

ProtoDUNE Slow Controls Database updates

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Database WG meeting

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IOWA



Introduction

- Slow control API is currently working again
 - ▶ Ana Paula created a new CERN VM in Alma9
 - ▶ She deployed the slow control rest API
 - ▶ **A reminder:** for Slow control DB, I am working in my CERN Ixplus.

Now:

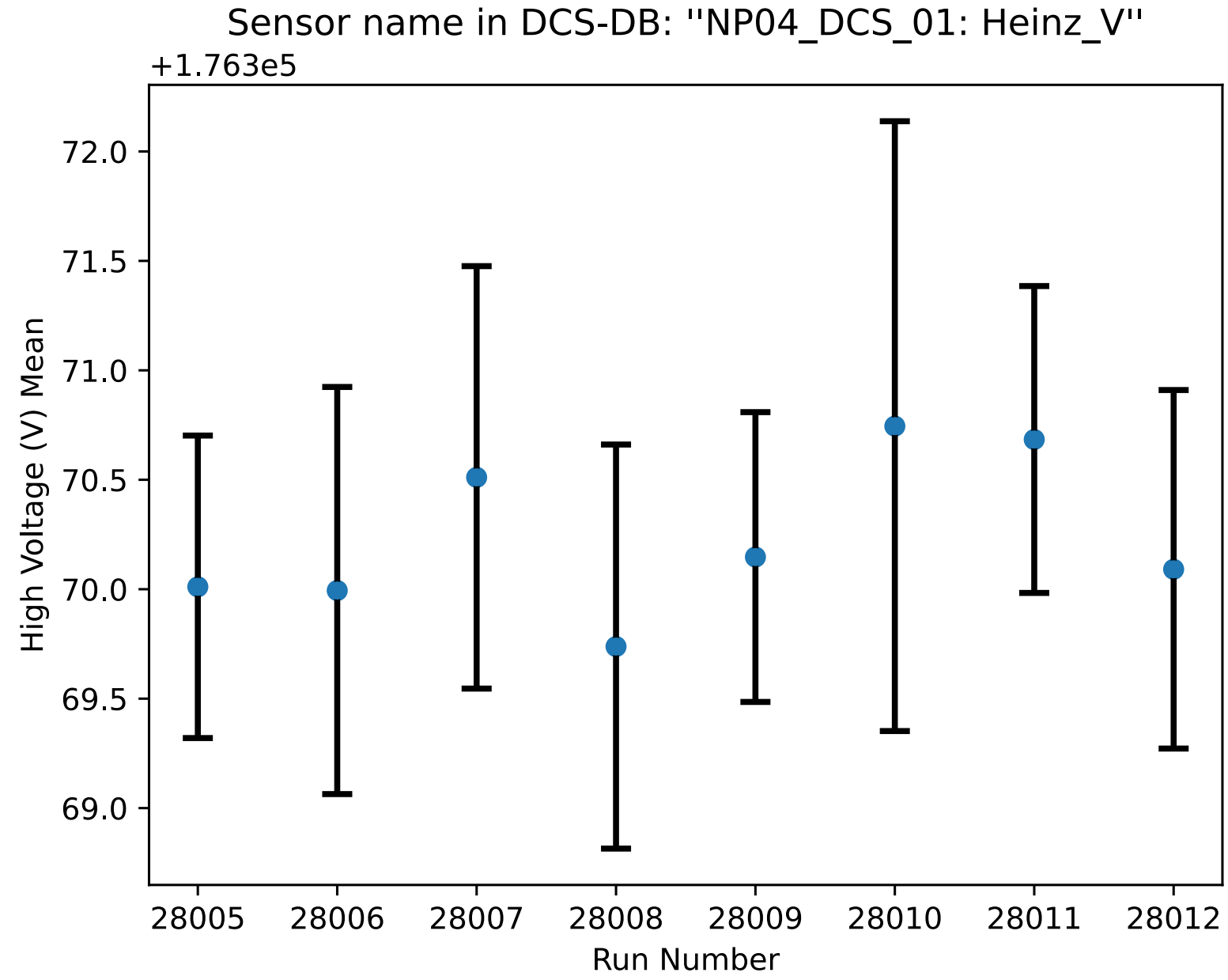
- I have just started investigating some of the sensor data to get needed granularity.
 - We want to check fluctuations per run, getting mean and std for each run.
 - ▶ I have started by plotting values vs time (for the run numbers: 28005-28012) for:
 - 3 LAr purity sensors,**
 - Temperature - top and bottom,** *(there are lots of temperature sensors inside the cryostat which can be monitored via the slow controls)*
 - High Voltage - drift-inducing and HV_cathode**
- (28005-28012: between 2024-07-12 and 2024-07-14, run_type: PROD, detector_id: np04_hd)*
- ▶ Then I checked the mean for all of the runs which have been listed in condb for HV values so far but I will continue to investigate with the updates of the runs and other sensors as well.
 - ▶ Today, I am going to present my initial study to understand the needed granularity.
 - ▶ Last thing is that we sent our CHEP2024 proceedings to DUNE CS&C and APB to provide feedback and suggestions. ***“ProtoDUNE Run Conditions Database”***

Results: Sensors vs Run Number: High Voltage and LAr Temperature

To know average HV and temperature values is important for offline analysis.

