Slow Controls Conditions Data

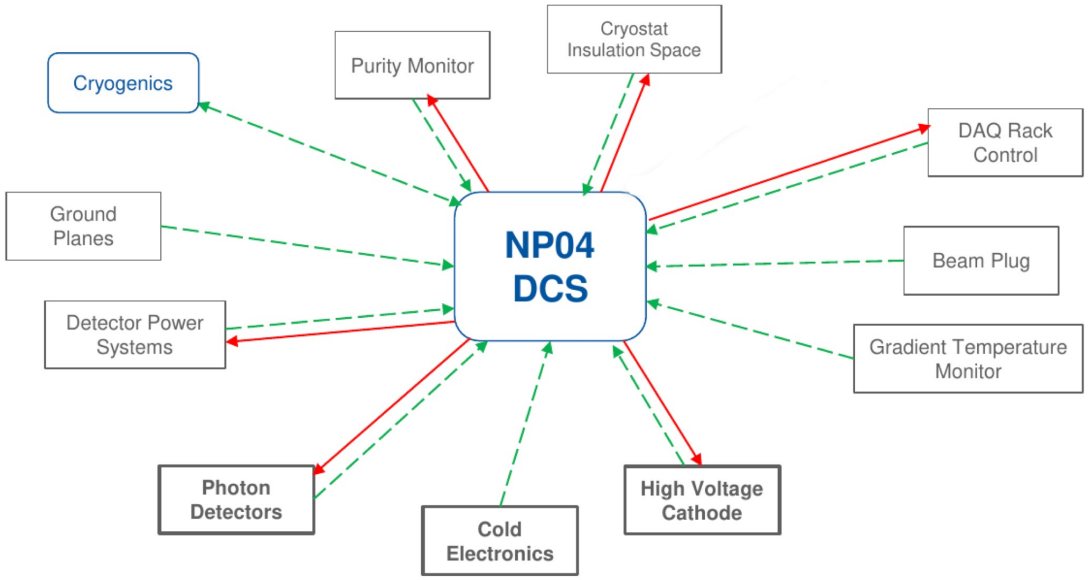
Lino Gerlach, Paul Laycock

13.04.2022

@BrookhavenLab

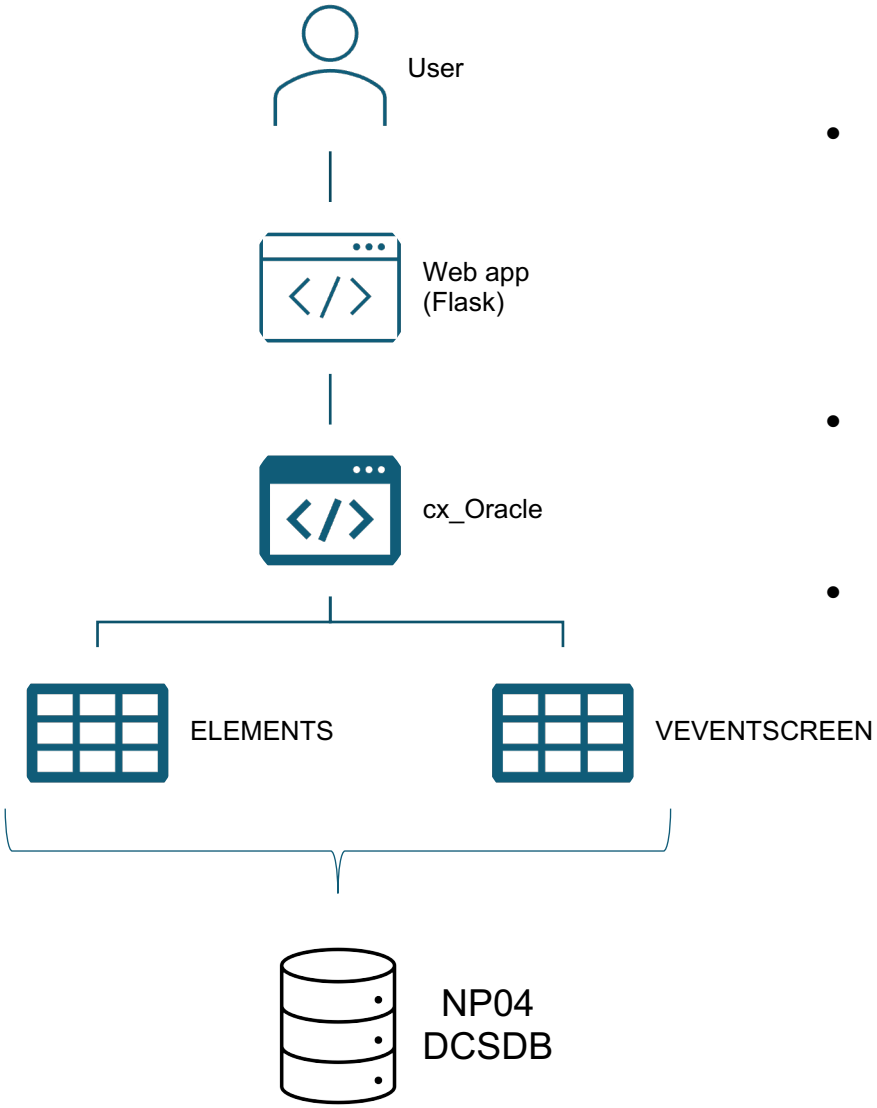
Introduction / Reminder

- Investigate data from Slow Controls (aka ‘DCS’)
  - E.g., LAr temp. & purity, high-voltage, ground impedance
  - Indexed by time stamp & stored in SC archive (‘DCS-DB’)
- Challenge: raw data written w/ very high granularity
  - Higher granularity than needed for offline processing
- DCS-DB accessed via read-only API



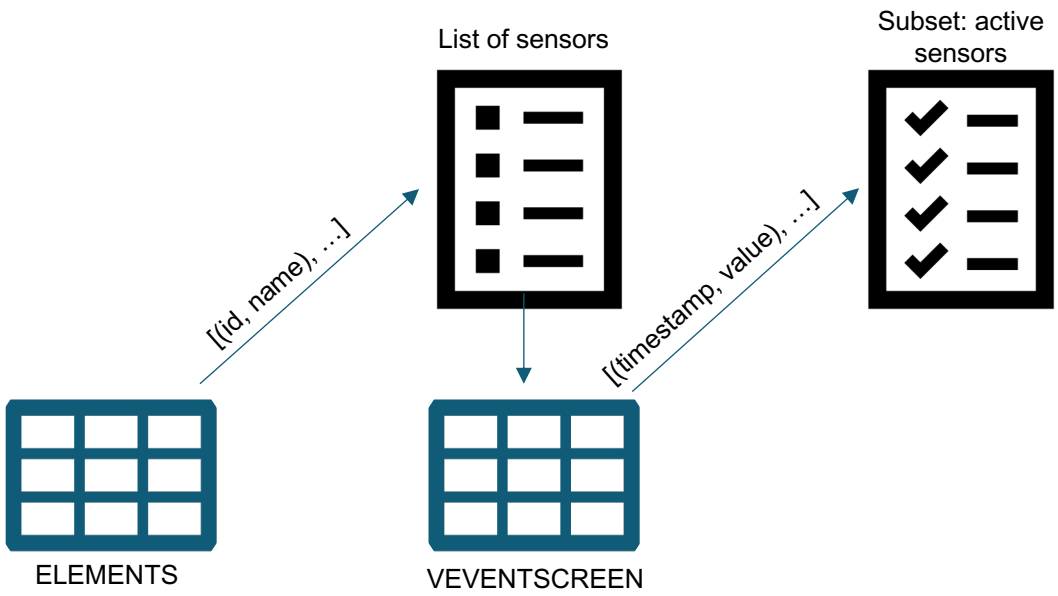
From Manuel J. Rodriguez

State of the API



- Debugging: All original functionalities work now
  - Exception: Run controls table does not seem to exist in DB
- Implemented plotting capabilities with Charts.js library
- Groups of sensors defined via conf
  - Conf file content unreliable
  - Investigate which sensors are important

Sensor Activity



Last Timestamp	Number of sensors	% of all sensors
-	29766	100%
Any	12805	43%
2021	9225	31%
2022	7195	24%
April 2022	3787	13%

- Retrieve (id, name) for every sensor from ELEMENTS
- Retrieve latest (timestamp, value) for every sensor from VEVENTSCREEN
  - Remove sensor based on requirement on timestamp

