PI Piezo movers (BPM3) performance
Second proceedings with an interferometer

Summary

Mirror on interferometer head :
- interferometer error ?

Mirror on surface plate :
- interferometer + 'lab noise' errors ?

BPM3 – PI vertical movers – no power supply :
- interferometer + 'lab noise' + PI movers & BPM support mechanics errors.

BPM3 – PI vertical movers – with power supply : at 0V (0% stroke) / 5V (50% stroke) / 10V (100% stroke)
- characterization of the stabilized position ?

BPM3 – PI vertical movers – with power supply : at 5V (1,5s) / 5,001V (1,5s) alternatively
- minimum step ?

Conclusion

Mirror on interferometer head

Time (hh:mm:ss)

Relative move (nm)

Temperature (°C)

Rel move (nm)

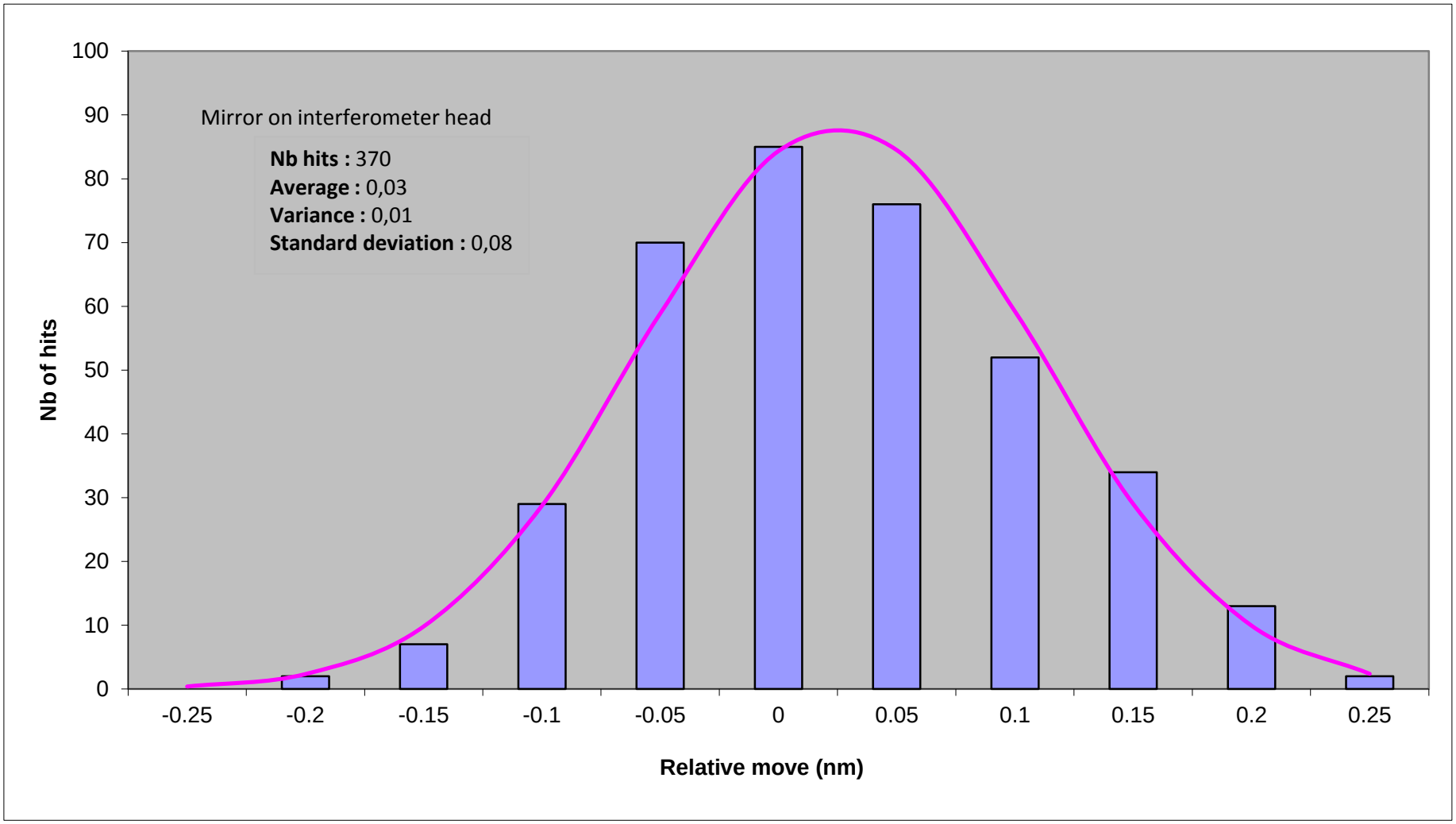
Relative move linearization (nm)

Temp (°C)

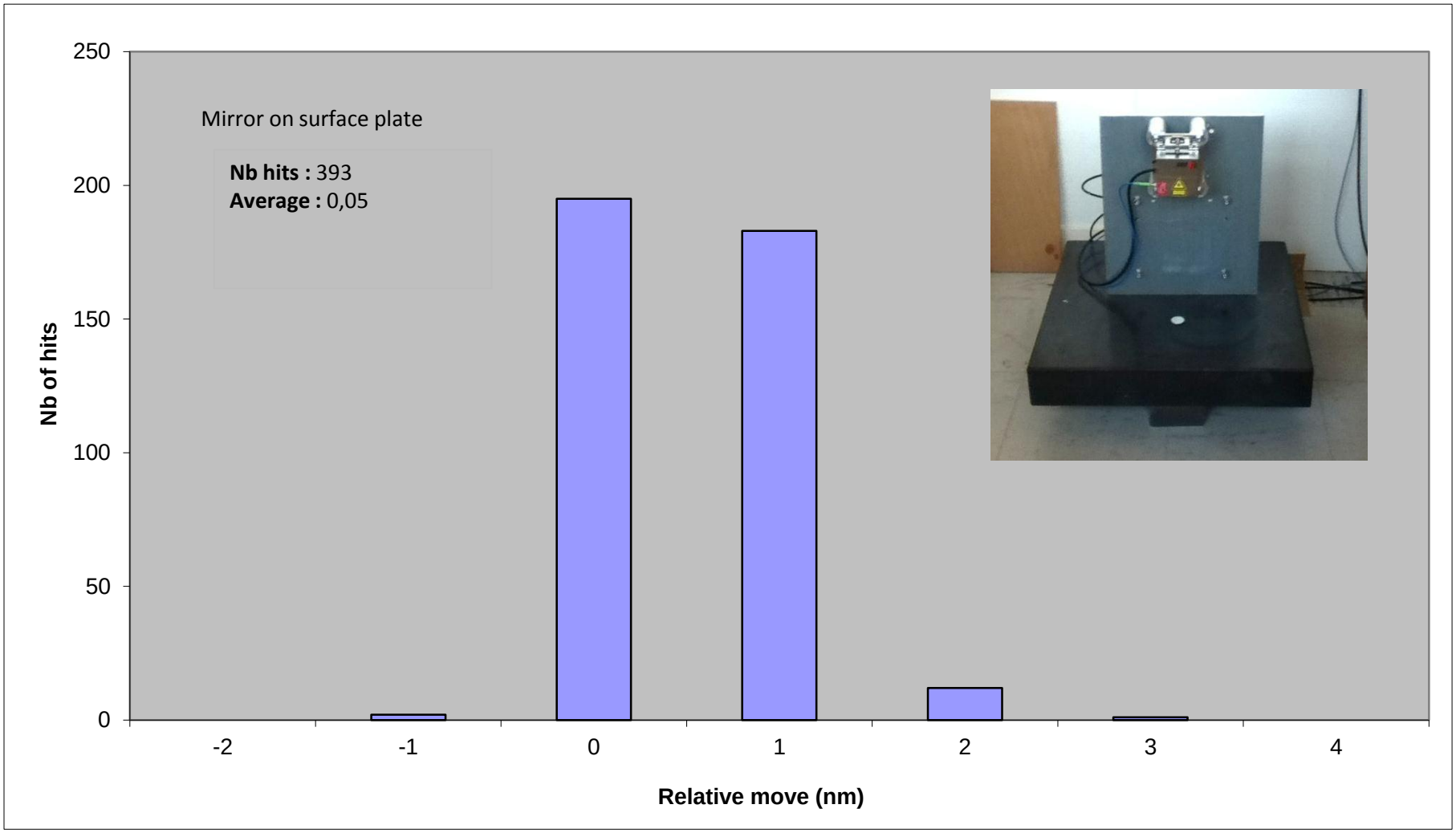
Linear (Rel move (nm))

The green curv is obtained by difference between linearization of the relative move (black line) and relative move (blue curv).

