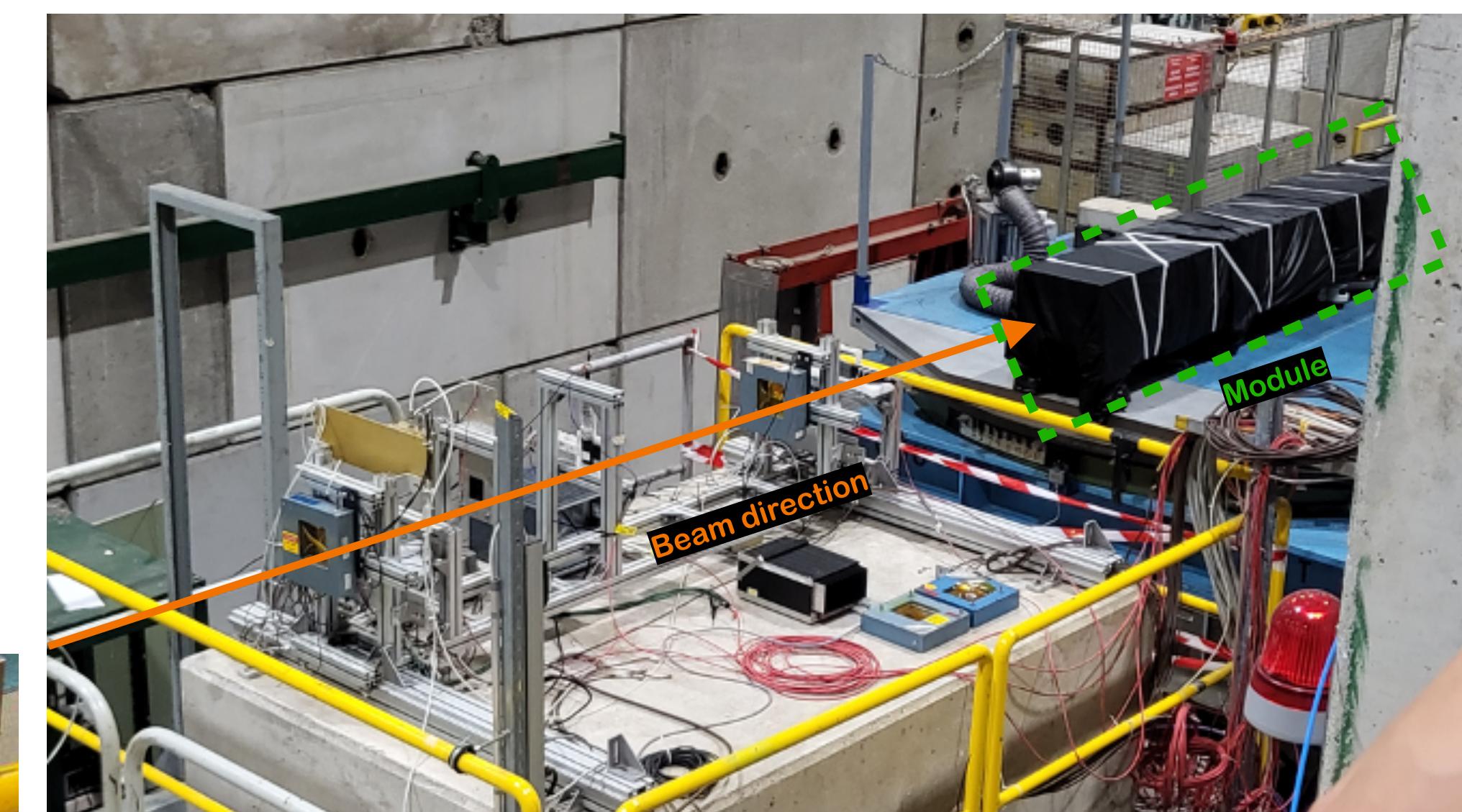