Plotting Sensor Values

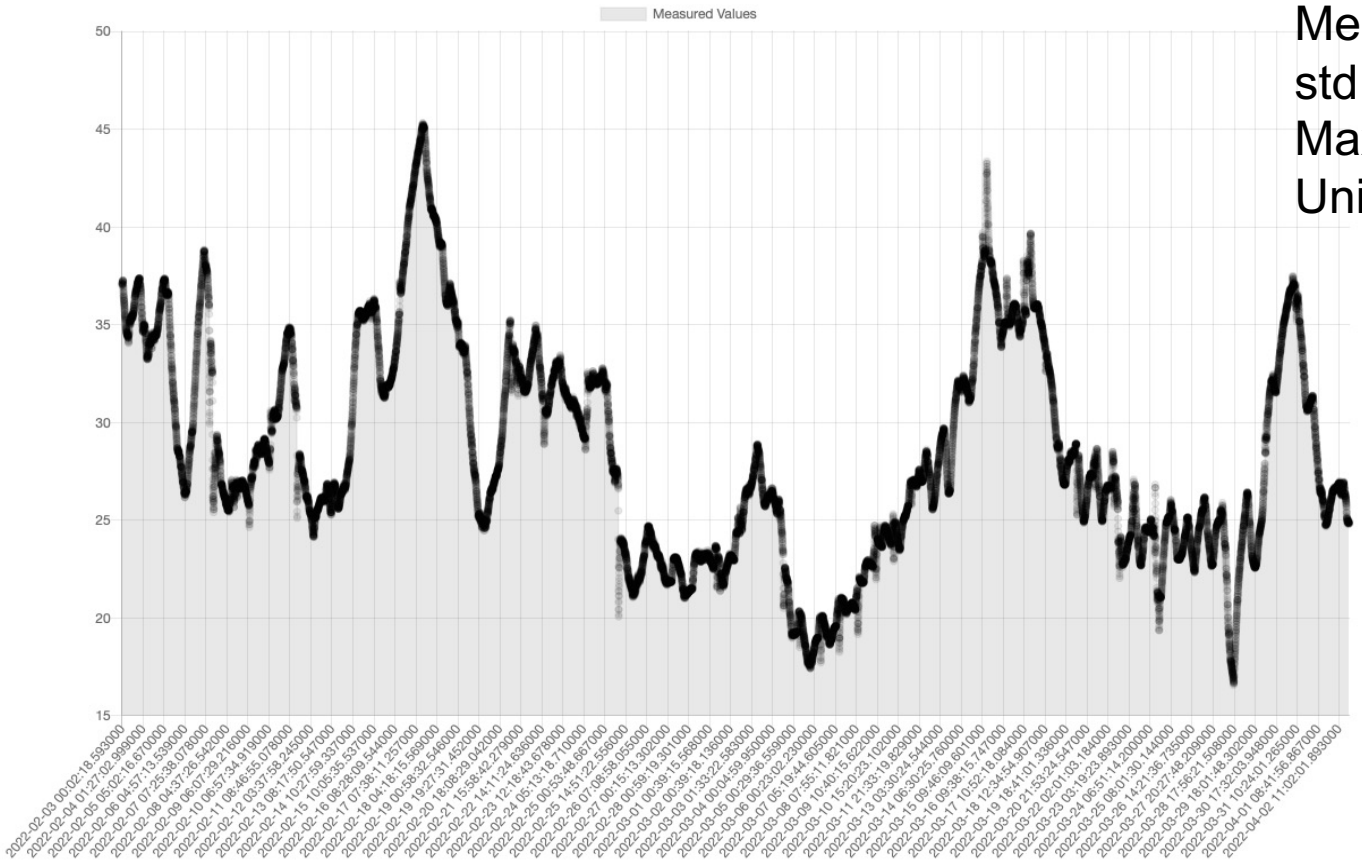
http://vm-01.cern.ch:5000/plotRange/2022-02-03/2022-04-03/47878785489690