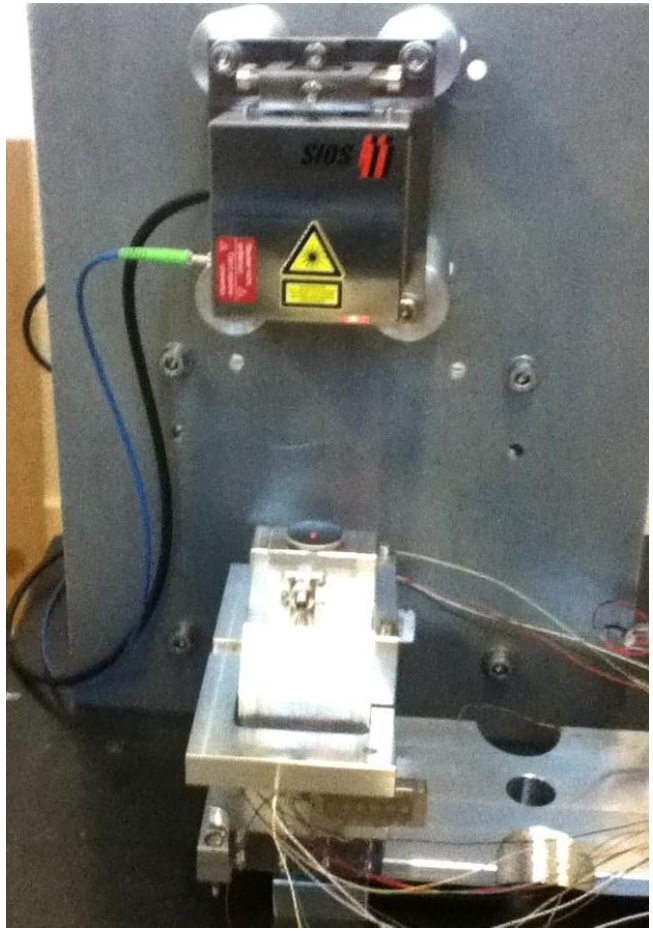
Results with mirror on interferometer head

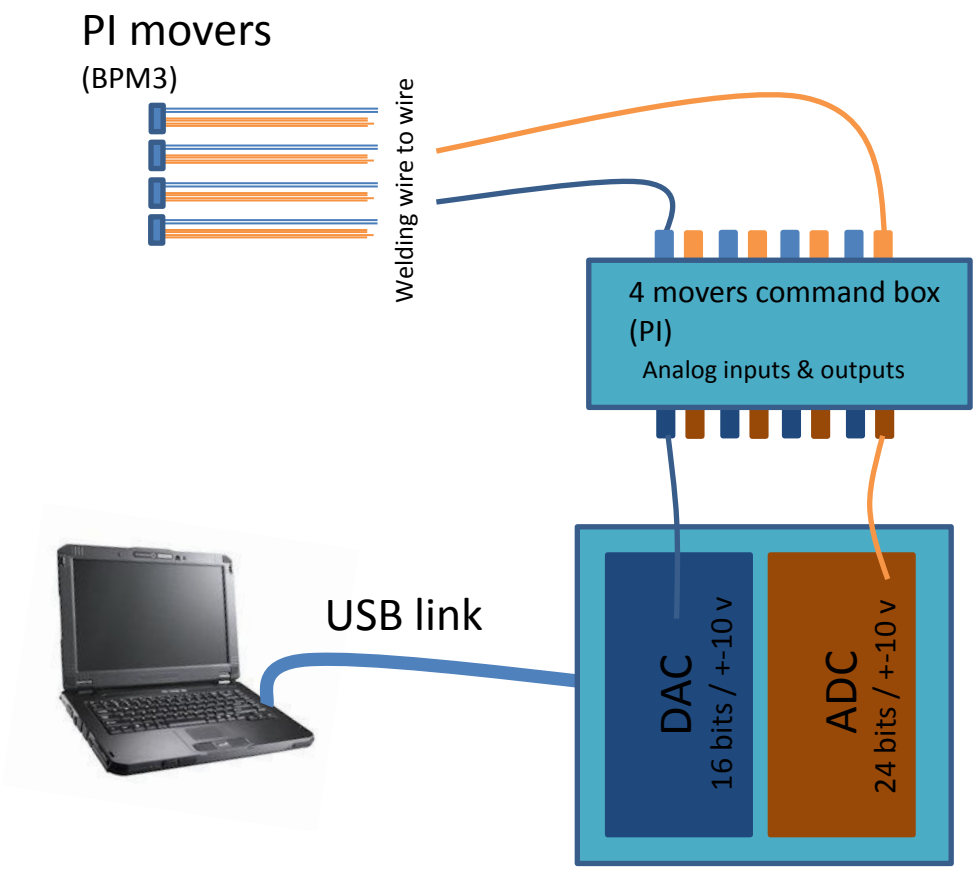


Results with mirror on surface plate

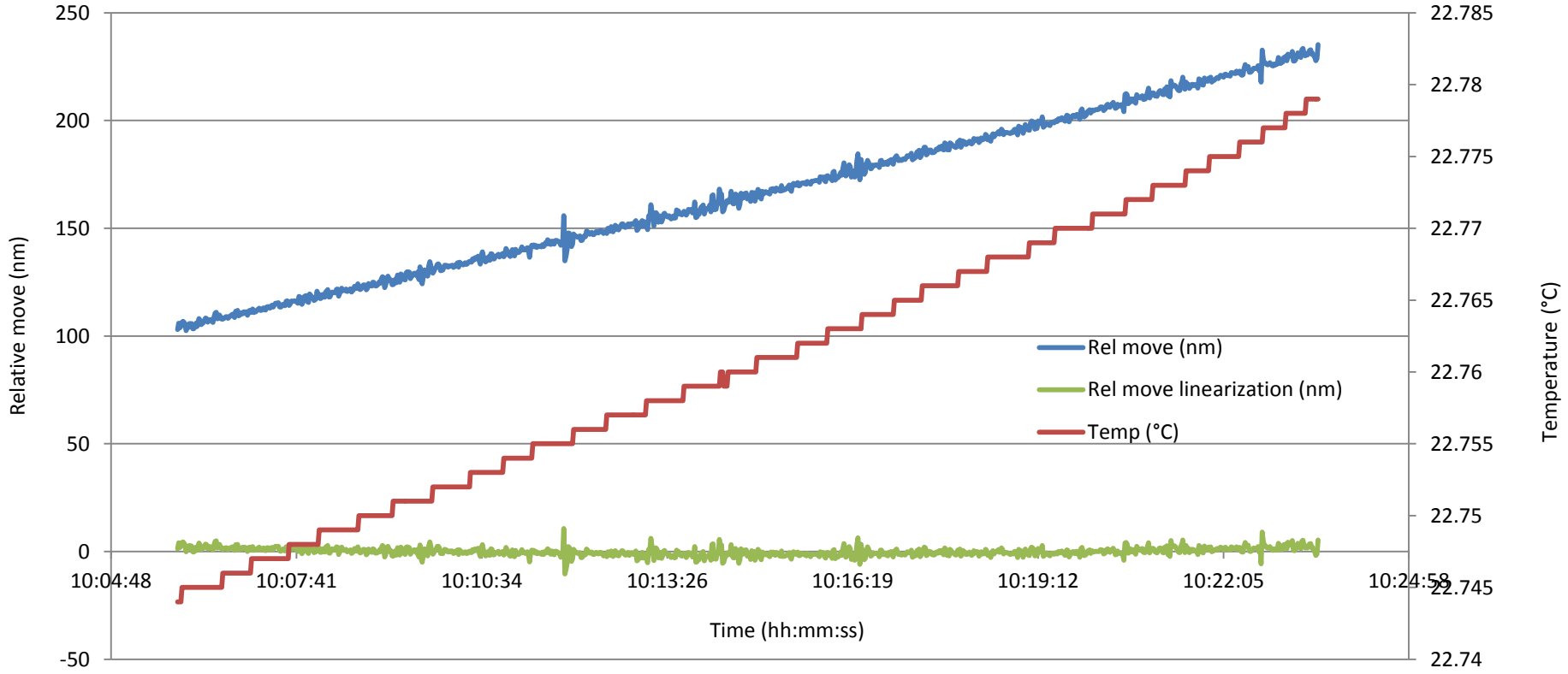


The experiment is done on the equipped base plate : movers ‘E’ ‘D’ and ‘C’ (from PI) and BPM3.
The 3 movers are stimulated at the same time by the same input voltage.