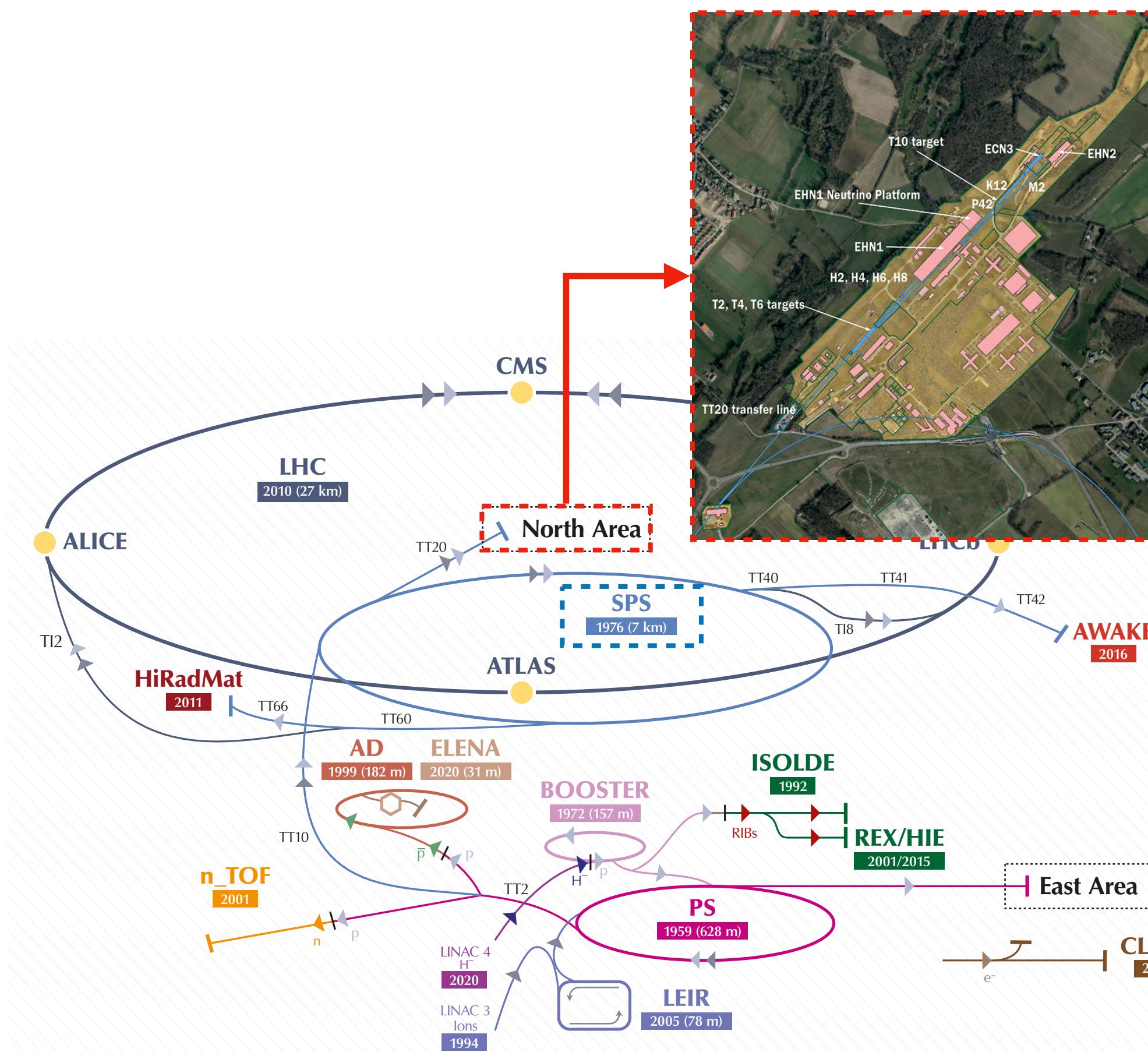


