



# Beam Profile Measurements with new IRRAD-BPM DAQ Electronics

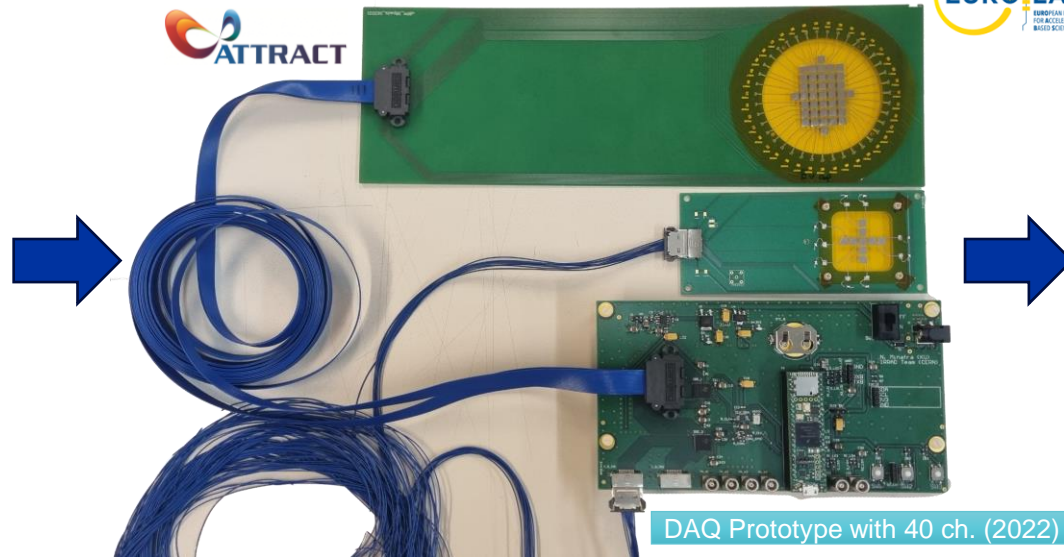
Nicola MINAFRA (EP and KU), Giuseppe PEZZULLO and Federico RAVOTTI (EP) for the IRRAD team

# IRRAD-BPM DAQ Electronics Upgrade

- New DAQ Electronics developed and now being produced:
  - Former DAQ electronics from OSU (10 years old) had several limitations:
    - 20ms **sampling time**, limited **number of channels** (40 channels/unit) and **dynamic range** (matching with new detector technology), **longitudinal profile availability** (one channel only), etc.
  - Trying to cope with new operational requirements:
    - slow- and **fast-extracted beams**, **heavy ion** beams, **new sensor technology**, increase information available for MD studies, etc.
  - **Scalable system** (data bus), **sampling time down to hundred's  $\mu$ s**, prototypes tested and now new units (160 channels) to replace the former DAQ being produced



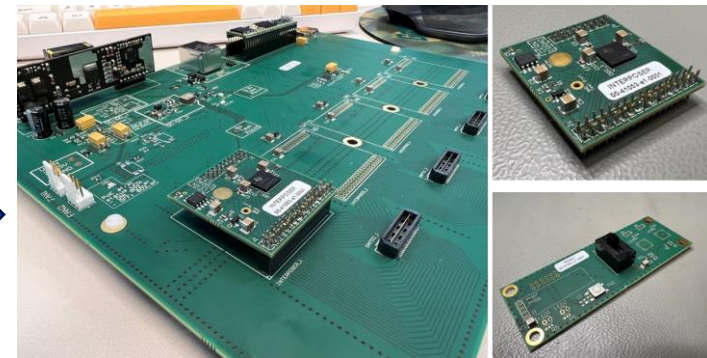
Former IRRAD-BPM DAQ unit 40 ch. (2014)



DAQ Prototype with 40 ch. (2022)



IRRAD-BPM DAQ Scalable unit 160 ch. (>2024)