BPM3 – PI vertical movers – no power supply



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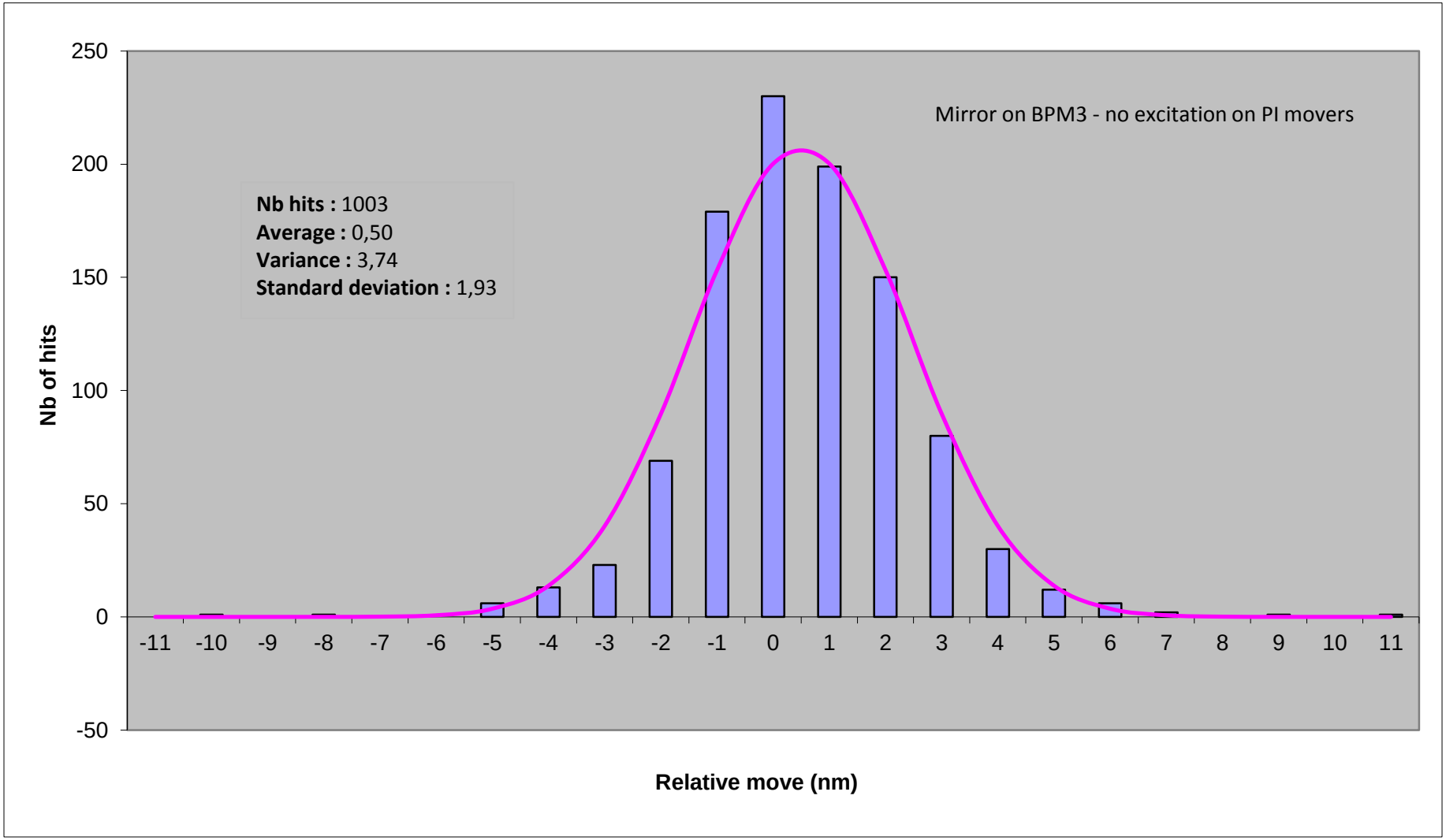
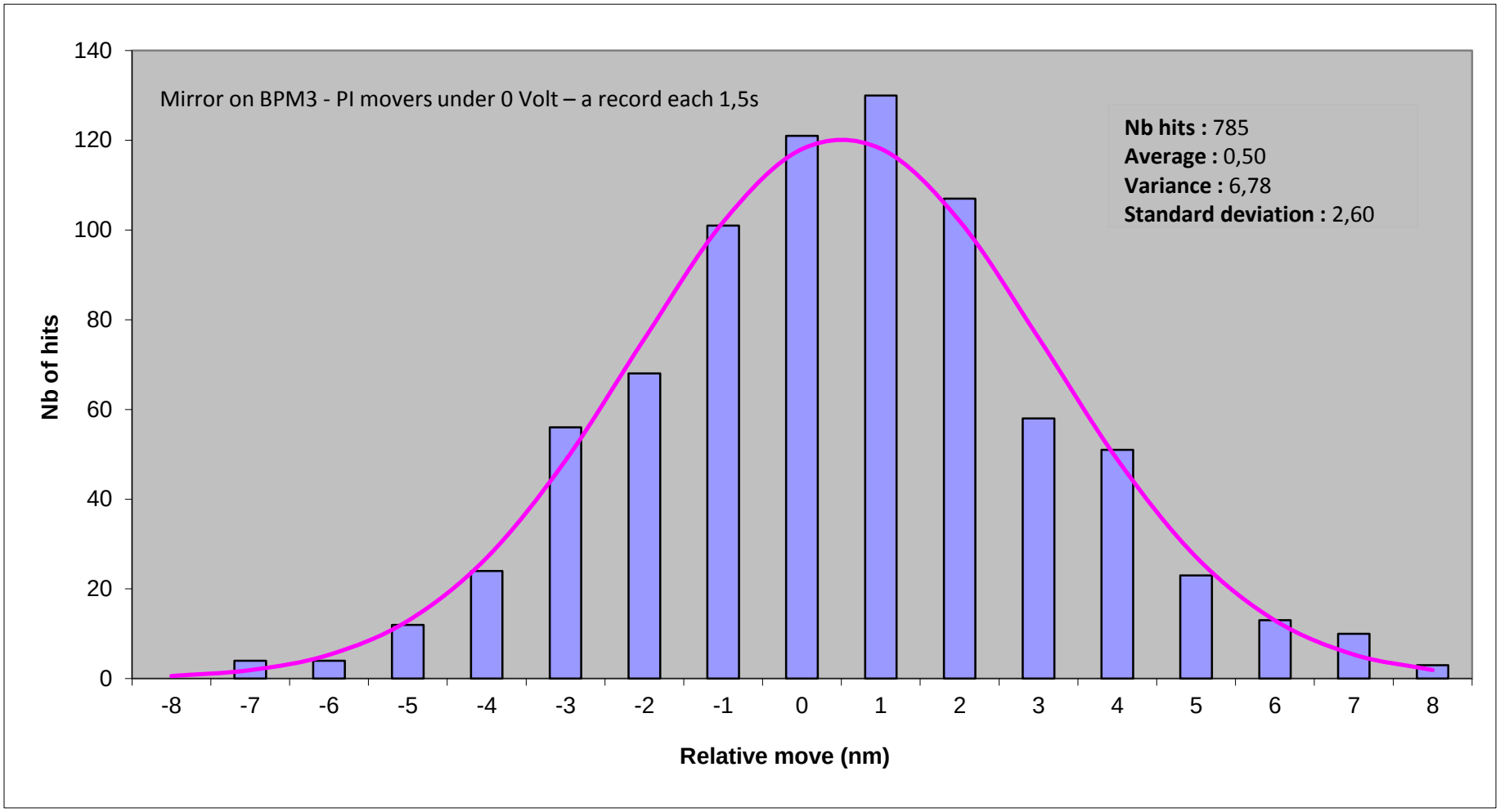
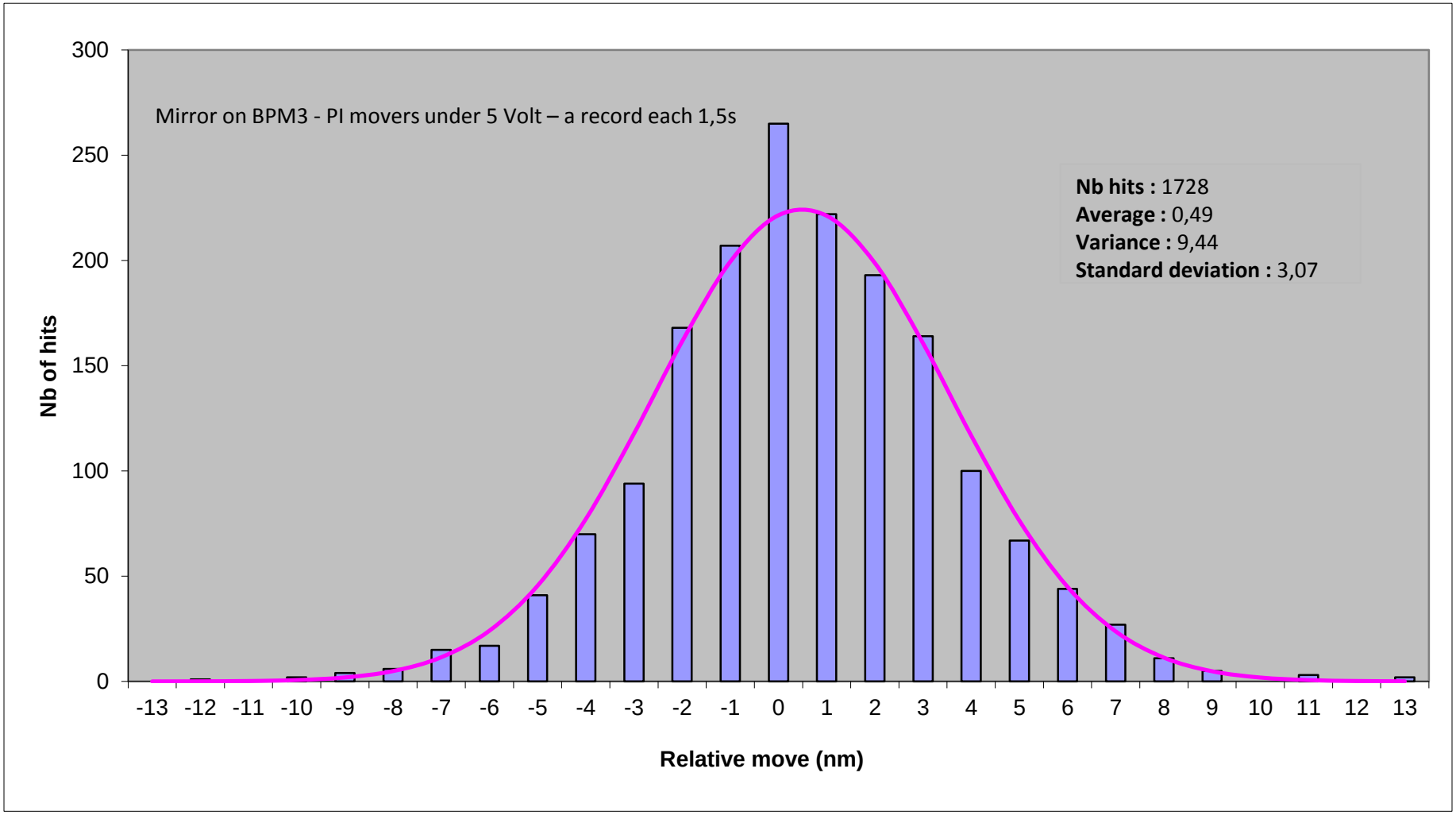
BPM3 – PI vertical movers – results with no power supply