Test beam with DRC module at CERN

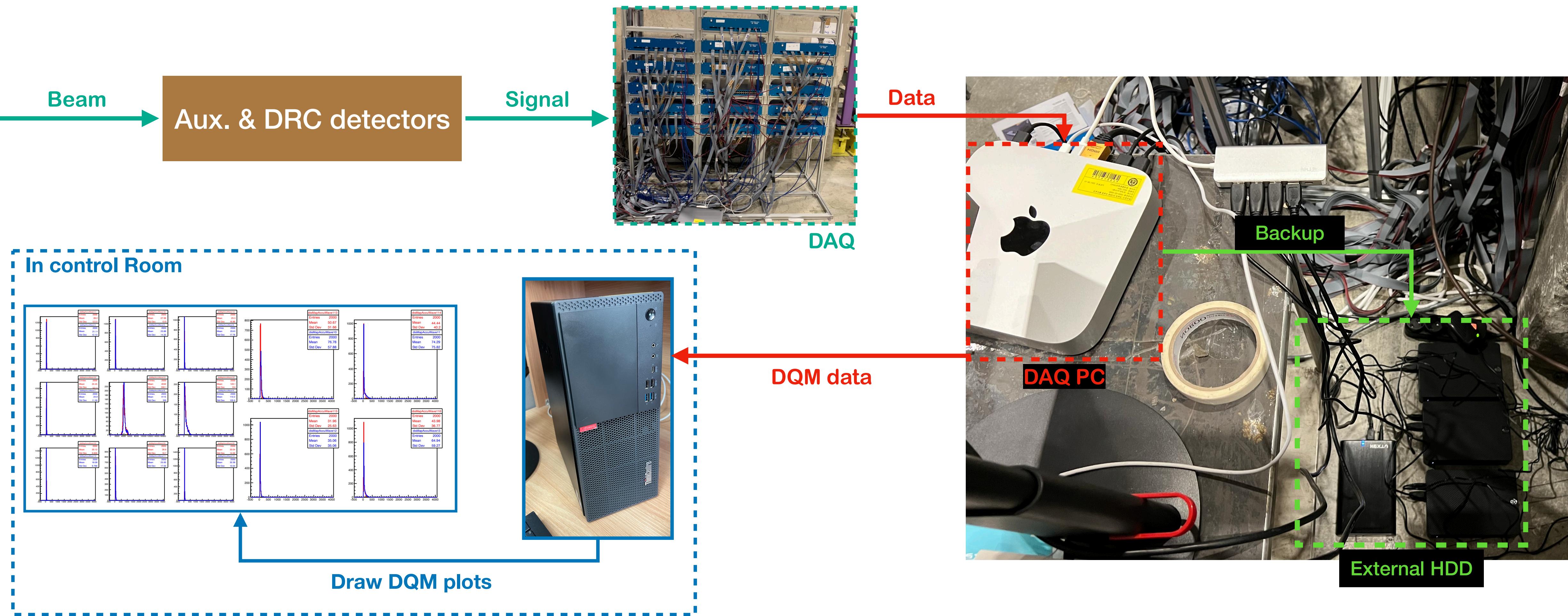
- **IDEA detector** has been proposed in conceptual design report of FCC-ee and CEPG
 - **Dual-Readout calorimeter** is included in IDEA detector design **in both CDRs**
 - **Korea DRC team** made **2 DRC module** and had **test beam** at CERN

- Test beam site located at **CERN** north area
 - **Up to 400 GeV** beam supplied from **SPS**
 - Test beam period : 2022 Aug 4th ~ 25th
 - **2 DRC modules** located in north area **H8** site
 - **Auxiliary detectors** are also installed



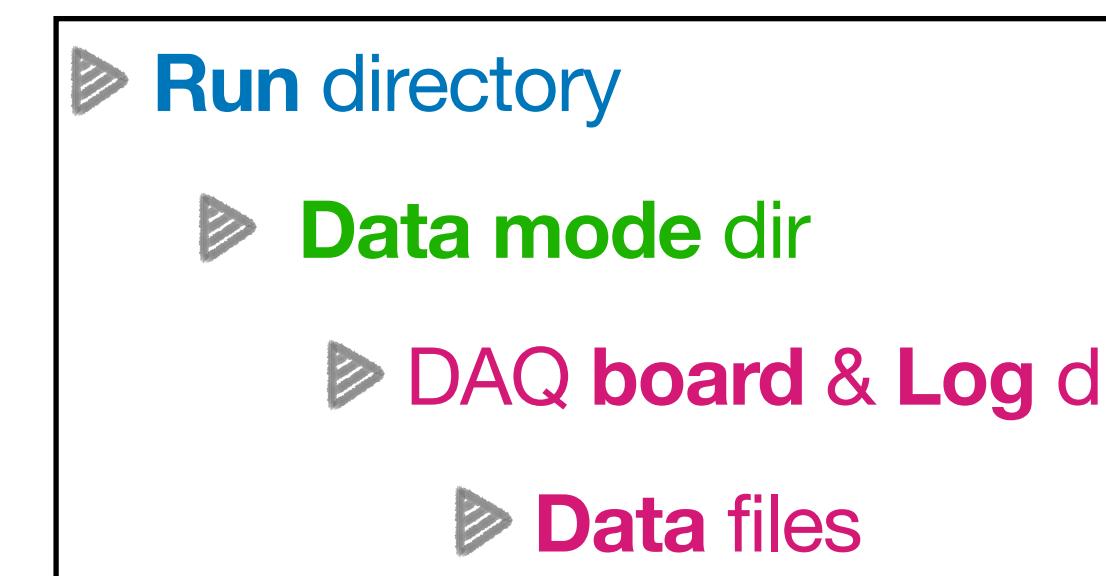
Data management and quality monitor

- To ensure the module, electronics, beam **setups**, we need to **monitor response** of DRC, auxiliary detectors : **Data quality monitoring (DQM)**
- Also for **safety** of the test beam data, we need to **backup** them
- Signals from detector converted to data at **DAQ**, stored in **DAQ PC**
- Data in **DAQ PC** can be used to draw plots for **DQM**
- Data in **DAQ PC** copied to **external HDD** for **backup**