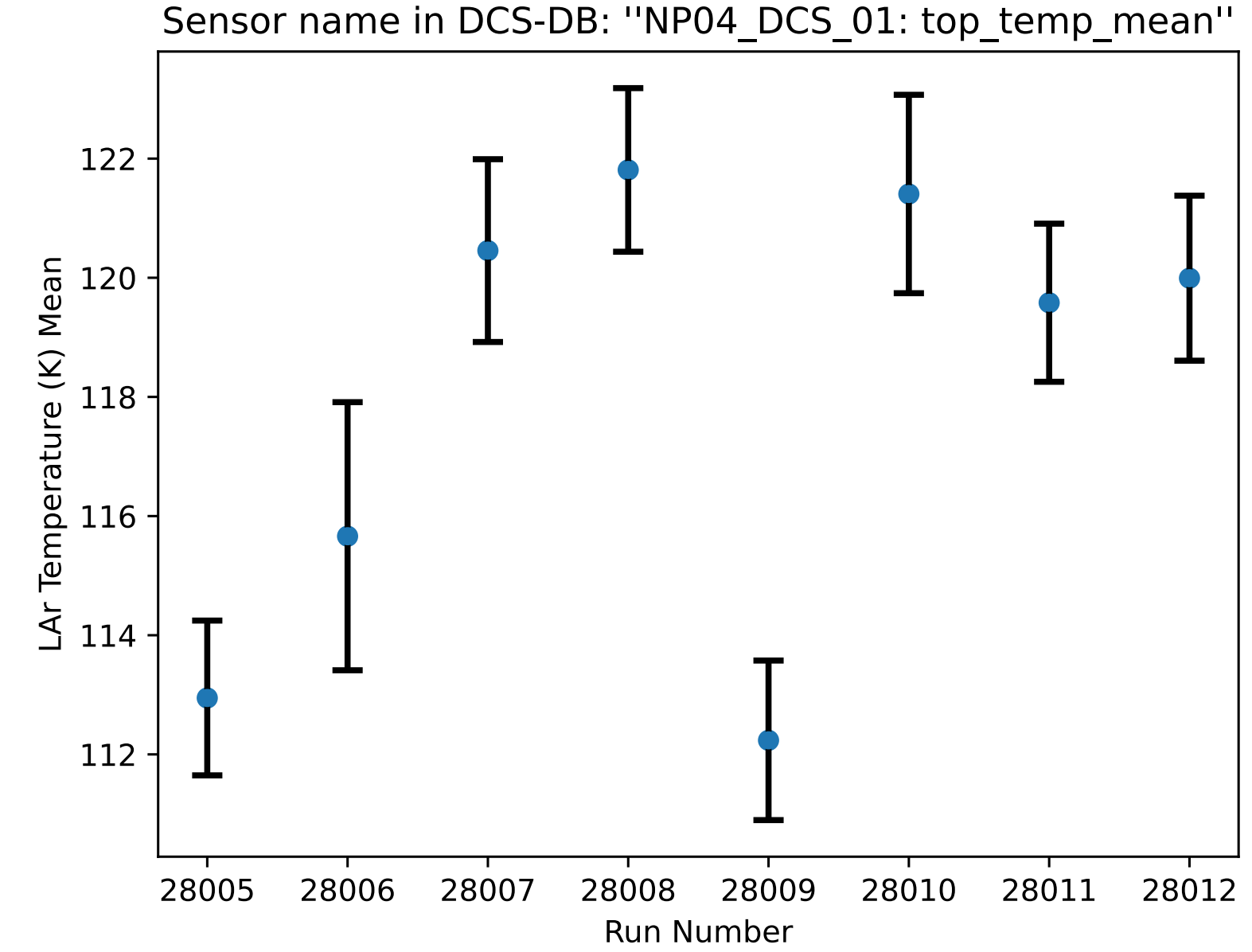
**High Voltage:
Heinz_V
(drift-inducing)**

Required parameters
for HV in DB:
Run number and HV value,
two timestamps that give
the start and end HV
time periods.