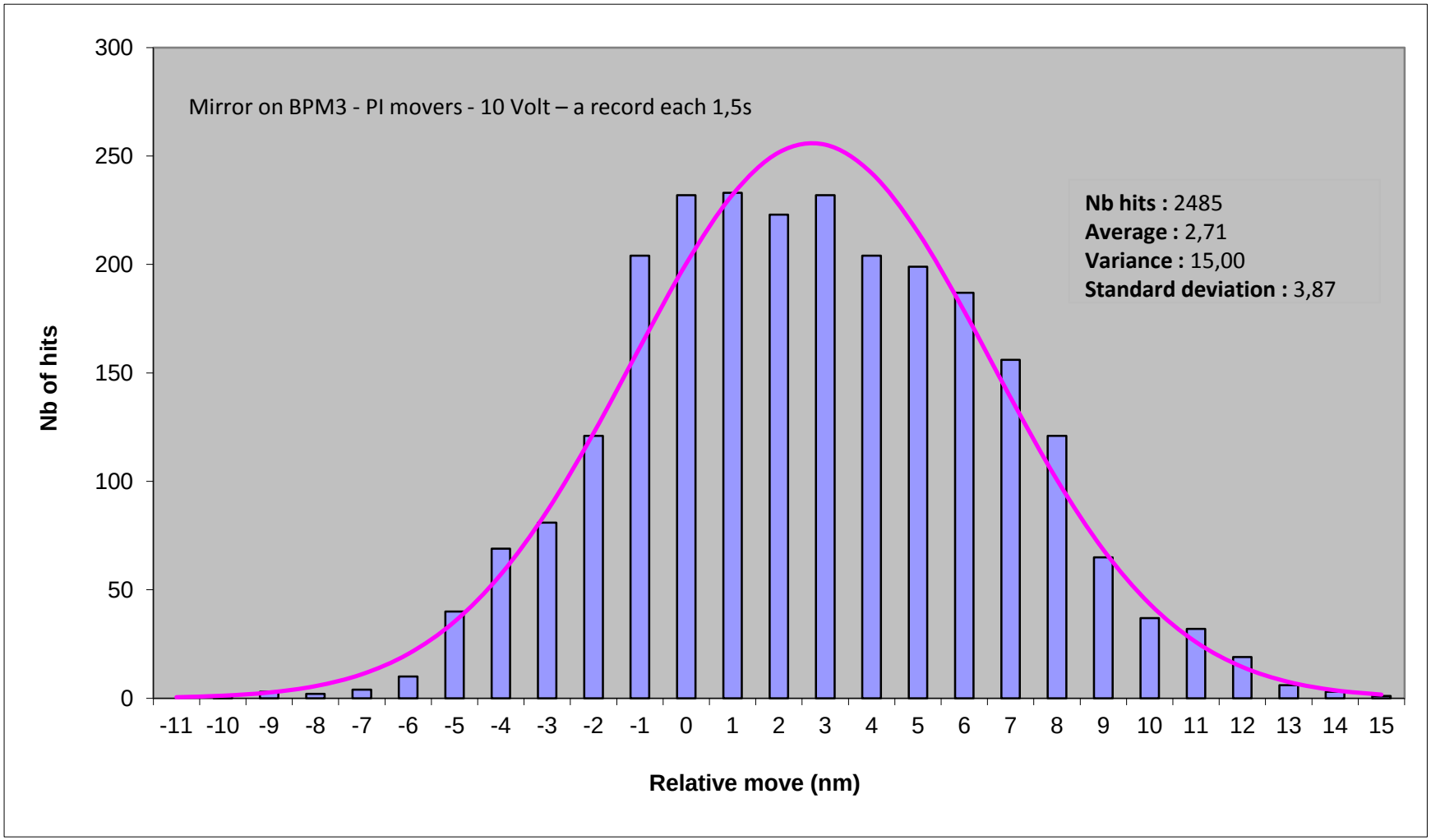
BPM3 – PI vertical movers – results at 0V