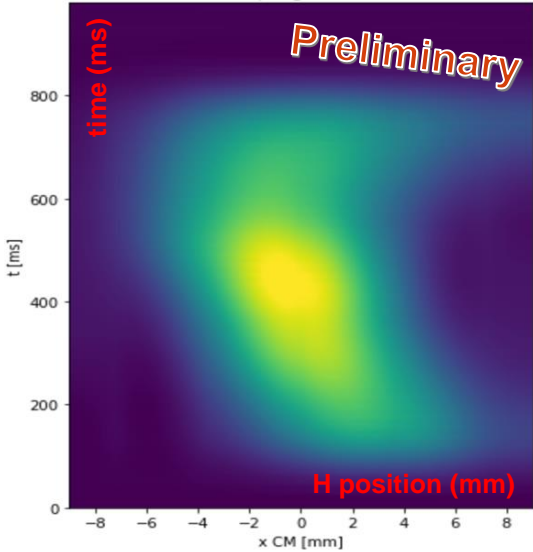


CERN-THESIS-2023-127  
<https://cds.cern.ch/record/2867817>



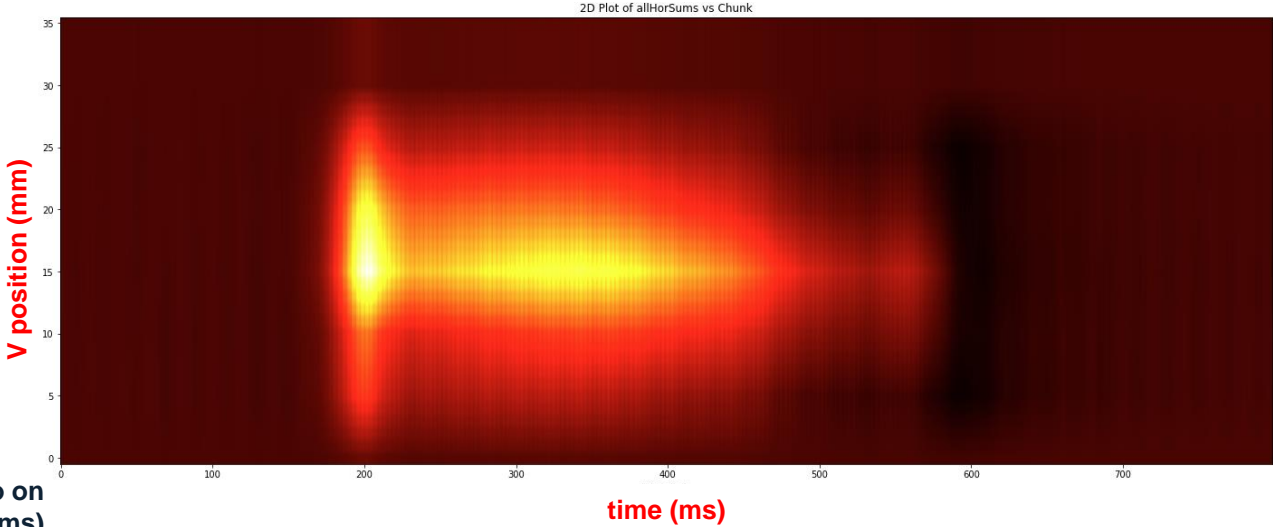
# IRRAD-BPM DAQ Measurement Examples

Evolution of H beam position with time