Visualising Measured Values for Sensor

NP04_DCS_01:un-PLC_DCS_01-NP04_DCS_V21-CPC_AnalogInput-00007.ProcessInput.PosSt

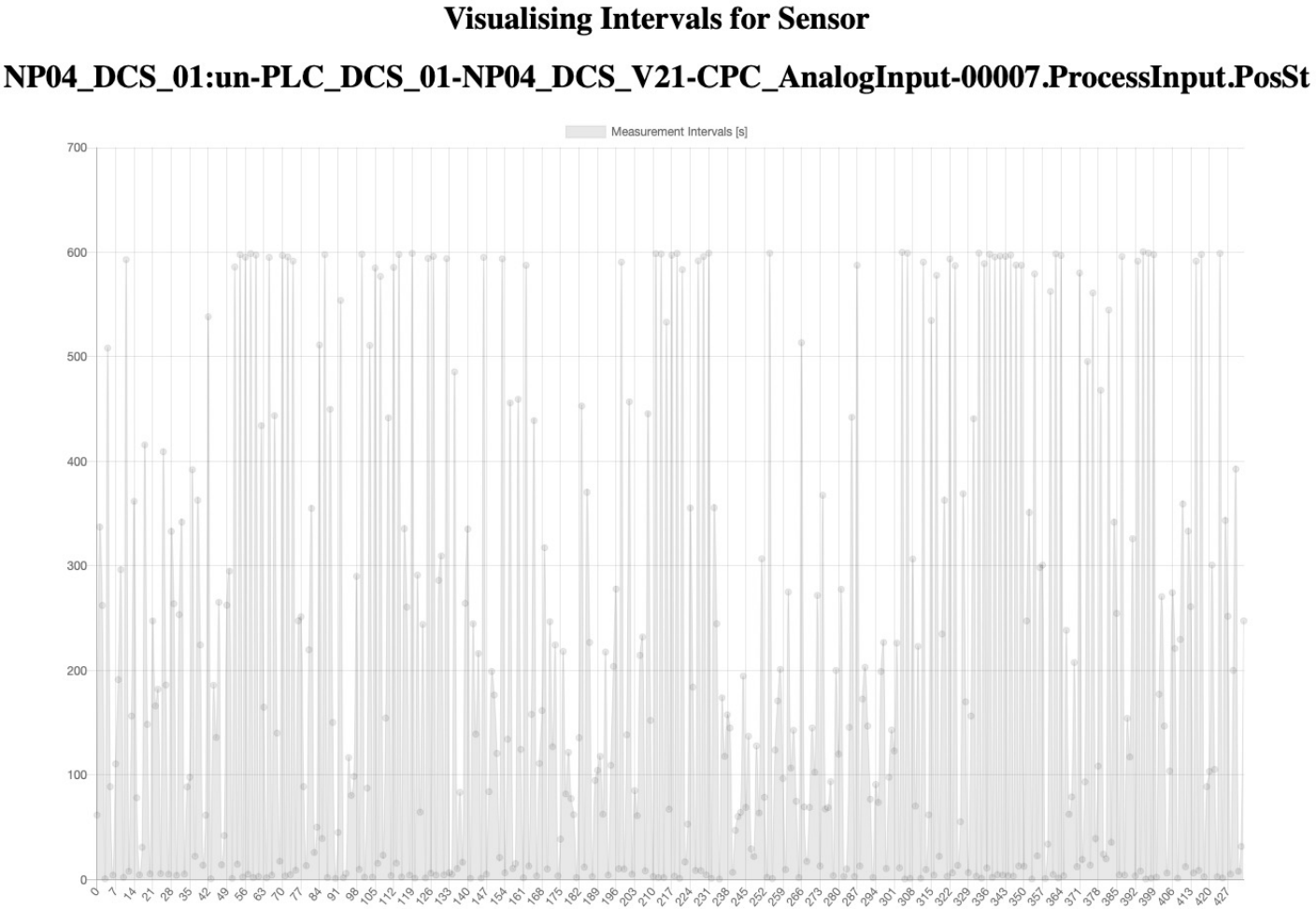