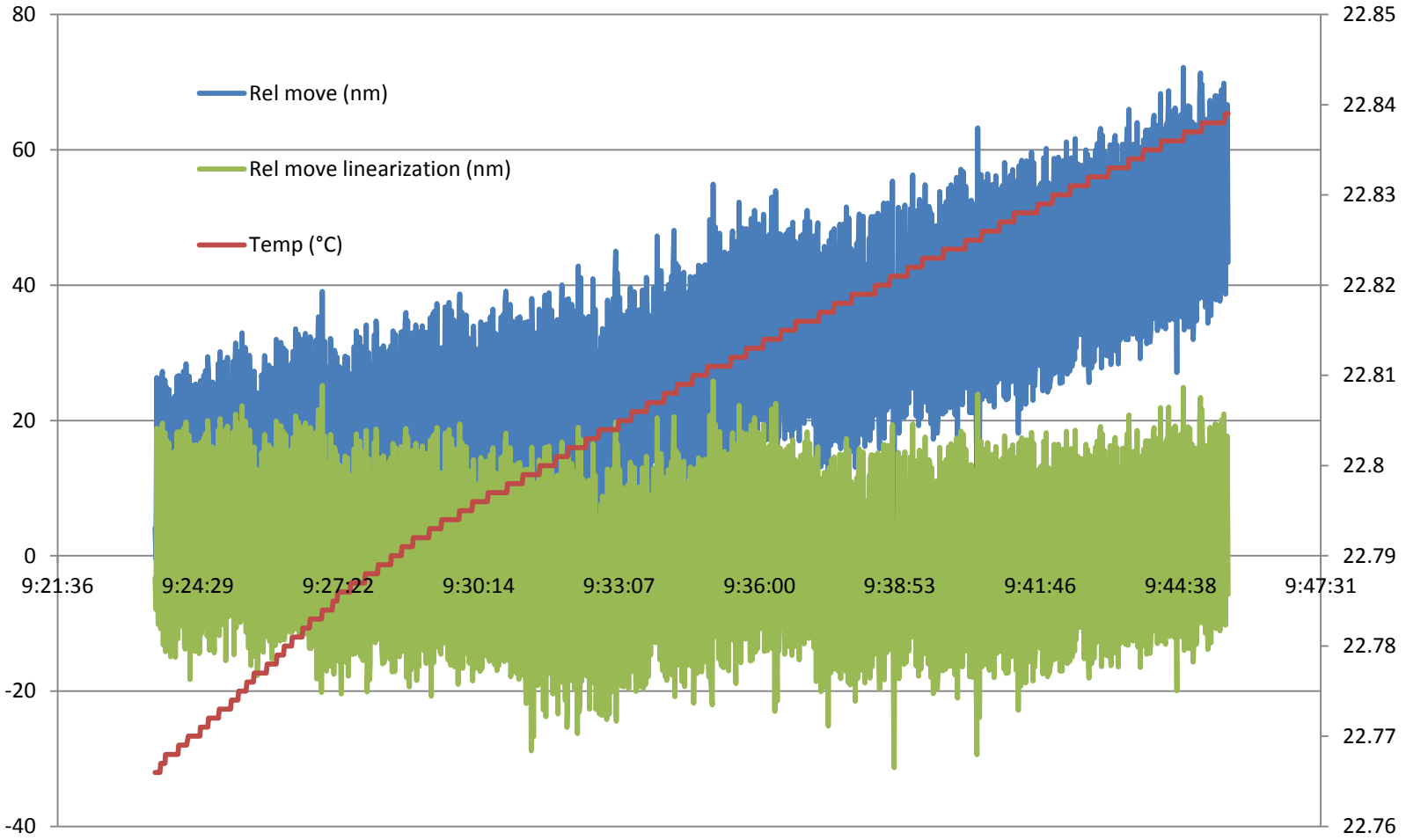
BPM3 – PI vertical movers – results at 5V



BPM3 – PI vertical movers – results at 10V

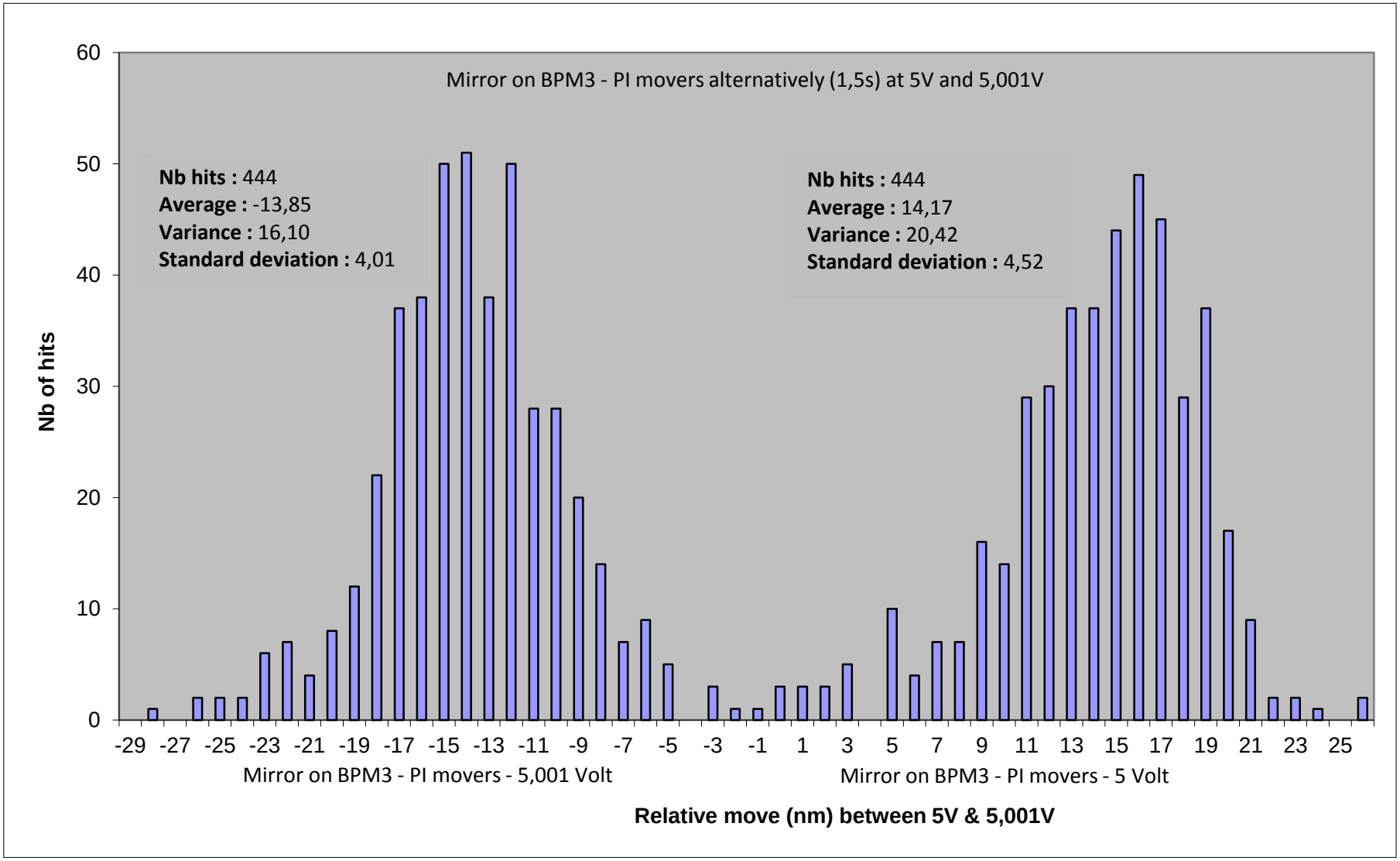


BPM3 – PI vertical movers – 5V / 5.001V alternatively



The 3 movers are stimulated at 5V (1,5s) then at 5.001 V (1,5s) during this experiment.

Results at 5V/5.001V alternatively during 1,5s



Conclusion

Mirror on interferometer head :

- no significant drift (average # 0,03nm)

Mirror on surface plate :

- no significant drift (average # 0,05nm)

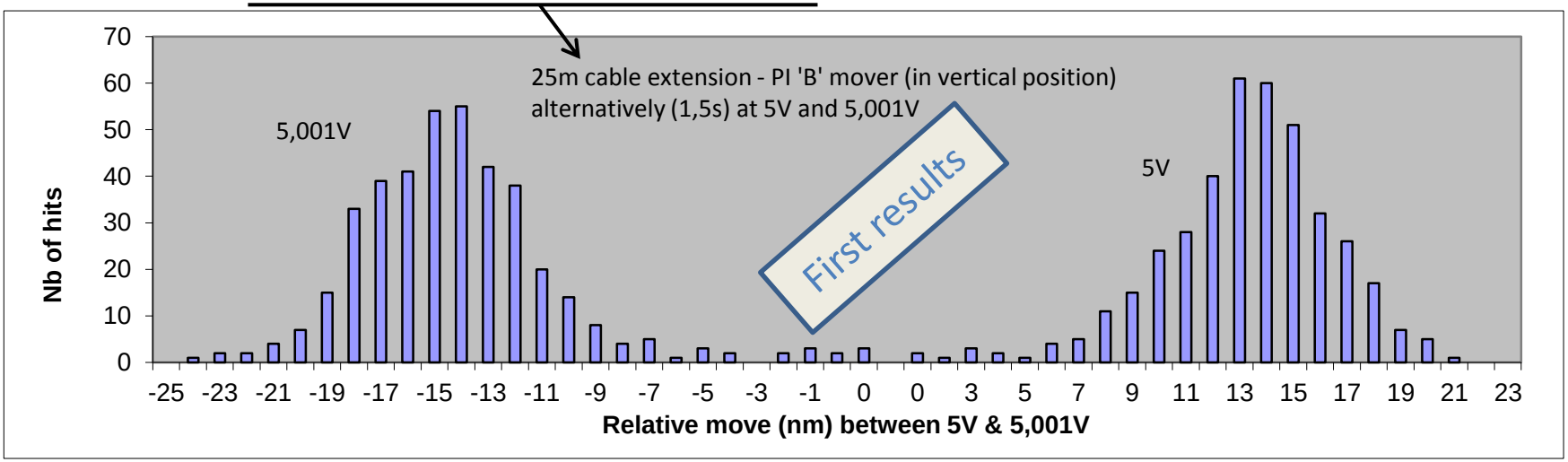
With thermal 'compensation'

BPM3 – PI vertical movers :

- no significant drift (average #0,5nm with no power supply, at 0V and 5V - max standard deviation #3),
- little drift (average # 3nm at 10V - max standard deviation #4),
- resolution for 1 mV : #30 nm (max standard deviation #4).