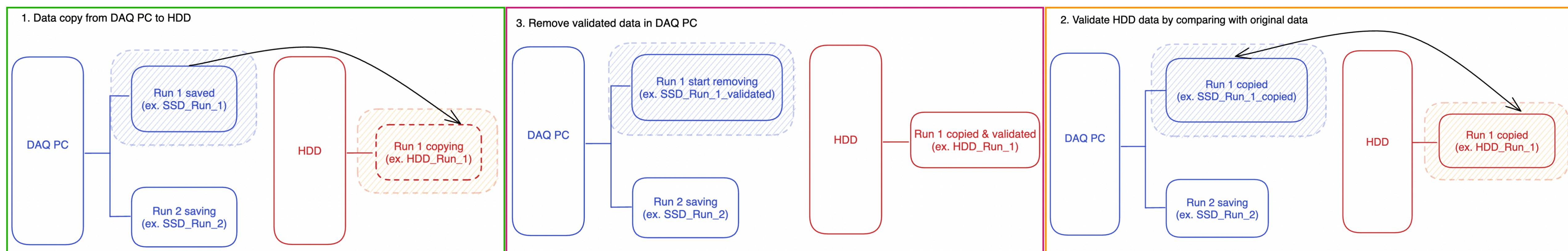
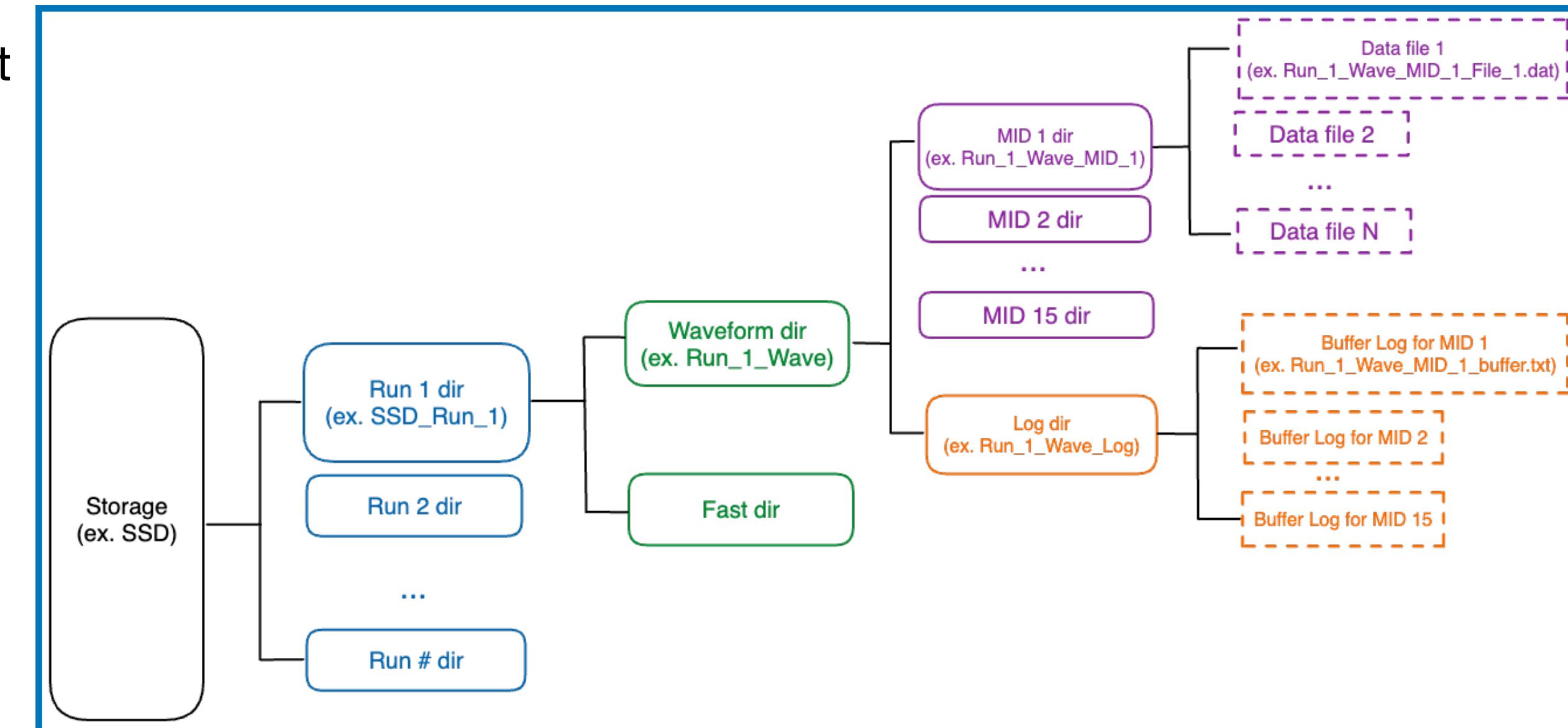