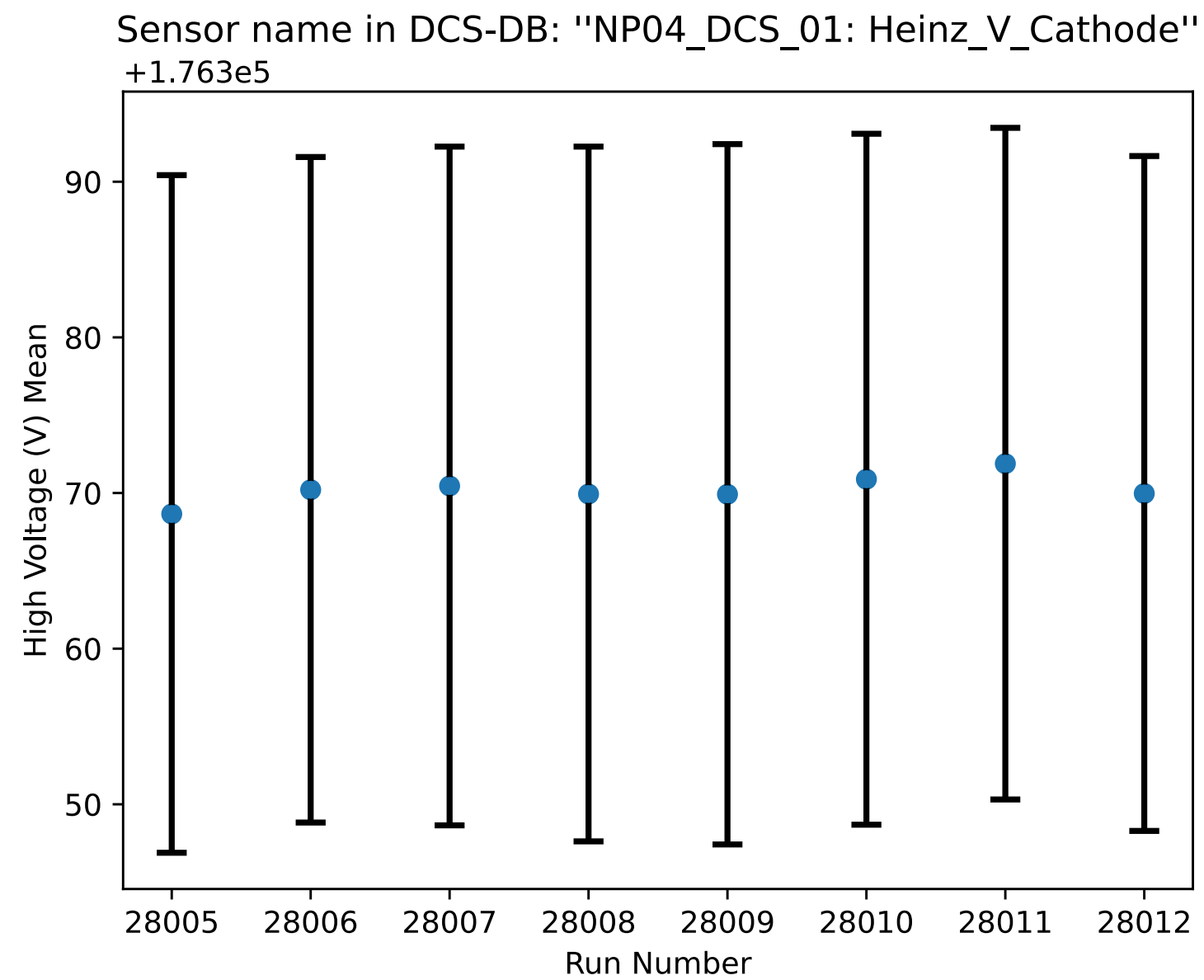


**Temperature:
top_temp_
mean**

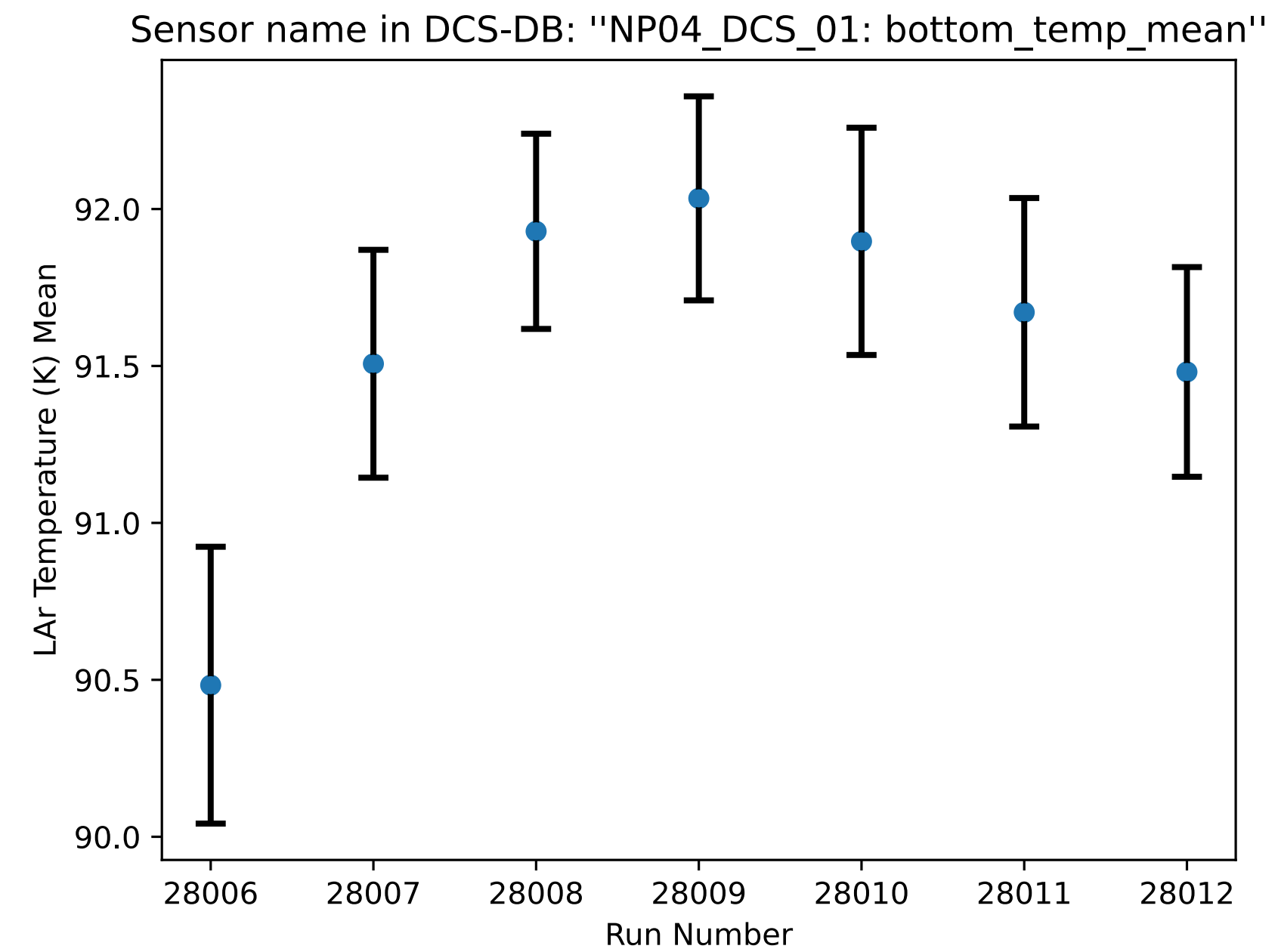
Required parameters
for Temperature in DB:
Run number and
Temperature
(in Kelvin scale)