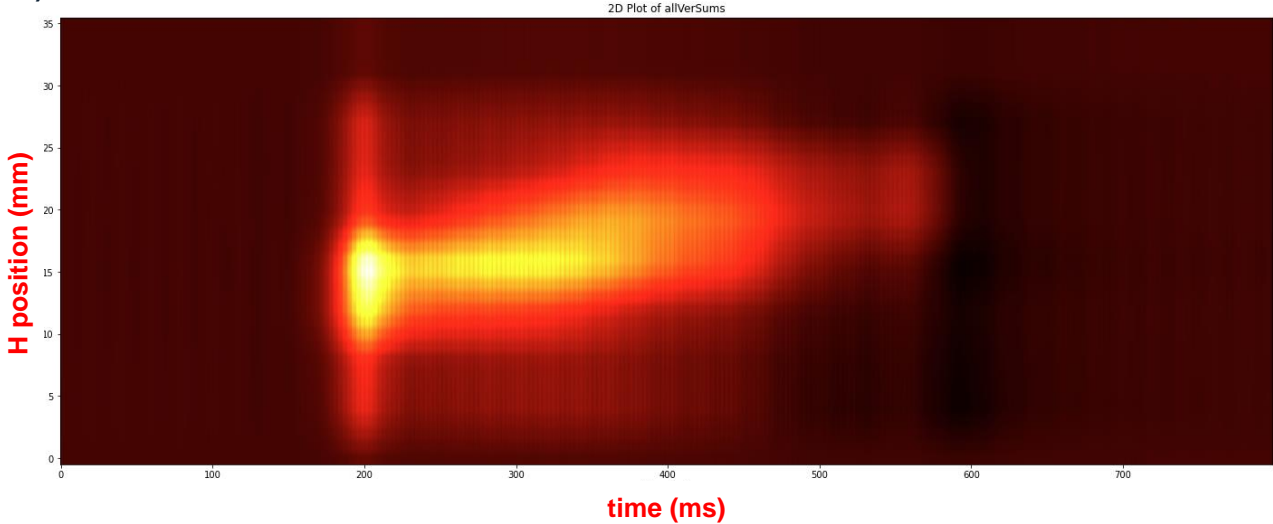


© N. Minafra (CERN and KU),  
BTTB10 workshop, June 2022

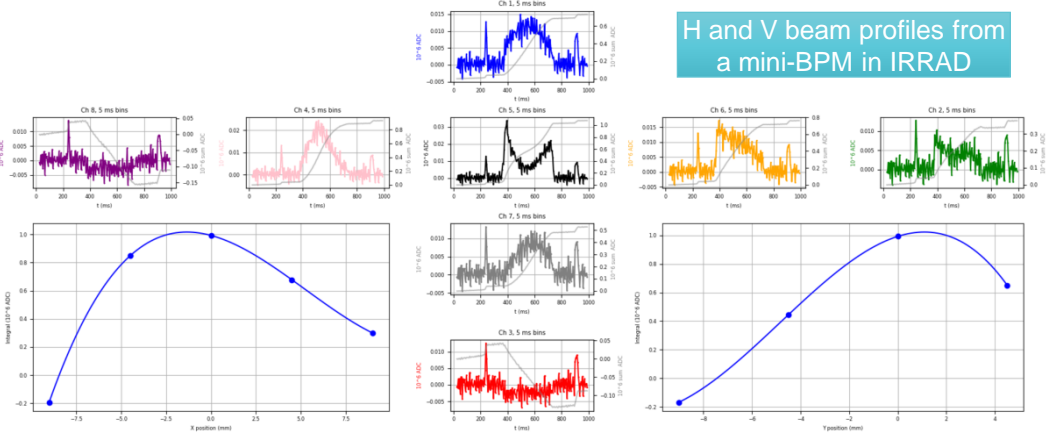
Evolution of beam position with time



© N. Minafra / G. Pezzullo on  
March 25<sup>th</sup>, 2024 (0.5ms)