Data management

- Each **DAQ** created its own data file, and save it on **DAQ PC**
- Data saved with **fixed directory structure** for efficient data management



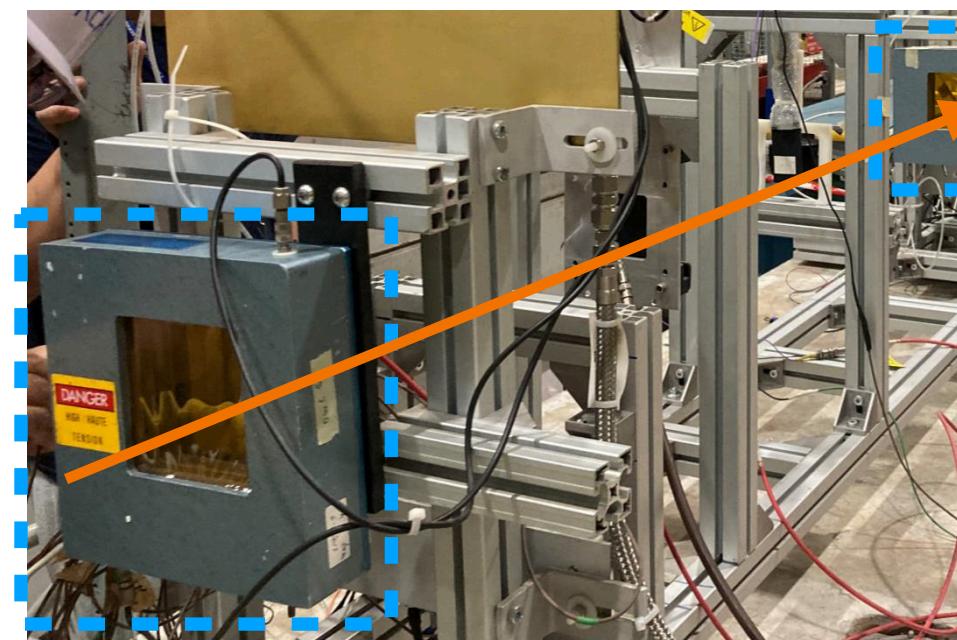
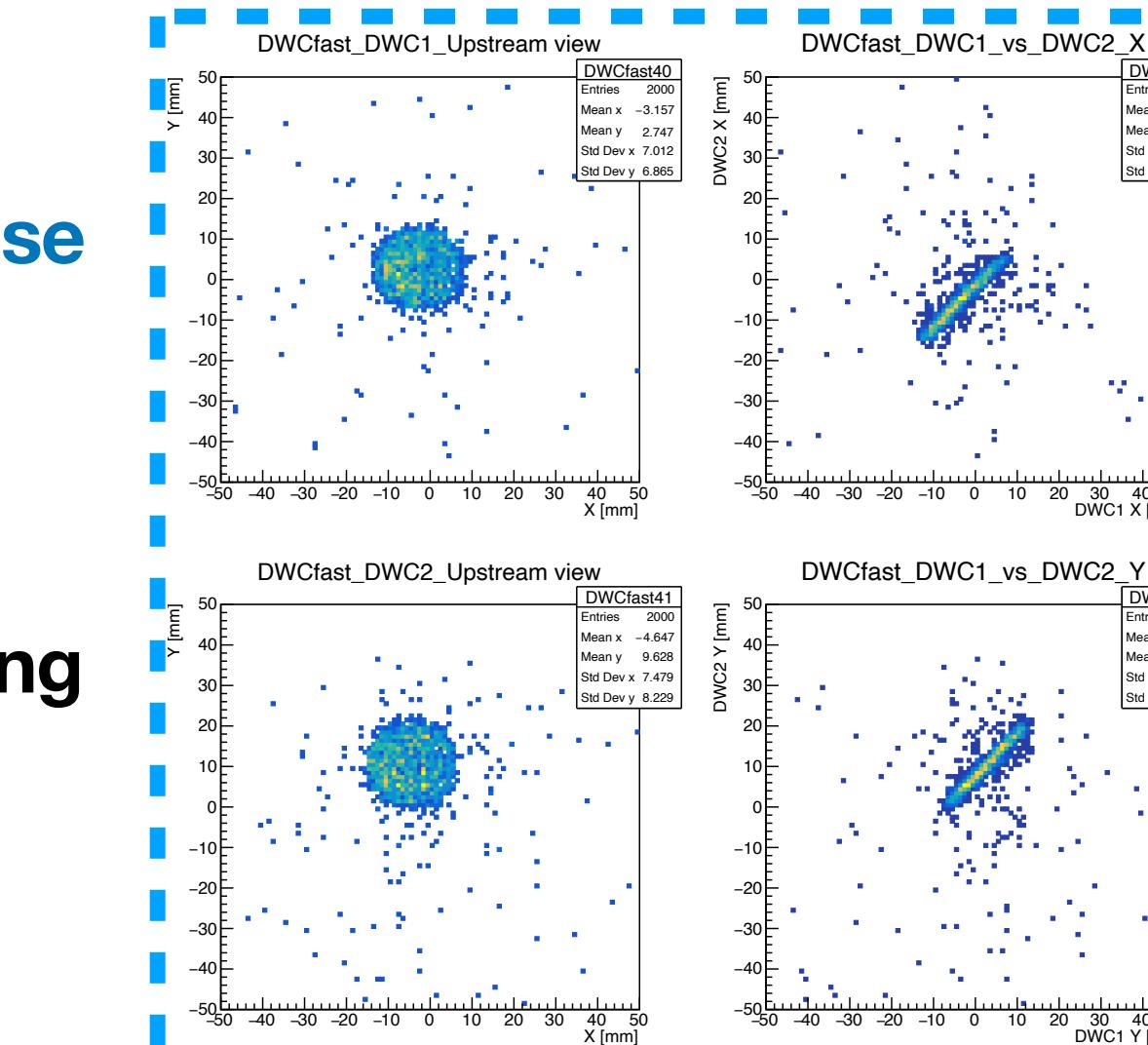
- Data **backup** procedure : **Copy - Validation - Remove**
- First copy the data to external HDD, then validate the data if its well copied. Remove the file when DAQ PC runs out of storage