**High Voltage:
Heinz_V_Cathode**



**Temperature:
bottom_temp_
_mean**



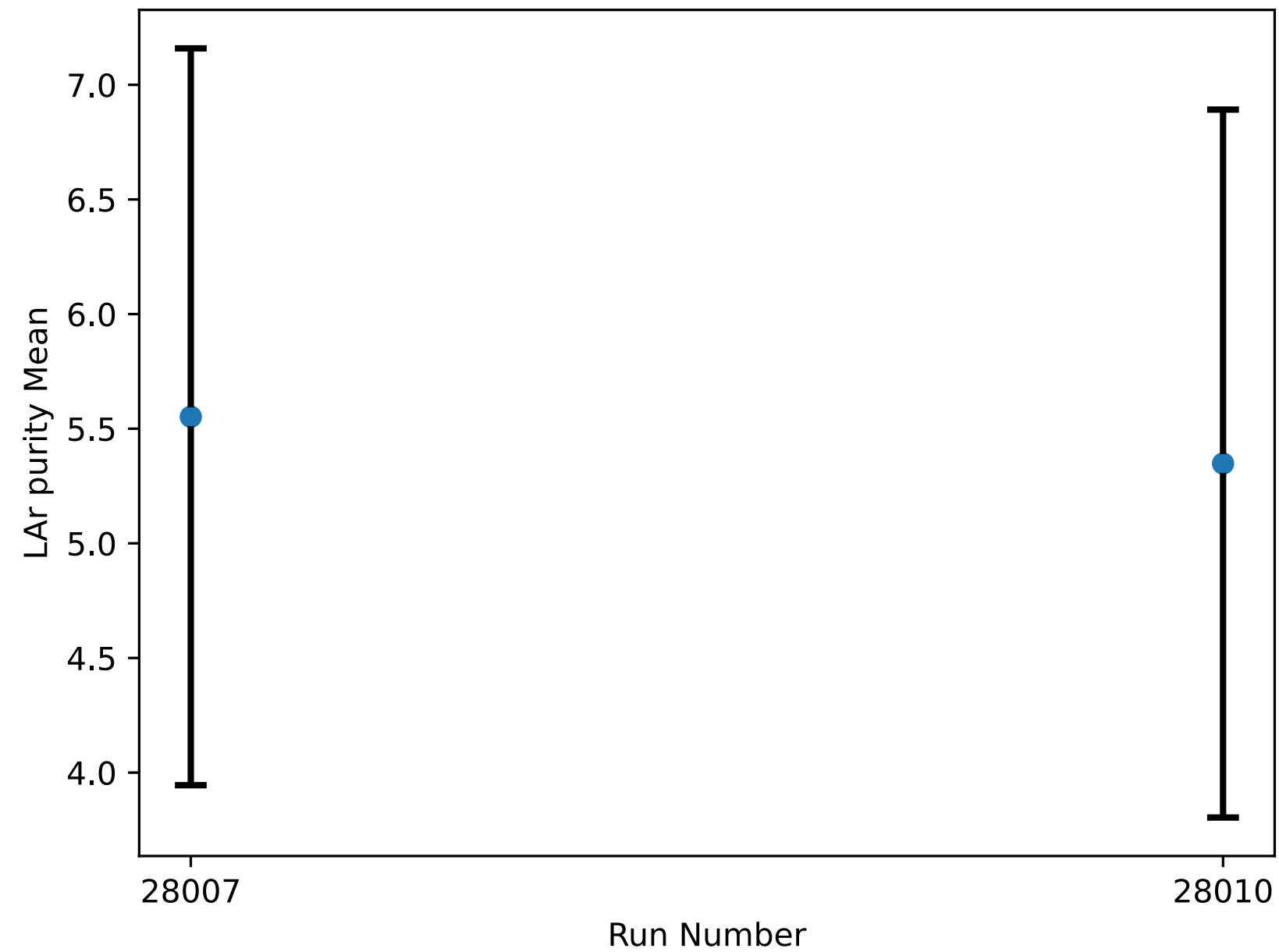
Results: Sensors vs Run Number: LAr Purity Sensors

We have 3 LAr purity sensors in DCS-DB:

"47928748016410" : "NP04_DCS_01:PrM0.PrM_corrected_e_lifetime",
"47928764793626" : "NP04_DCS_01:PrM1.PrM_corrected_e_lifetime",
"47928781570842" : "NP04_DCS_01:PrM2.PrM_corrected_e_lifetime"

→ The three purity monitors used in NP04 are designed to measure the electron drift lifetime in the LAr

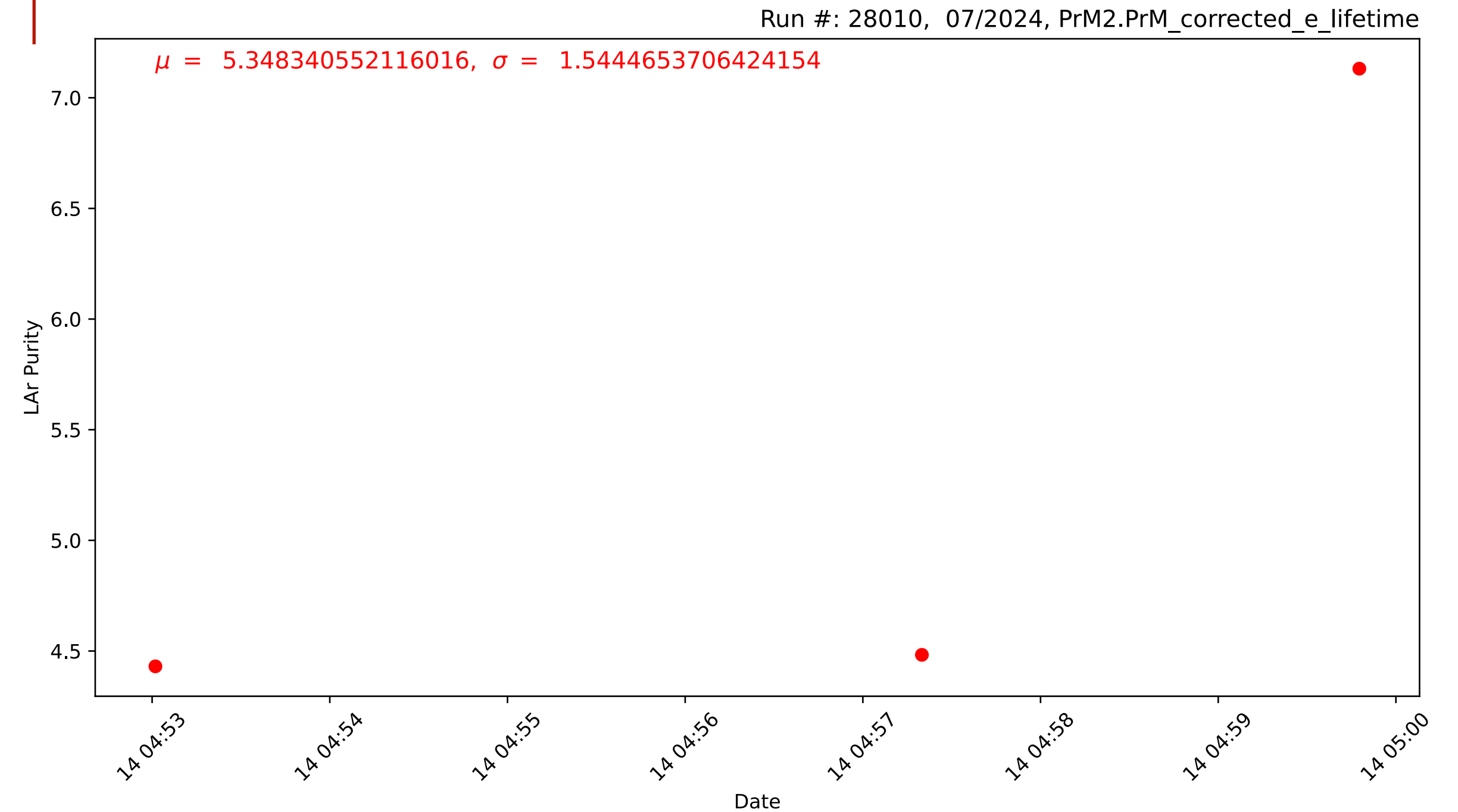
Sensor name in DCS-DB: "NP04_DCS_01: PrM2.PrM_corrected_e_lifetime"