H and V beam profiles from  
a mini-BPM in IRRAD

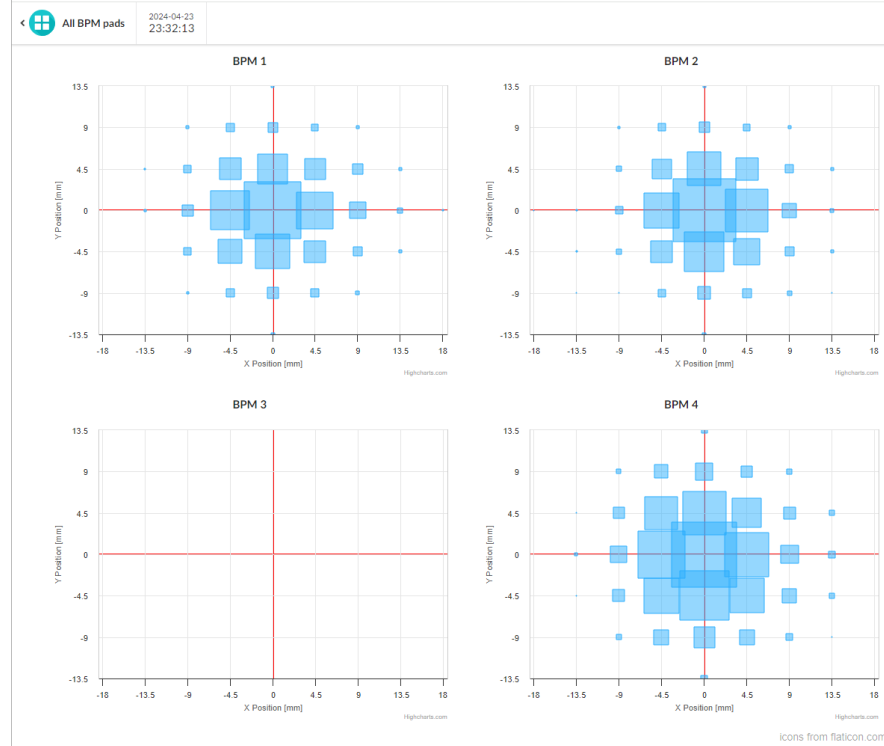
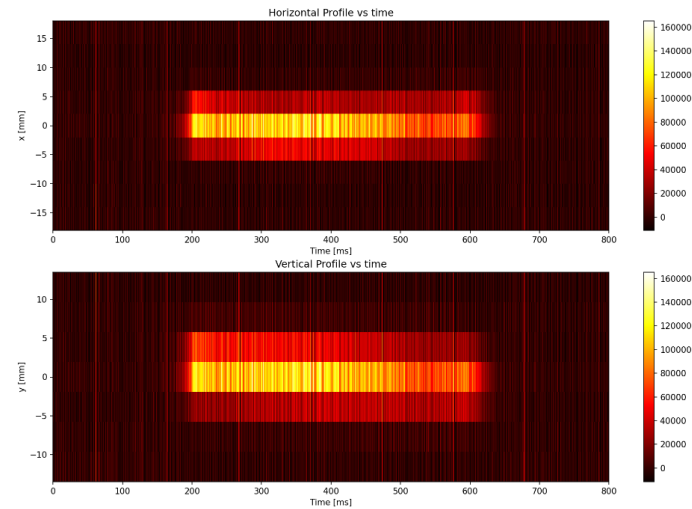
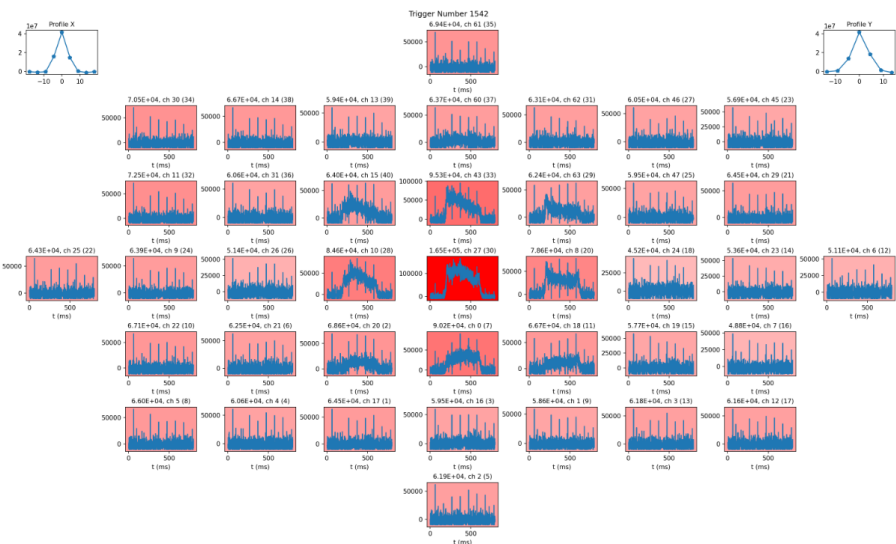


