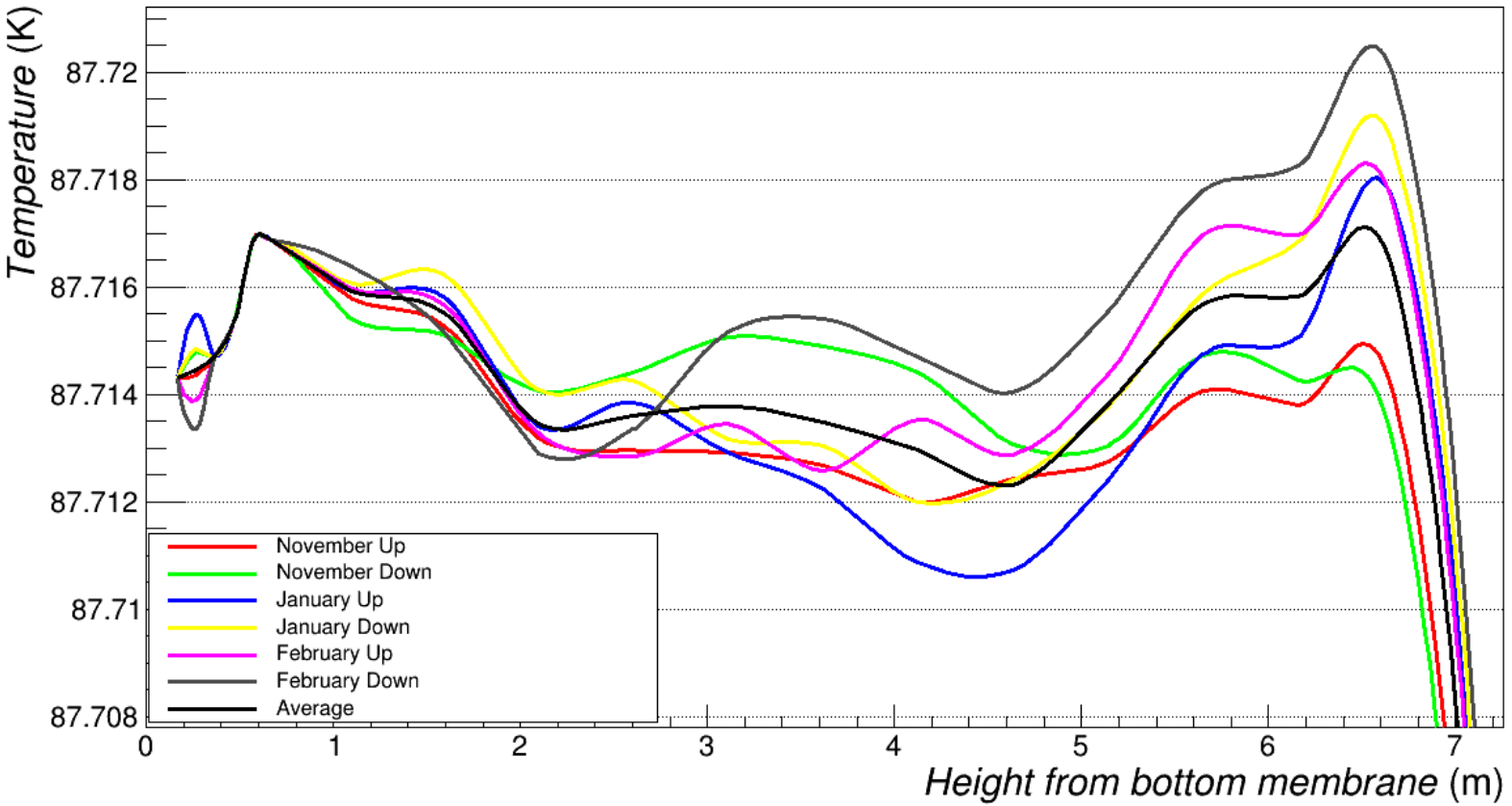


Resulting profile(1)



Less dispersion than last week (from 35 mK to 7 mK) but it is still too much.

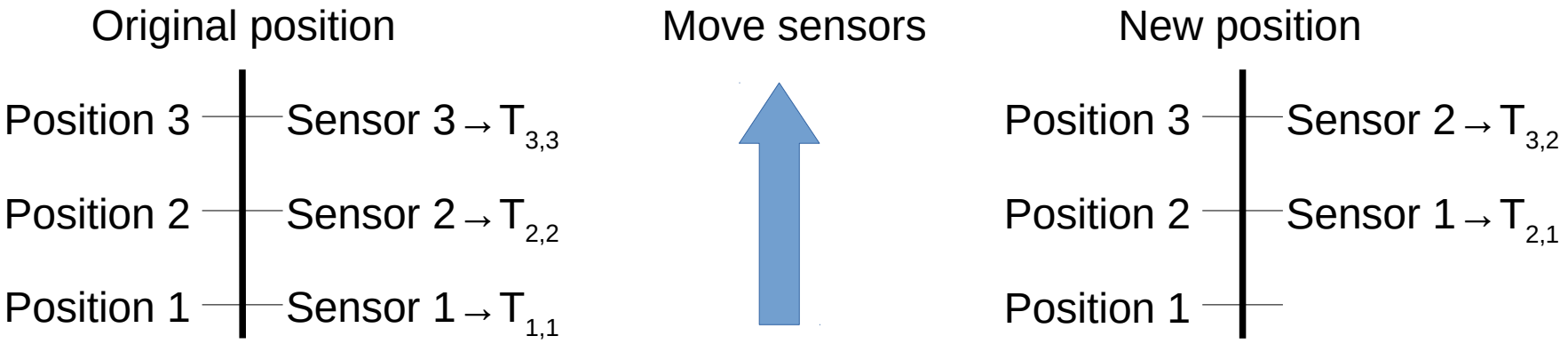
Resulting profile(2)



If bottom values are fixed (5 sensors in 50 cm) dispersion is similar for middle sensors.

New calibration focused on them?

Middle sensors calibration



As time between both positions decreases uncertainty (model dependence) decreases.

Calibration procedure takes more than 30 minutes to relate middle sensors because firstly relates bottom sensors.

If bottom sensors steps are avoided uncertainty can be reduced for middle sensors.

This could be repeated few times in a row to increase statistics.

Conclusions

Amux current corrections have reduced dispersion on profile measurements.

However it is still big for middle sensors (6 mK) if we are aiming to constrain CFD simulations, with similar gradients.

Repeating the calibration focusing on those sensor may reduce dispersion more.