To be done, with 25m (?) extension cable :

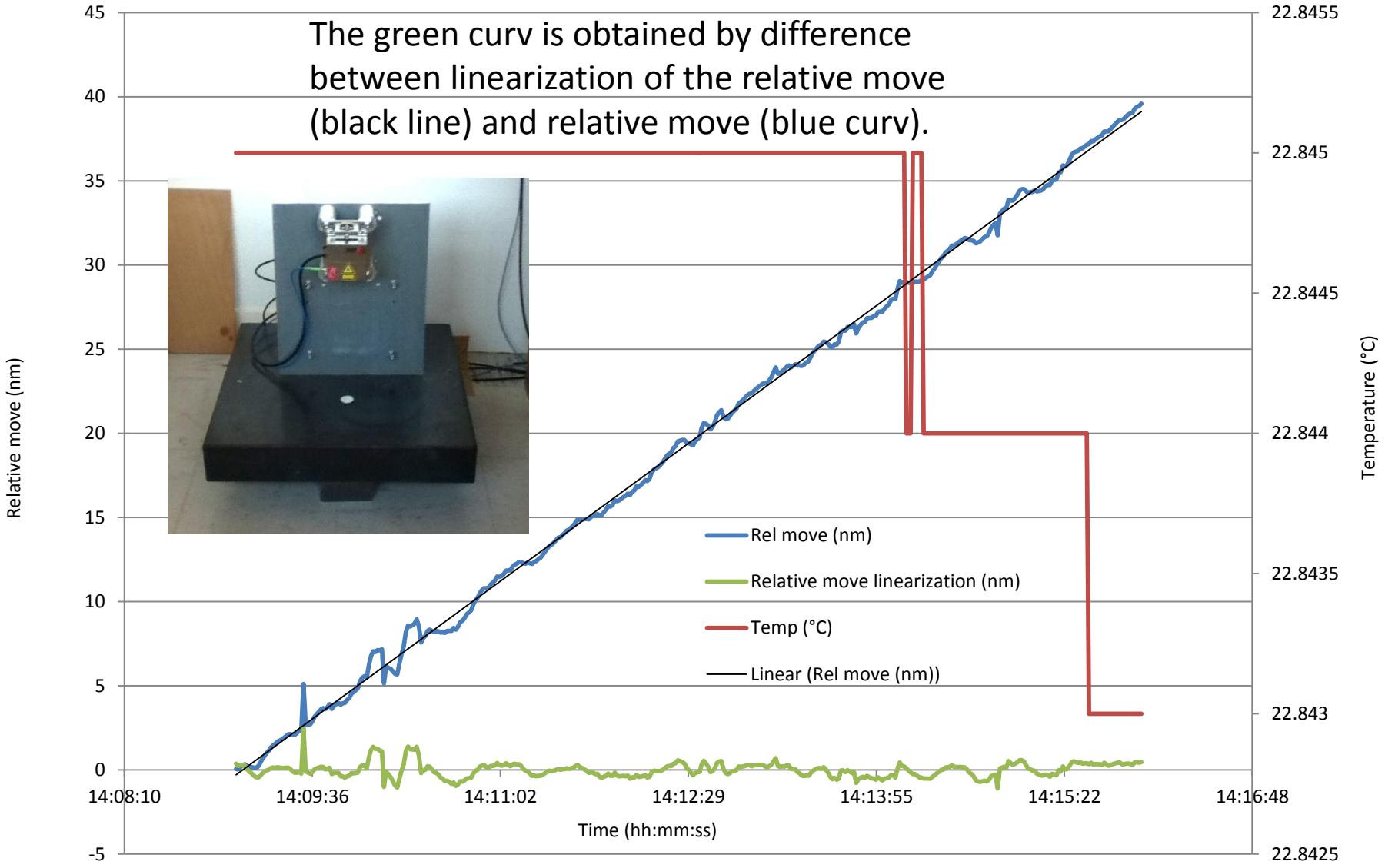
- characterization of vertical Cedrat movers (BPM1&2 when received),
- characterization of lateral Cedrat mover (BPM1&2 when received),
- characterization of vertical PI movers (BPM3),
- characterization of lateral PI mover (BPM3).



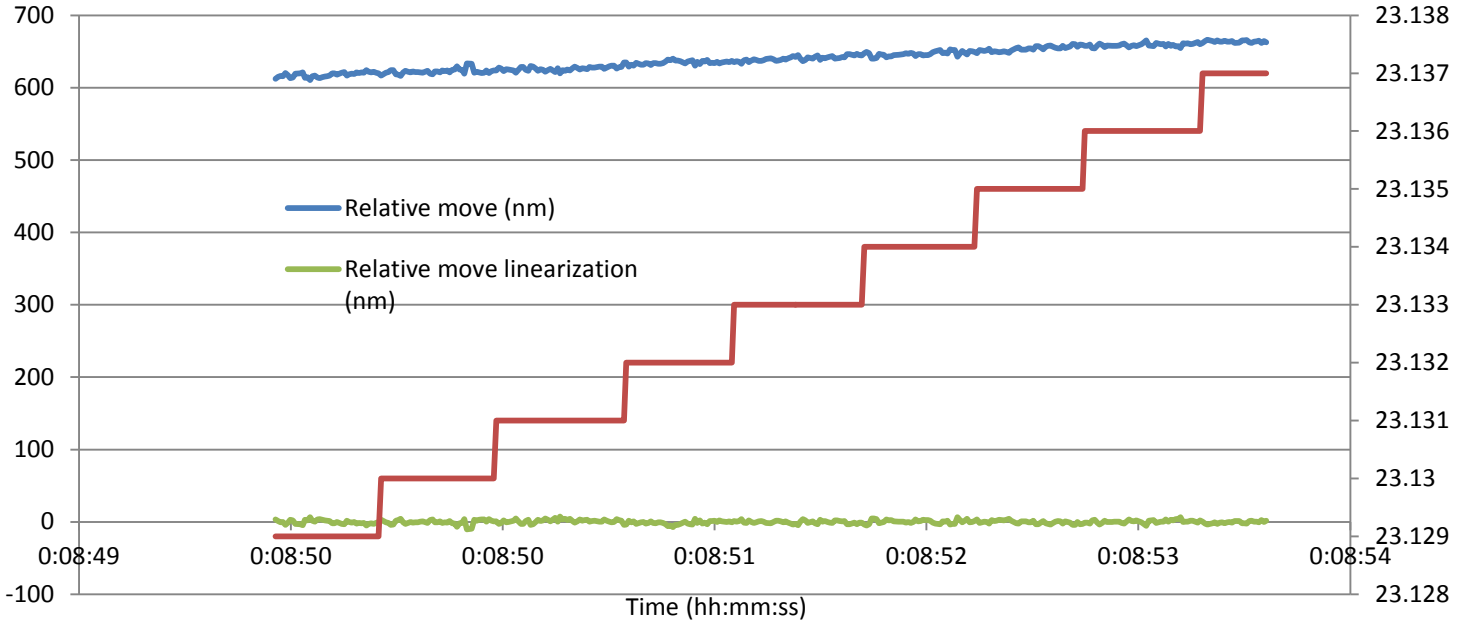
Curve records :