# IRRAD-BPM DAQ Measurement Examples

T8 autosteering test run (Joe)

Very preliminary IRRAD BPM online monitor

Last Trigger 2024-04-23 23:32:18

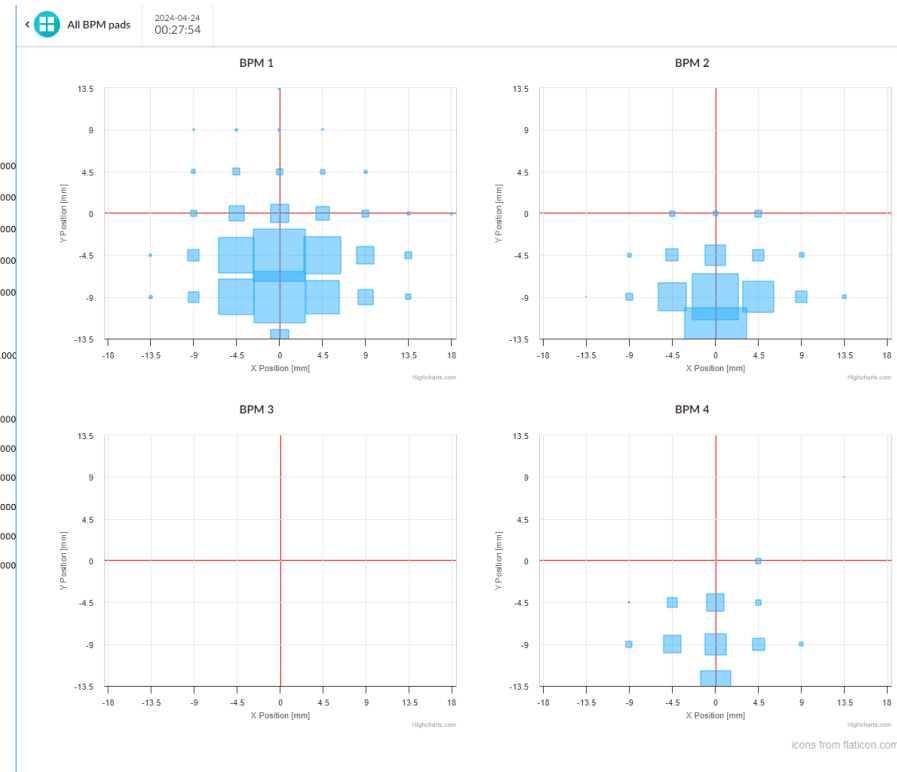
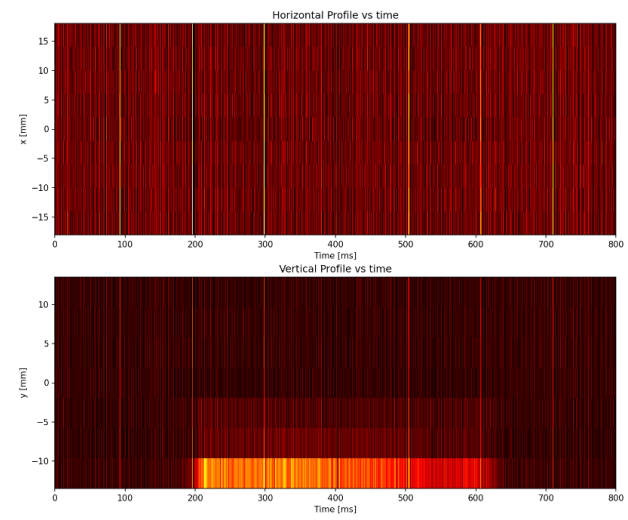
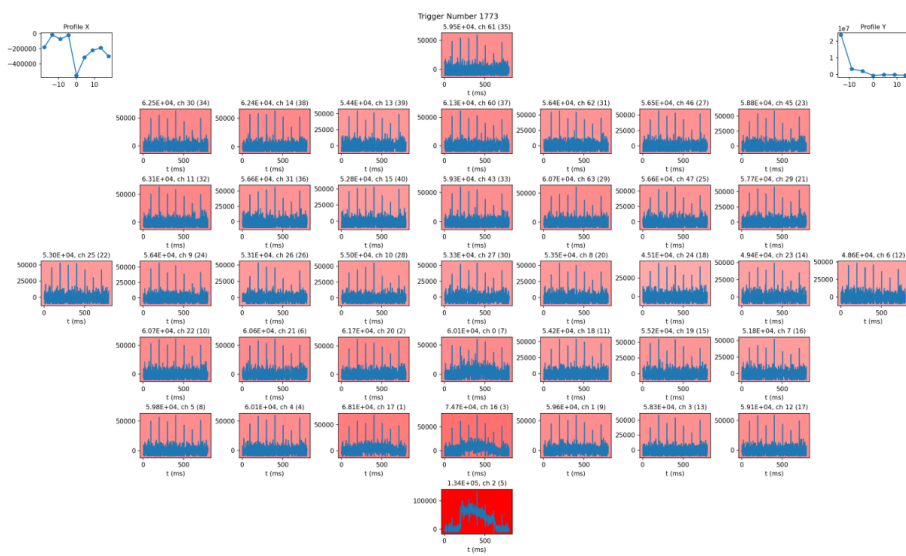