Except for PrM2, I did not find any values in DB for PrM0 and PrM1. The DCS DB gives me NaN for PrM0 and PrM1 for given run numbers: (28005-28012).

For instance:

```
, "1717223083476": NaN, "1717223084457": NaN, "1717223084949": NaN, "1717223085478":  
": NaN, "1717223087973": NaN, "1717223088461": NaN, "1717223089473": NaN, "171722308  
091967": NaN, "1717223092456": NaN, "1717223092989": NaN, "1717223093477": NaN, "171
```



✓ I checked for the long time period in DB to look at the NaN values continuation for PrM0 and PrM1, I also checked some time periods for PrM2.

✓ Most runs gave me `NaN` instead of too much data for purity sensors in DCS-DB.

?? We have NaN values because operating the purity monitors while data taking might affect the photon detectors and decreasing the data quality, so we have NaN values for purity monitors.

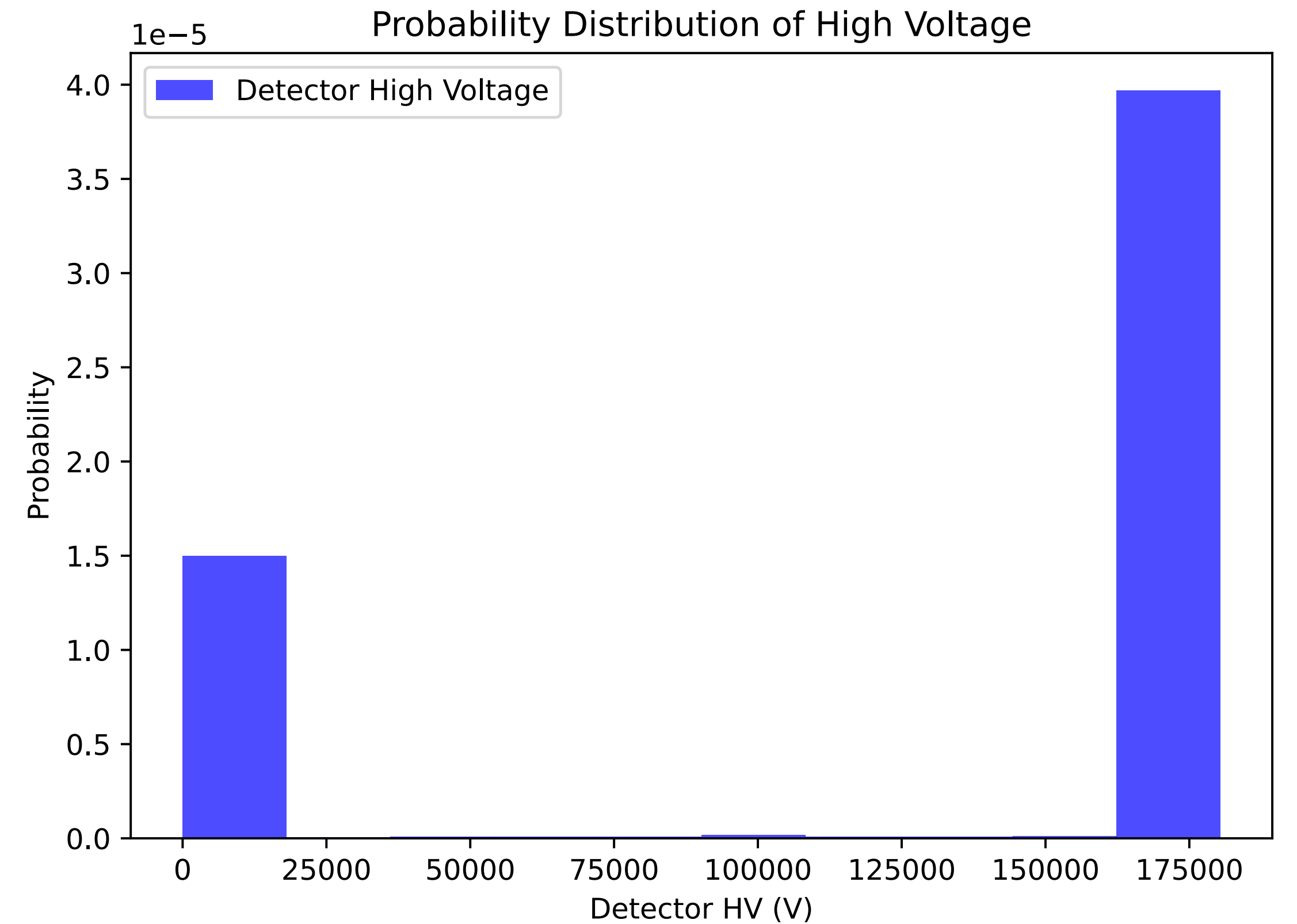
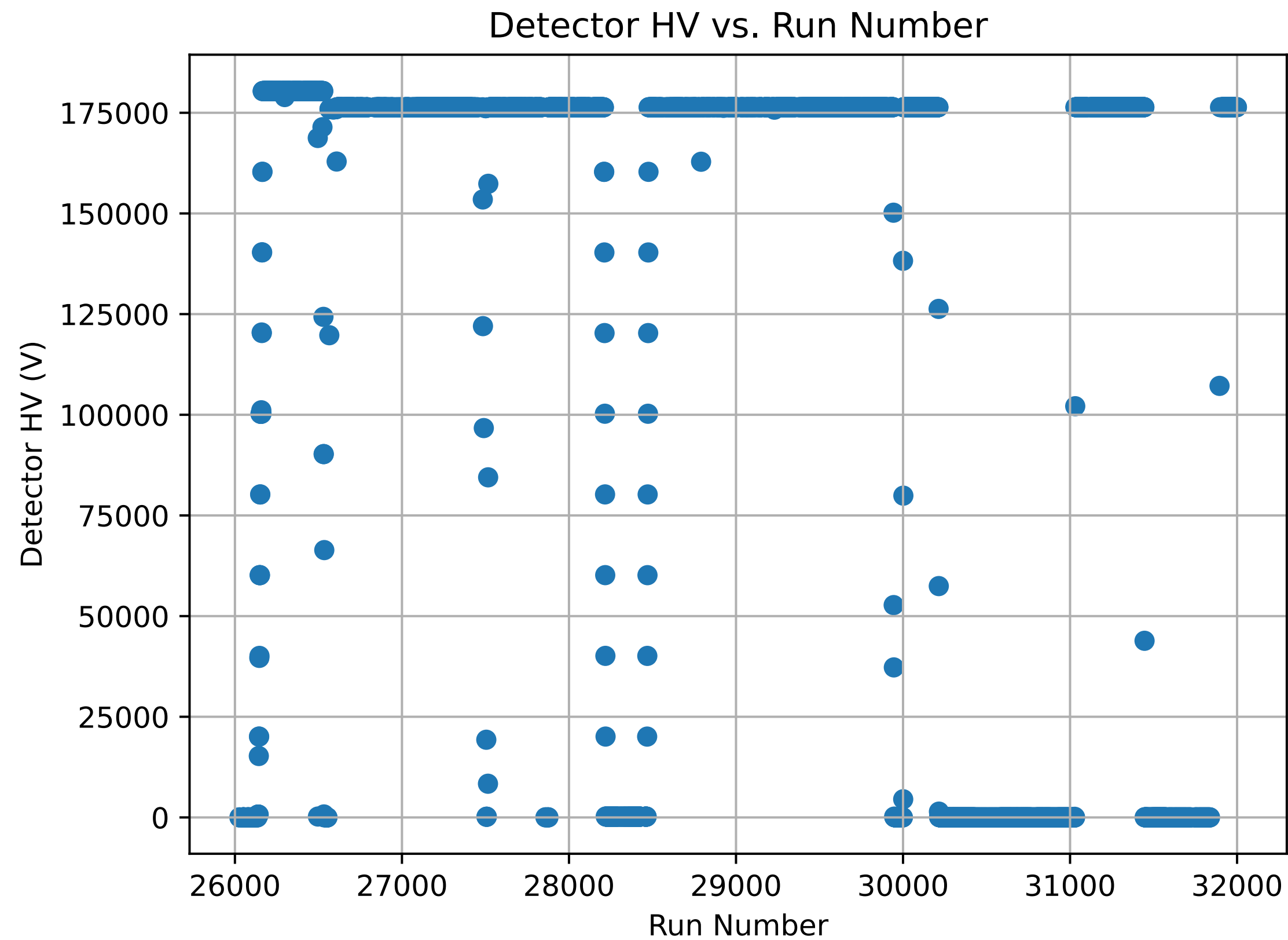
That might be the reason ??

Results: High Voltage vs Run Number, I looked all runs in `condb` which have been listed so far!

between: start time: 2024-05-04 18:31:01 UTC and stop time: 2024-10-24 21:29:37 UTC

detector_id = np04_hd, detector_hv

- ▶ The mean (average) of detector_hv for all runs in `condb` and np04_hd detector id: 113253.50555203398 V
- ▶ Standard deviation of detector_hv for all runs in `condb` and np04_hd detector id: 84370.00172283938 V



- ✓ High Voltage system should be stable for long time periods
- ✓ I notice that there are some HV instabilities and the periods where the HV was turned off (probably the off runs were planned before)

Next steps:

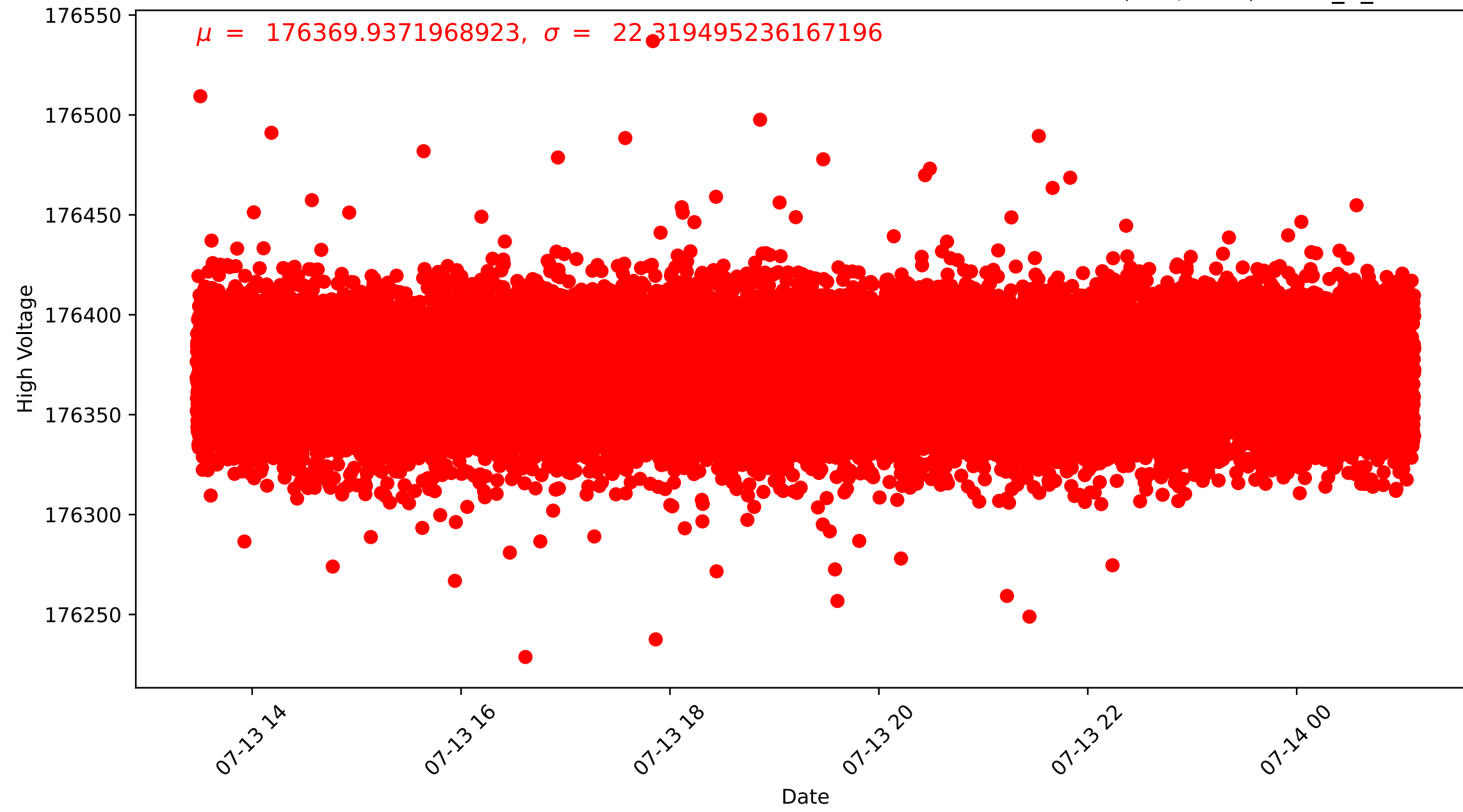
- ▶ Ana Paula contacted Xavier Pons (CERN) to get the sensor IDs - we need to know all the sensor names. He referred her to the DAQ group for an extraction tool (which is not what we need). *So, for the next steps, we need an expert who knows the sensor names. For instance:*
 - NP04: wire bias voltage for each plane, LAr purity corrected e lifetime*
 - NP02: high voltage cathode, wire bias voltage for each plane, LAr purity corrected e lifetime*
- ▶ In addition, we need to understand why we see the NaN values for purity sensors in DCS-DB, so we are planning to talk to experts for their guidance.
- ▶ We need to figure out the units of the sensors for our next steps.
- ▶ In addition, I just check Lino`s code to see what he did for HV Analysis before I joined the DB group.
 - > At my first glance, I understand that he looked at resistance in DB by using average current and voltage.
 - > Do we still need to look at resistance? (I do not know how to get the average current info in DB though)
- ▶ Not only HV, but all the sensors in DCS-DB, I am going to work for the next steps.

Any suggestions/comments for our next steps?

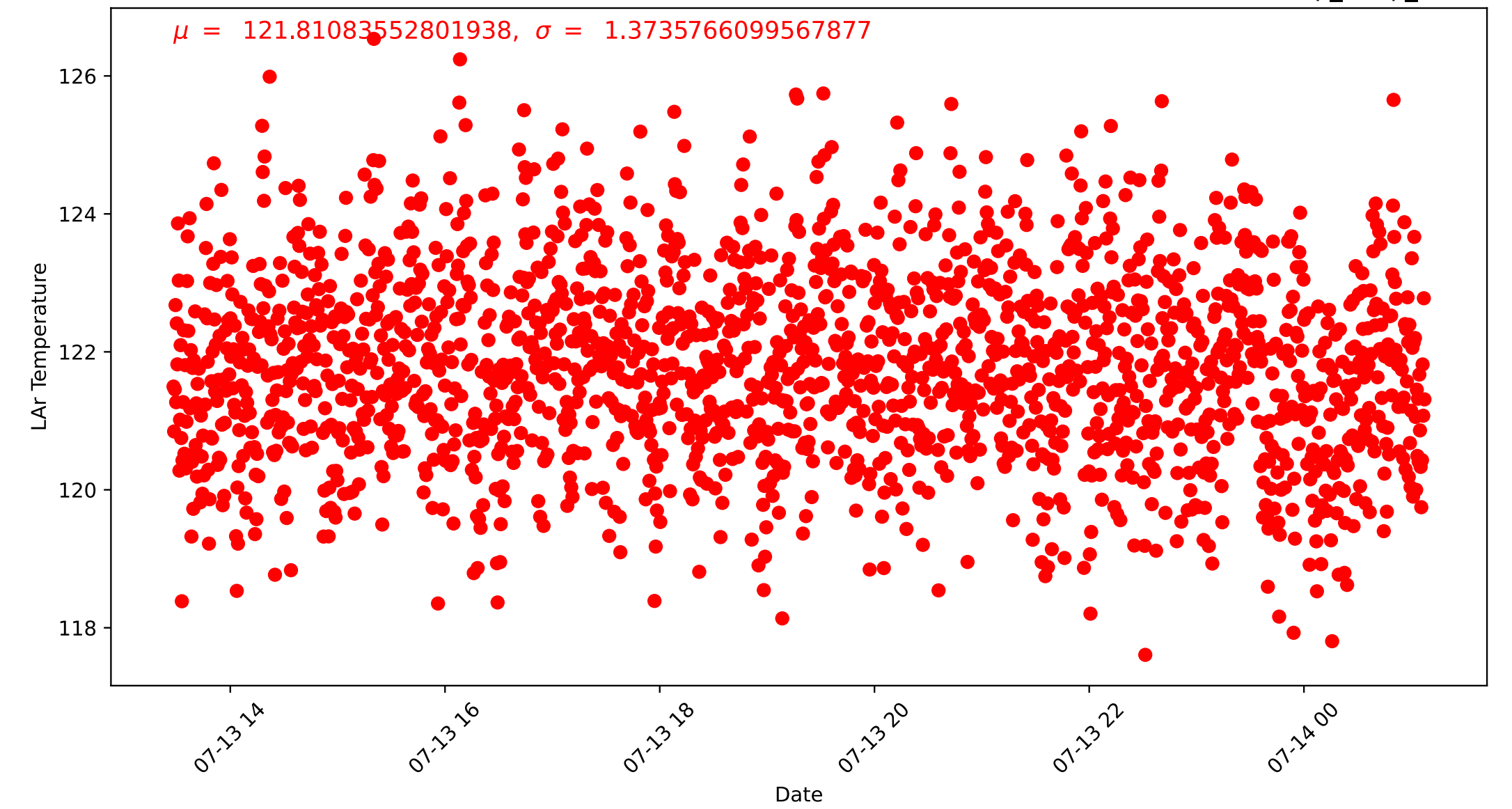
Thanks for listening!