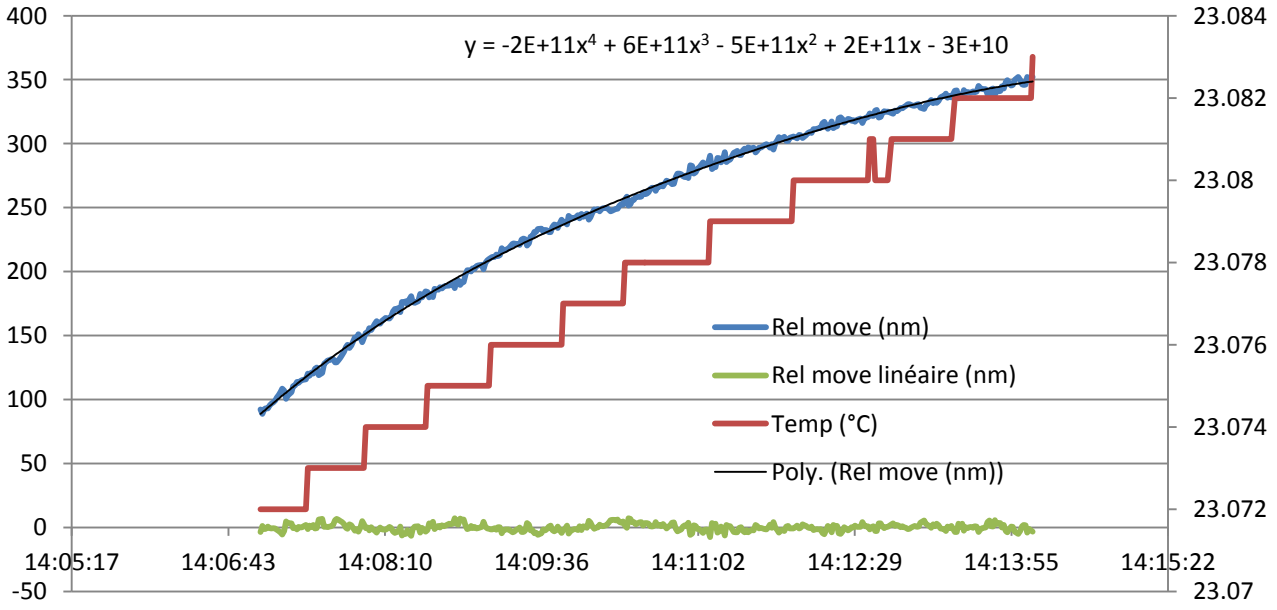
- mirror on interferometer head,
- mirror on surface plate,
- BPM3 – PI vertical movers – no power supply,
- BPM3 – PI vertical movers – with power supply,
  - 0V (0% stroke),
  - 5V (50% stroke),
  - 10V (100% stroke).