On-line monitoring interface (temporary): <http://bpmirrad:8000/>

# IRRAD-BPM DAQ Measurement Examples

Very preliminary IRRAD BPM online monitor

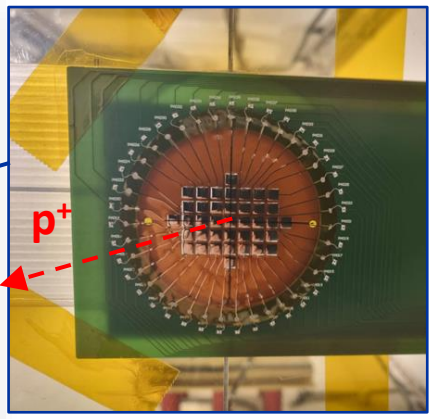
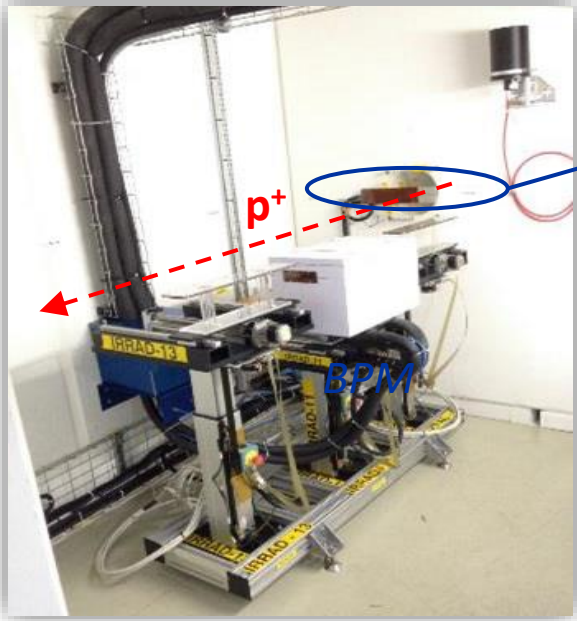
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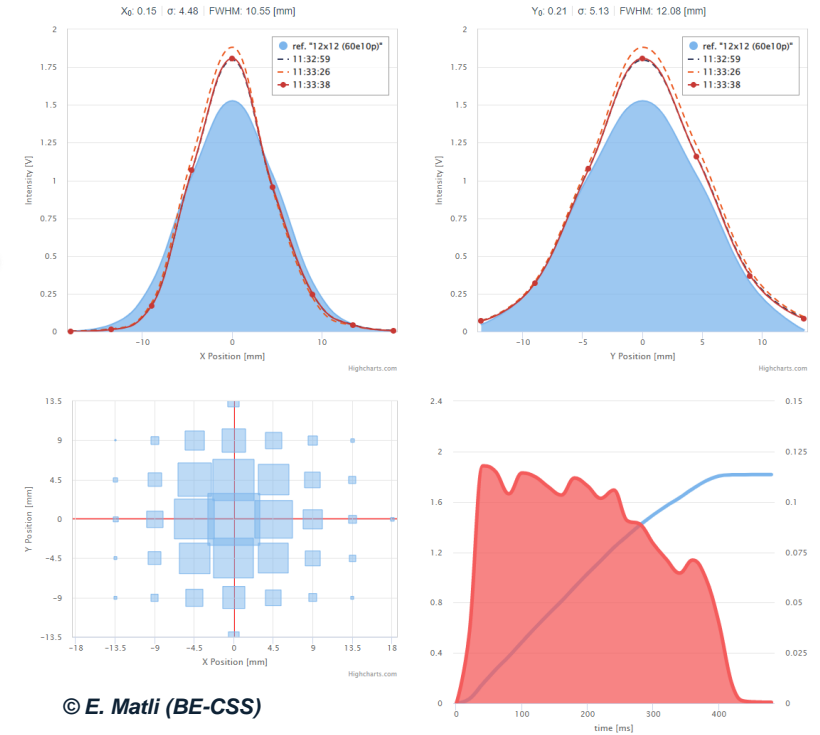
time (ms)