Start: 2022-02-03, 00:02:18

End: 2022-04-02, 23:57:54



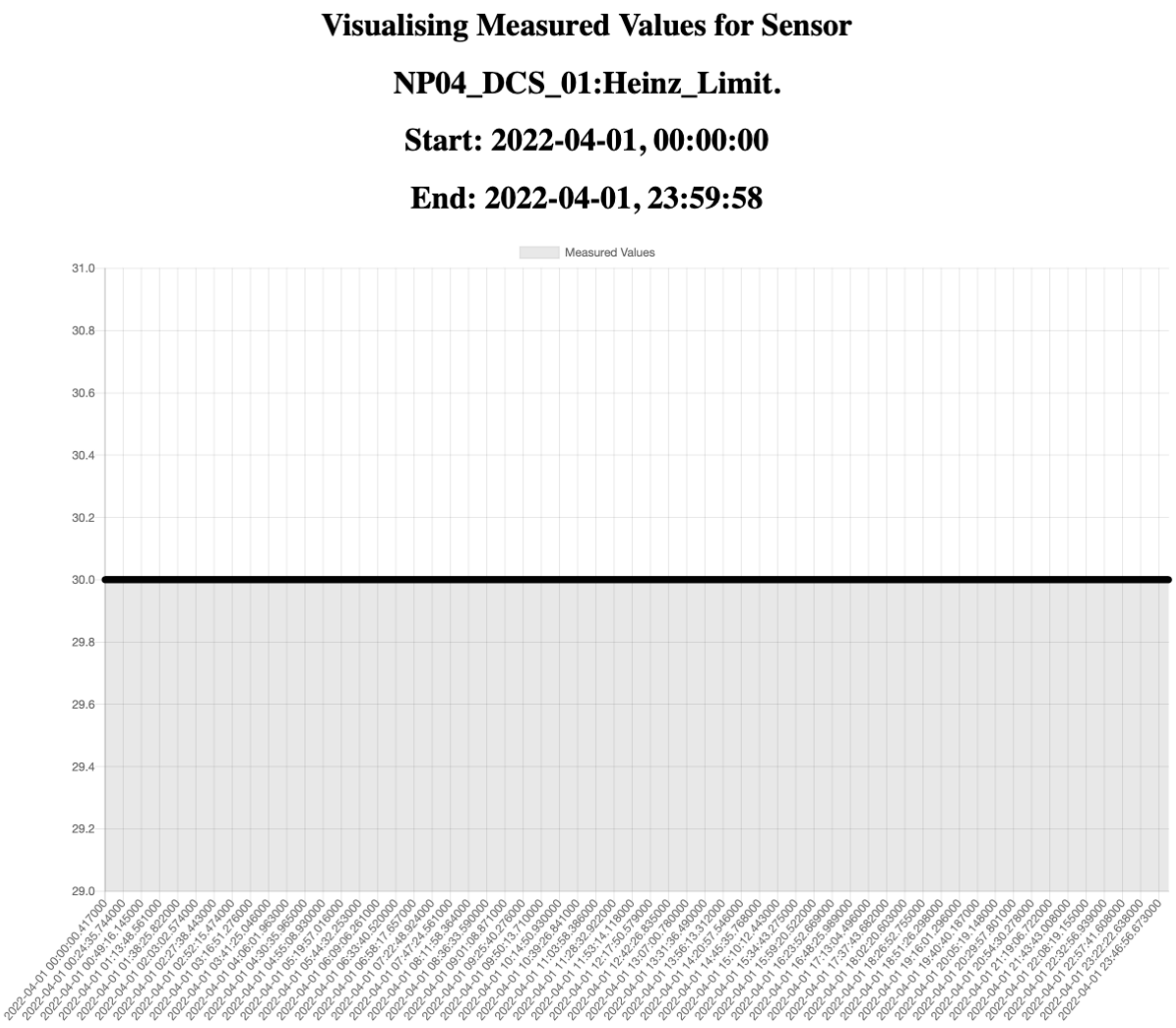
No of points: 26610
Mean: 28.47
std: 2.286
Max_diff: 0.24
Unit: '\%'