Mirror on surface plate



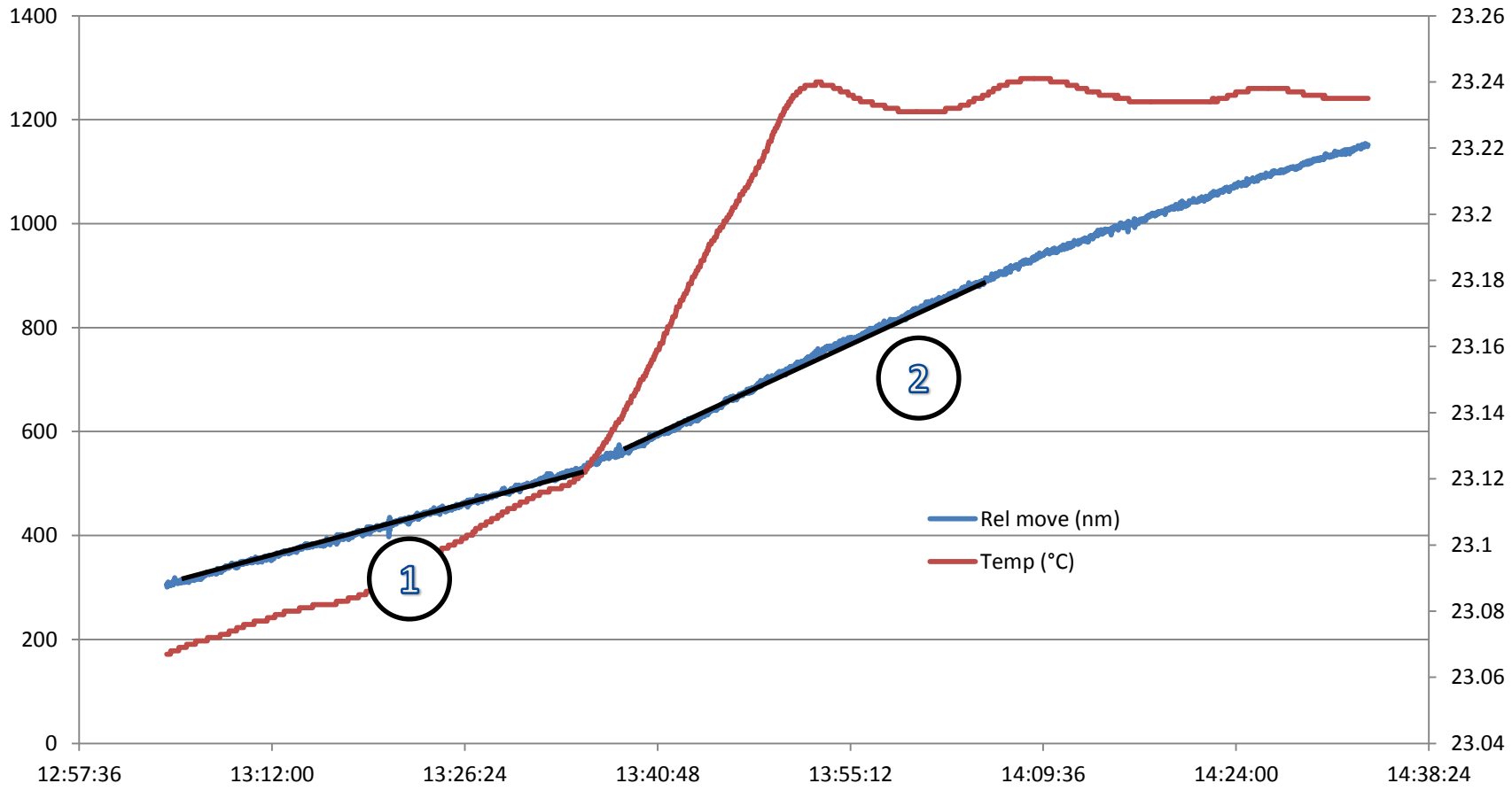
BPM3 – PI vertical movers – 0V



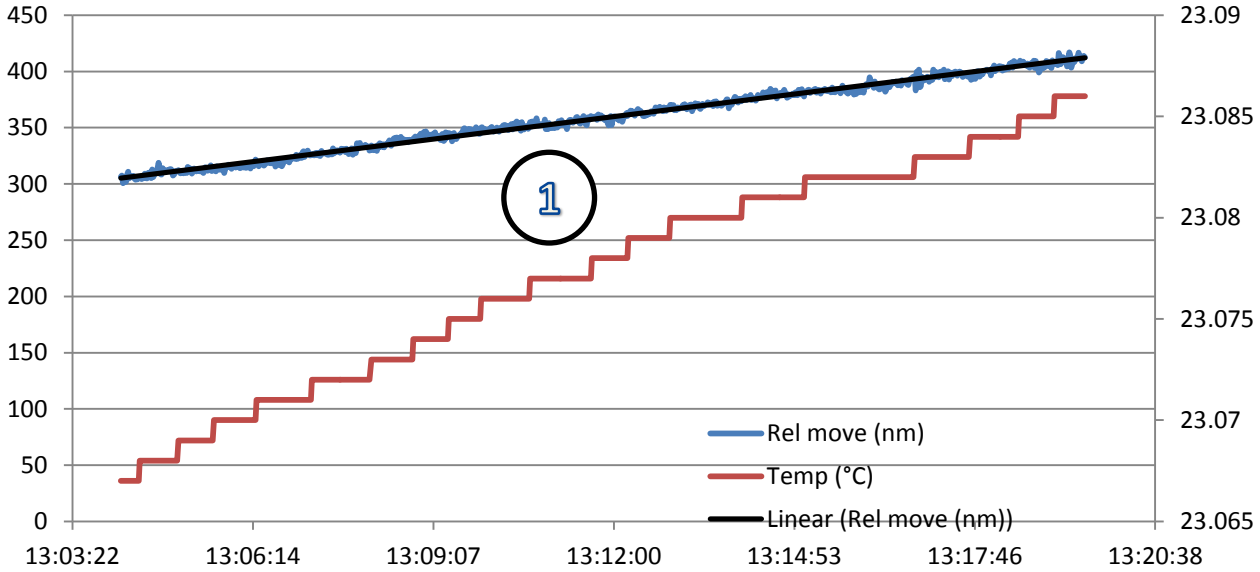


PI piezo movers performance 2

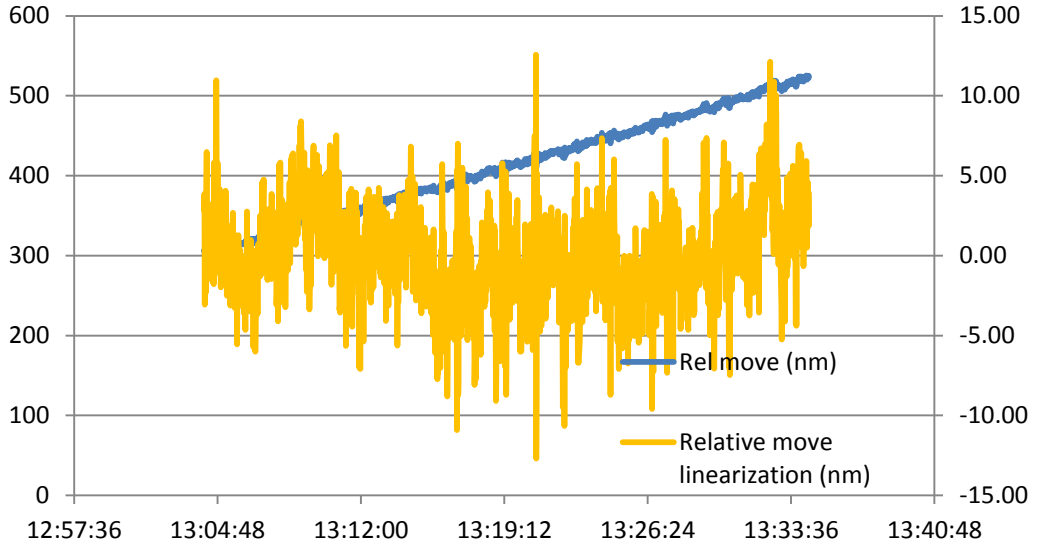
BPM3 – PI vertical movers – 5V



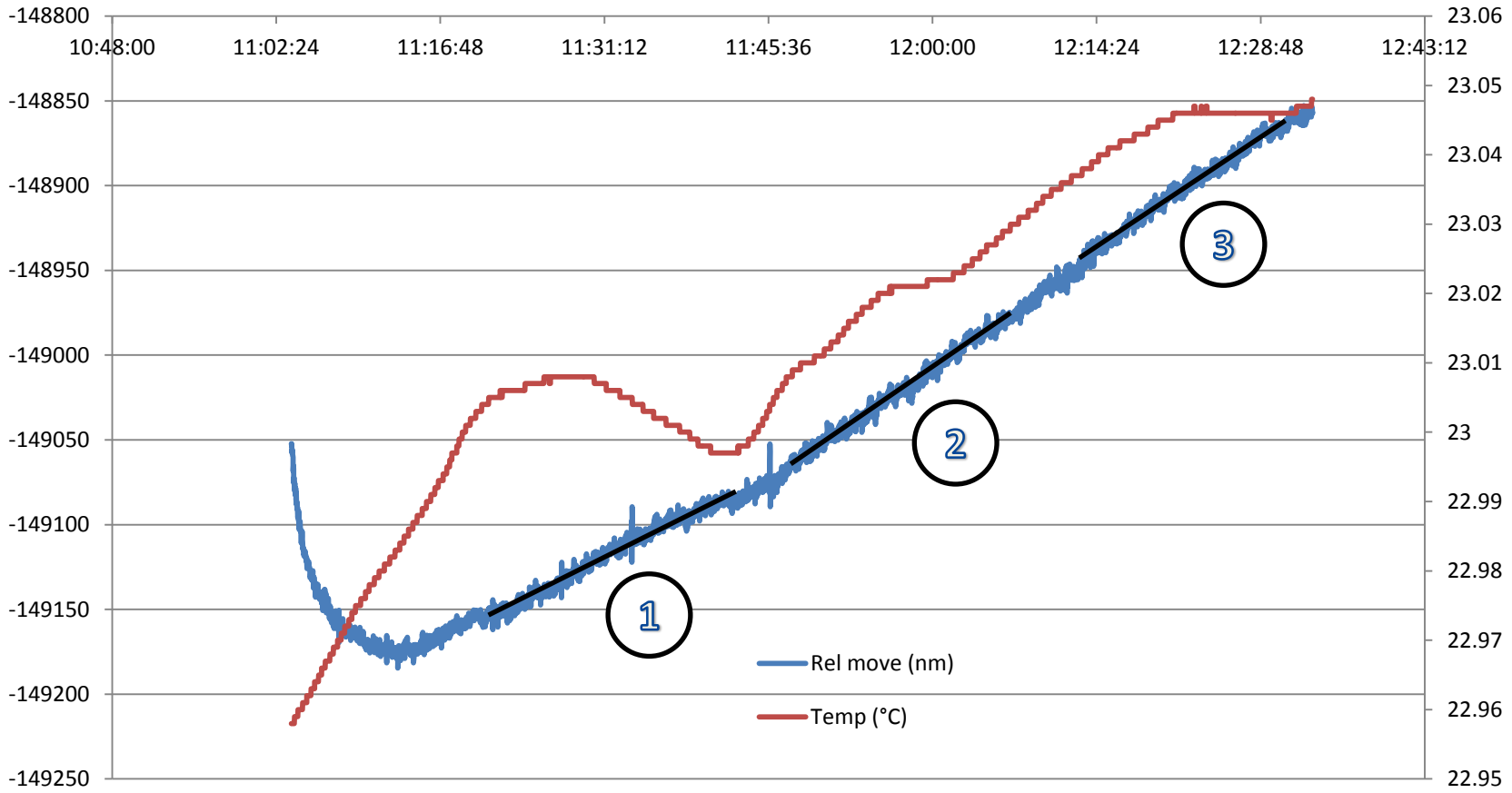
Detail from zone 1



The yellow curv is obtained by difference between linearization of the relative move (black line) and relative move (blue curv).

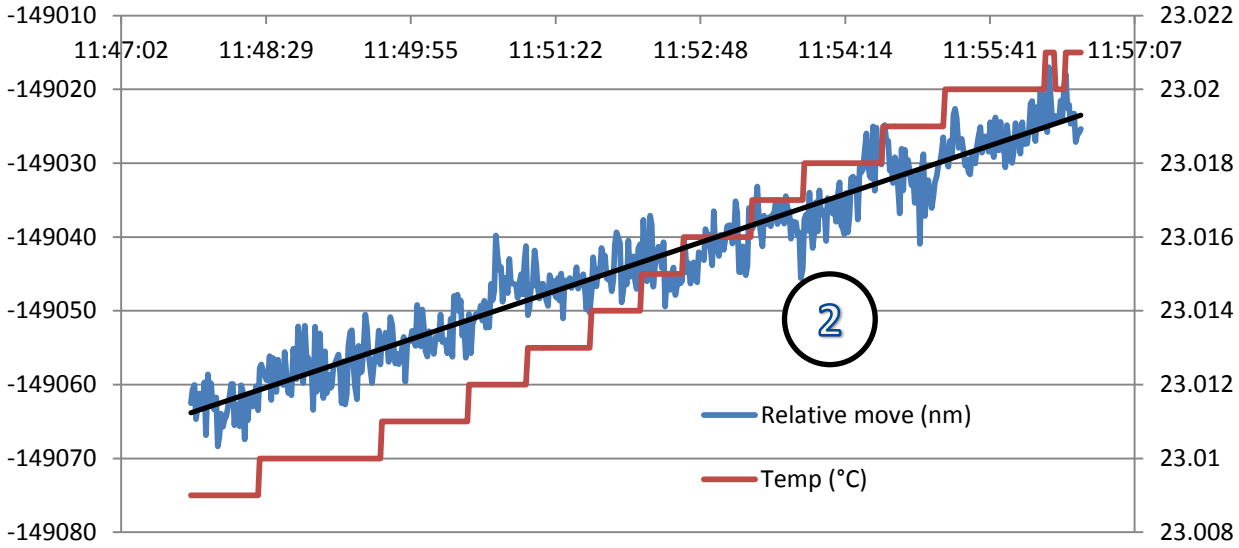


BPM3 – PI vertical movers – 10V



3 linear zones can be isolated : 1, 2 & 3.

Detail from zone 2



The yellow curv is obtained by difference between linearization of the relative move (black line) and relative move (blue curv).

The same operation is done on zones 1 and 3.