Backup

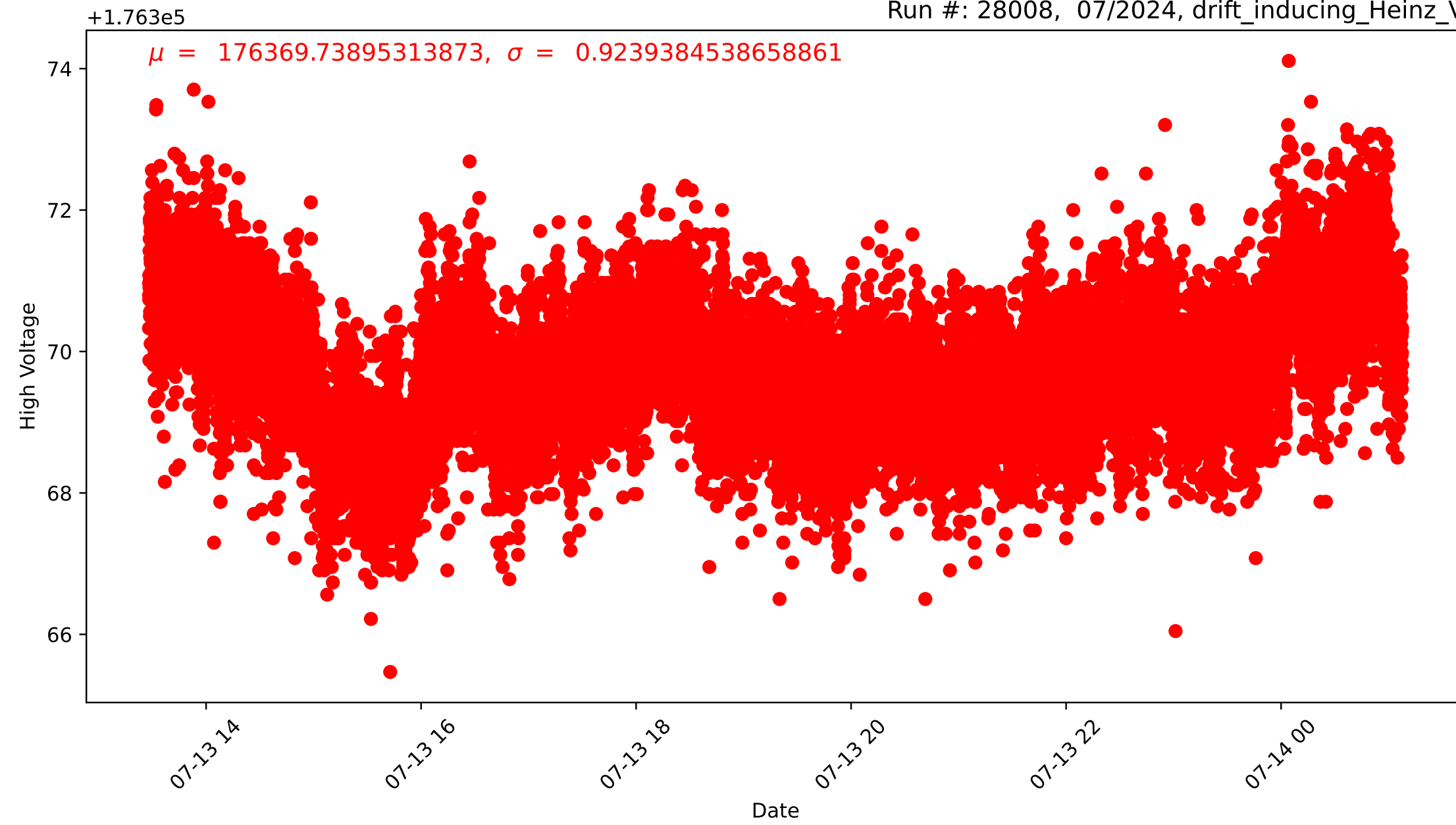
Run #: 28008, 07/2024, Heinz_V_Cathode



Run #: 28008, 07/2024, top_temp_mean



Run #: 28008, 07/2024, drift_inducing_Heinz_V



Run #: 28008, 07/2024, bottom_temp_mean