# OP: DAQ & Beam Display



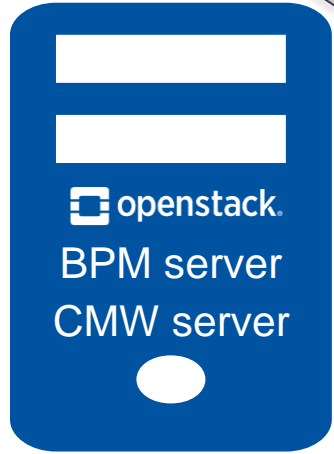
Real-time beam data GUIs (BE-CSS)



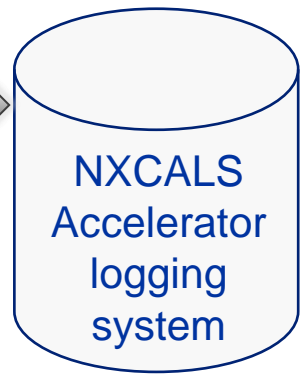
<https://op-webtools.web.cern.ch/irrad/>

BPM detector  
ATTRACT  
(data processing software)

2014



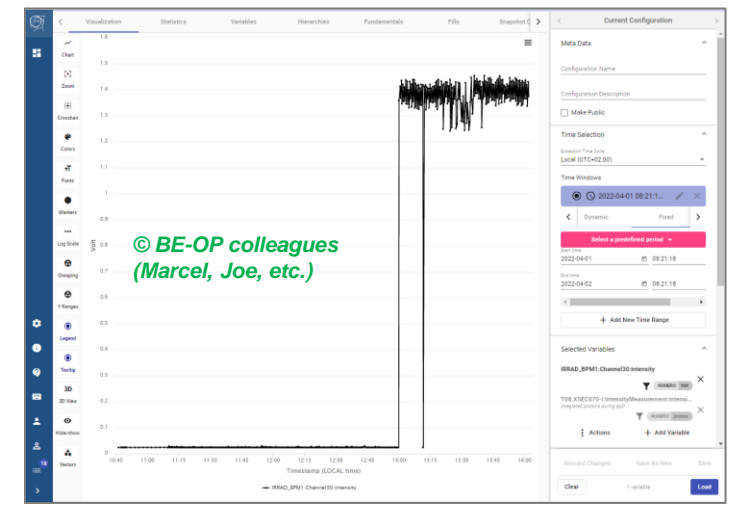
2021



Development of back-end software (EP-DT)



BPM DAQ  
(firmware for data-taking)



© BE-OP colleagues (Marcel, Joe, etc.)