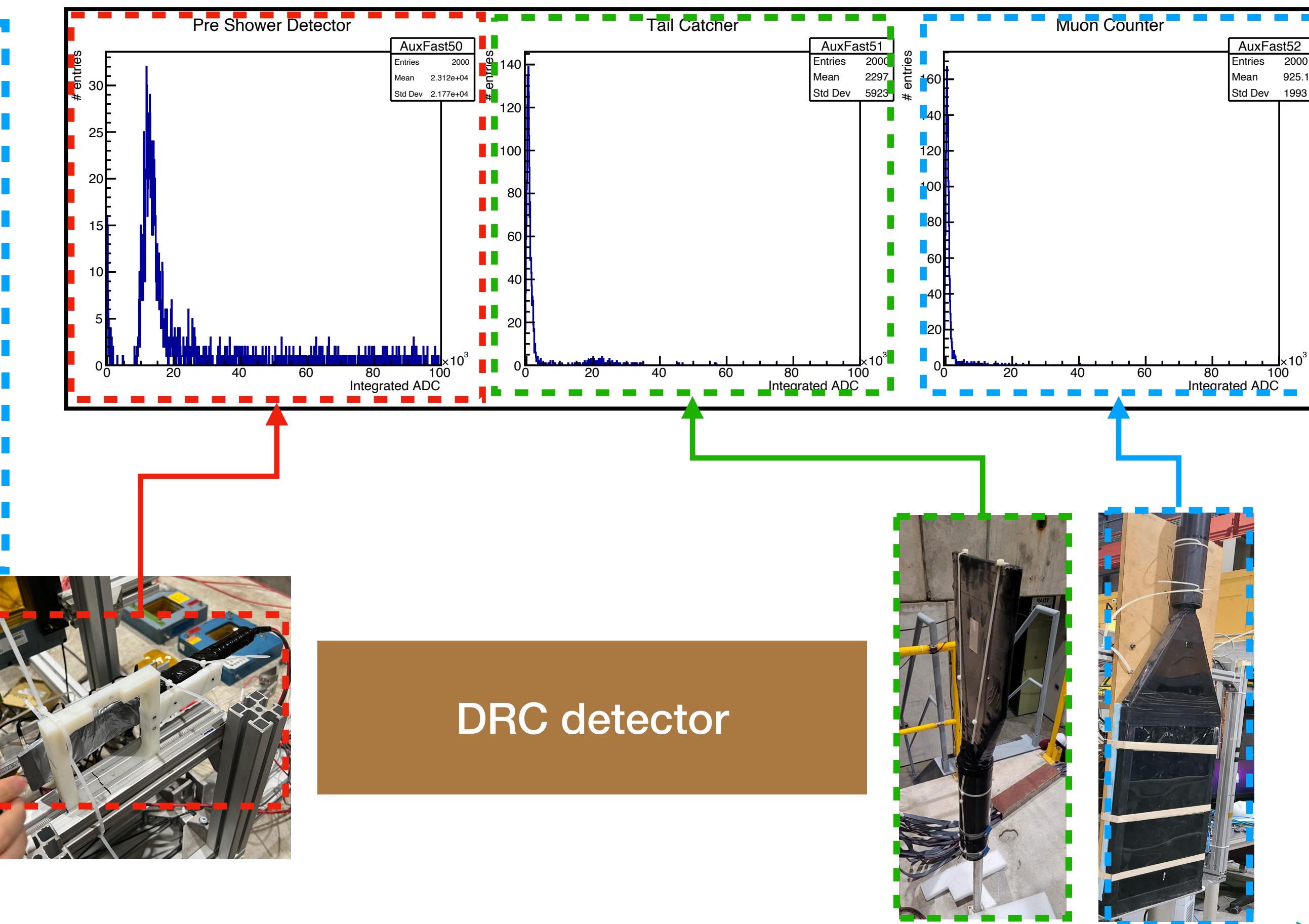
- Data **Validation** : File **size** check - SHA256 **checksum** - File **metadata** check