Plotting Sensor Intervals



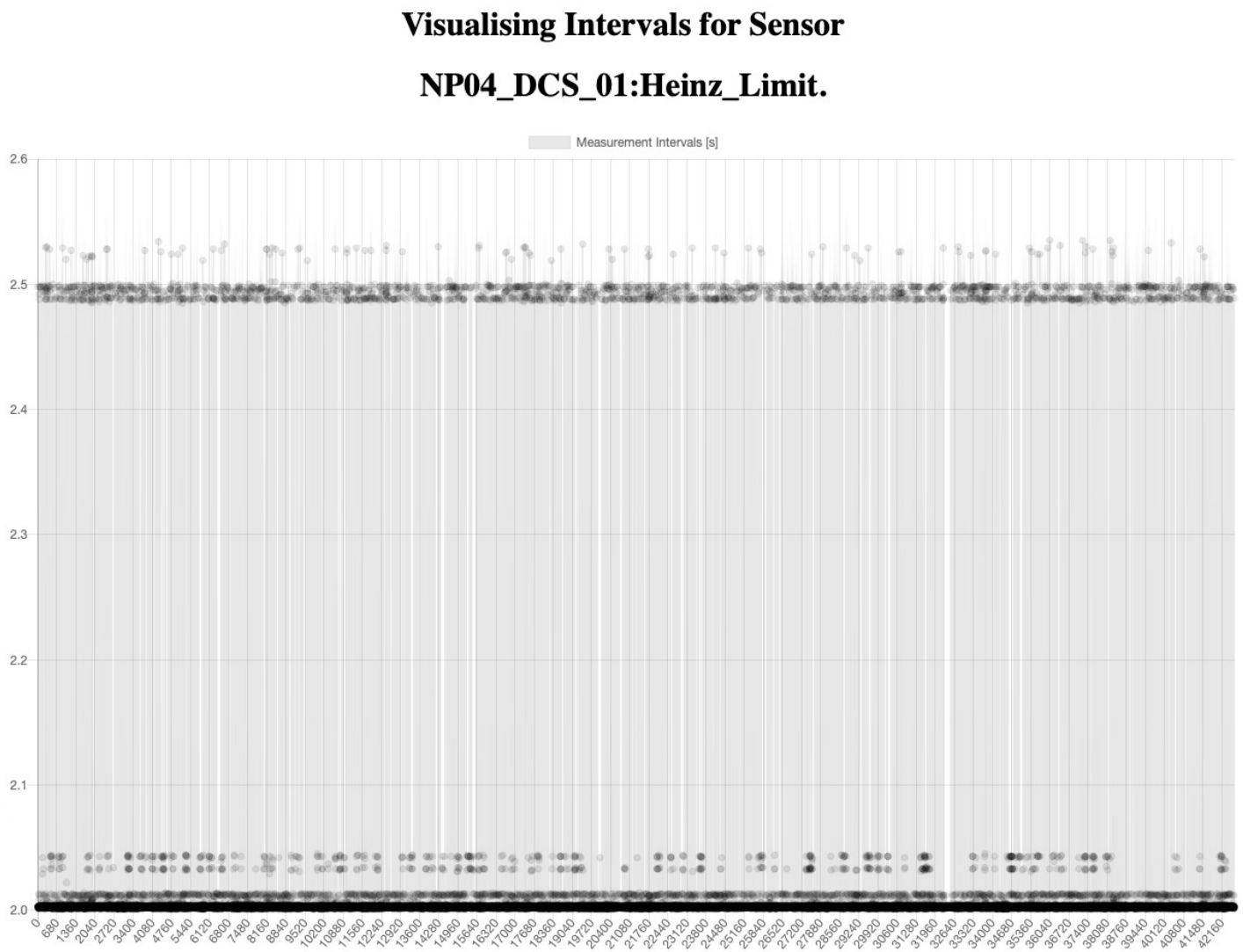
Mean: 181.77
std: 200.3
min: 0.199
max: 600.5

Homogeneous Sensor Values



No of points: 42609
Mean: 30.0
std: 0.0
Max_diff: 0.0
Unit: ‘uA’

Homogeneous Sensor Intervals



Mean: 2.03
std: 0.107
min: 2.00
max: 2.54

Conclusions from looking at data

- Roughly 4000 sensors have been active this month
- Some return very heterogenous data that will be hard to compress
  - Values vary strongly on time scale of minutes
  - Interval between two measurements varies between fraction of seconds and several minutes
- Others return the same value every 2 seconds
- Unclear which sensor measures what

Feedback from DRA experts

- Started discussion with DRA experts about offline needs w.r.t. DCS data
- Among others, the following properties are used
  - High Voltage
  - Argon Temp
  - Pressure
  - Electron lifetime
- Usually with very low granularity. Example:
  - Temperature & pressure defined as constants per Run in .fcl file
- Raw values used to derive corrections before storing as conditions data

Summary & Outlook

Summary

- DCS-DB API now very helpful for understanding the data
- Narrowed down list of potentially interesting sensors
- Investigated variation and frequency of selected sensors
- Started discussion with DRA experts about offline needs

Next Steps

- Continue investigating DCS data
- Continue conversation with DRA experts to better understand offline needs