- To monitor if overall (detector modules, electronics, beam etc..) setup has no flaw and works well, need to draw DQM plots
- Both DQM for **auxiliary detectors** and **DRC modules** are required

- 2D histogram of **DWC response**
- To monitor the **beam position** **setup**
- Make **2D histogram** with **timing information** of DWC

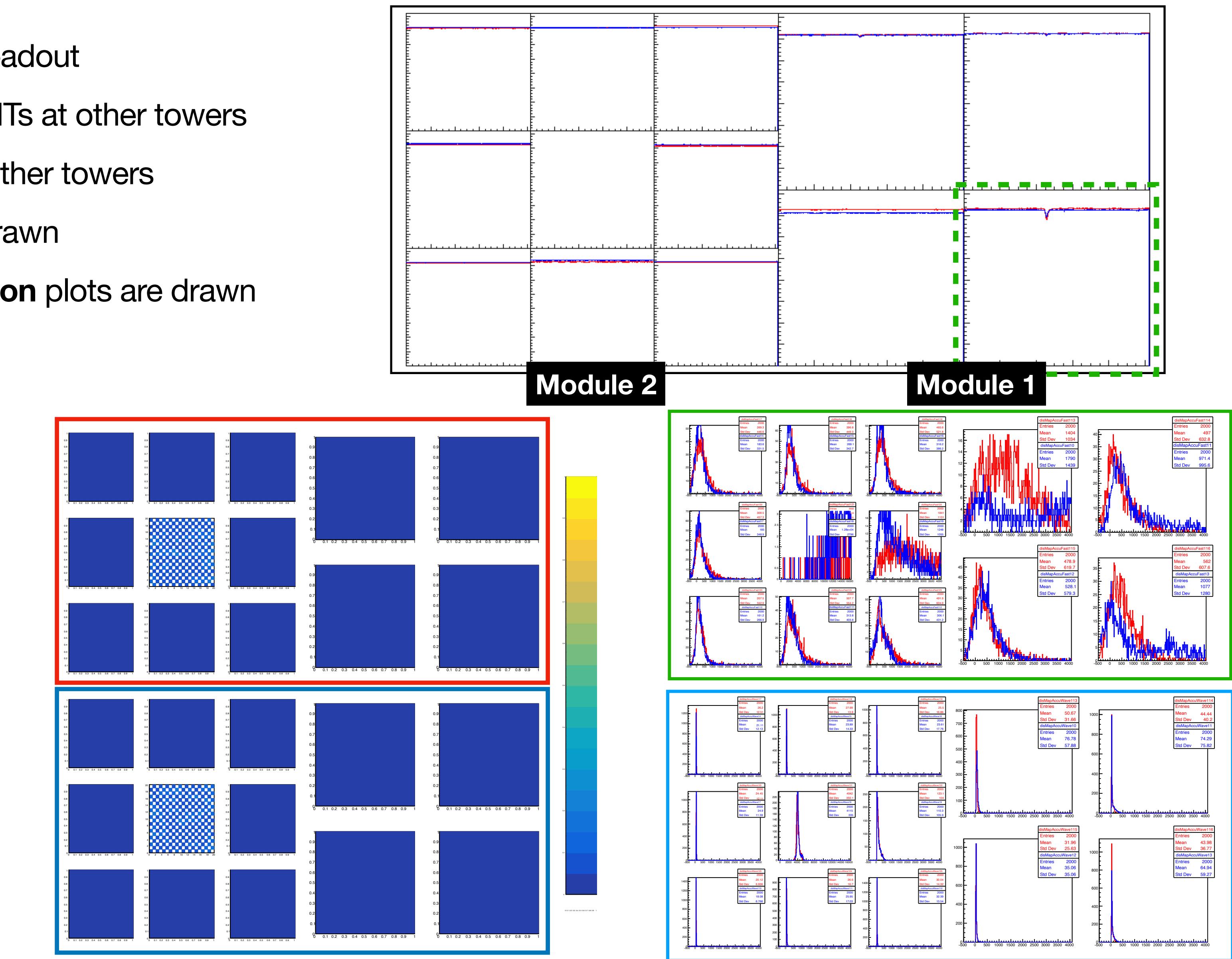
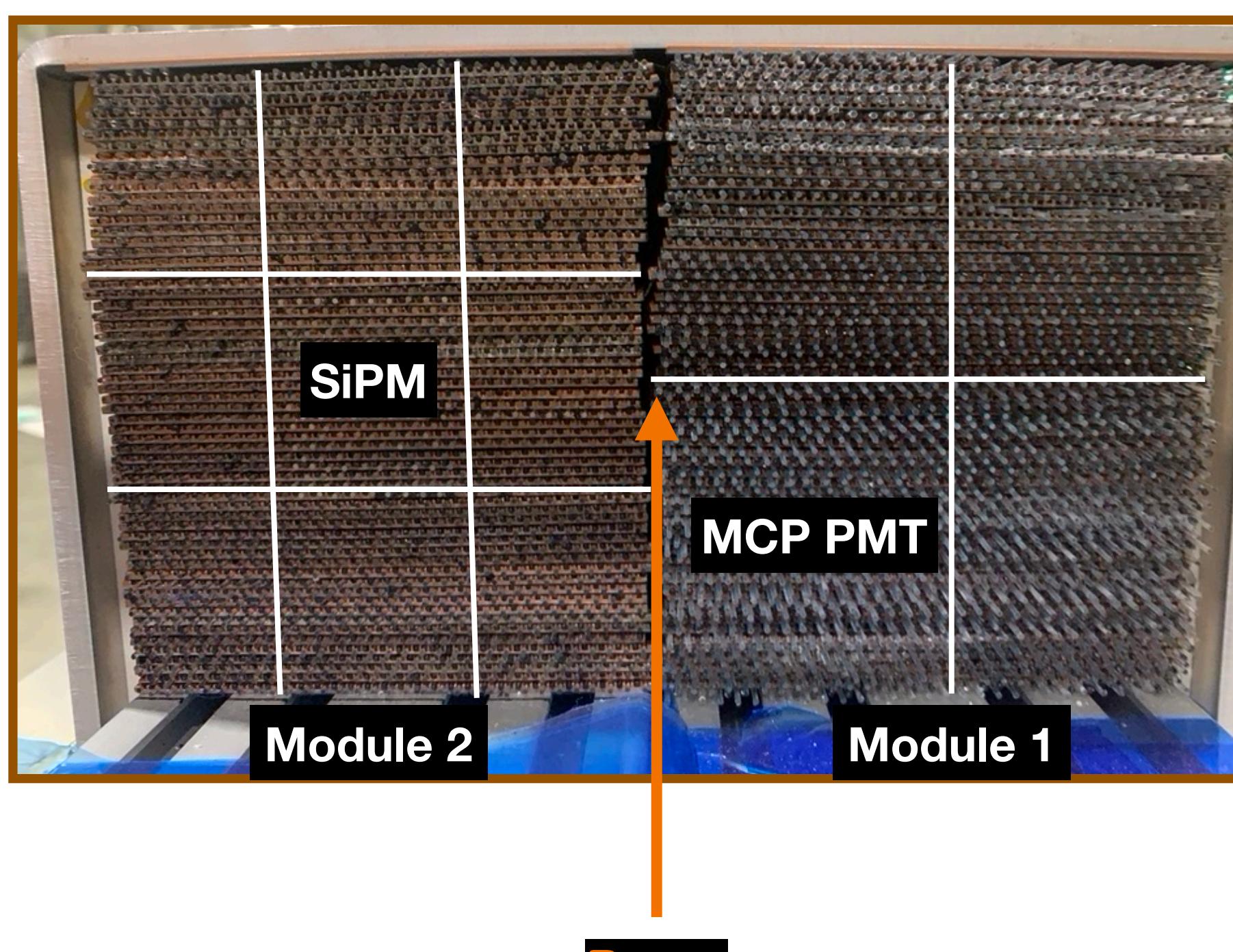


Beam



DQM for DRC module

- **DRC modules** separated into towers with different readout
- **Module 1** : MCP PMT at lower left tower, generic PMTs at other towers
- **Module 2** : 400ch. SiPM at center, generic PMTs at other towers
- DQM plot using **responses from each towers** are drawn
- **Waveform** (Raw signal), **2D Hit-map**, **ADC distribution** plots are drawn



Converting DAQ data to Ntuple

- Saved raw-data are not proper for physical analysis since the raw data is stored in **DAQ module-wise (same event info in 15 different files)**
- Need to ntuple the data in **event-wise format (one event info contains data taken from all the 15 DAQ boards)**
- Developed dedicated **ntupler** & ntupleized the test beam data to proceed **data analysis**

