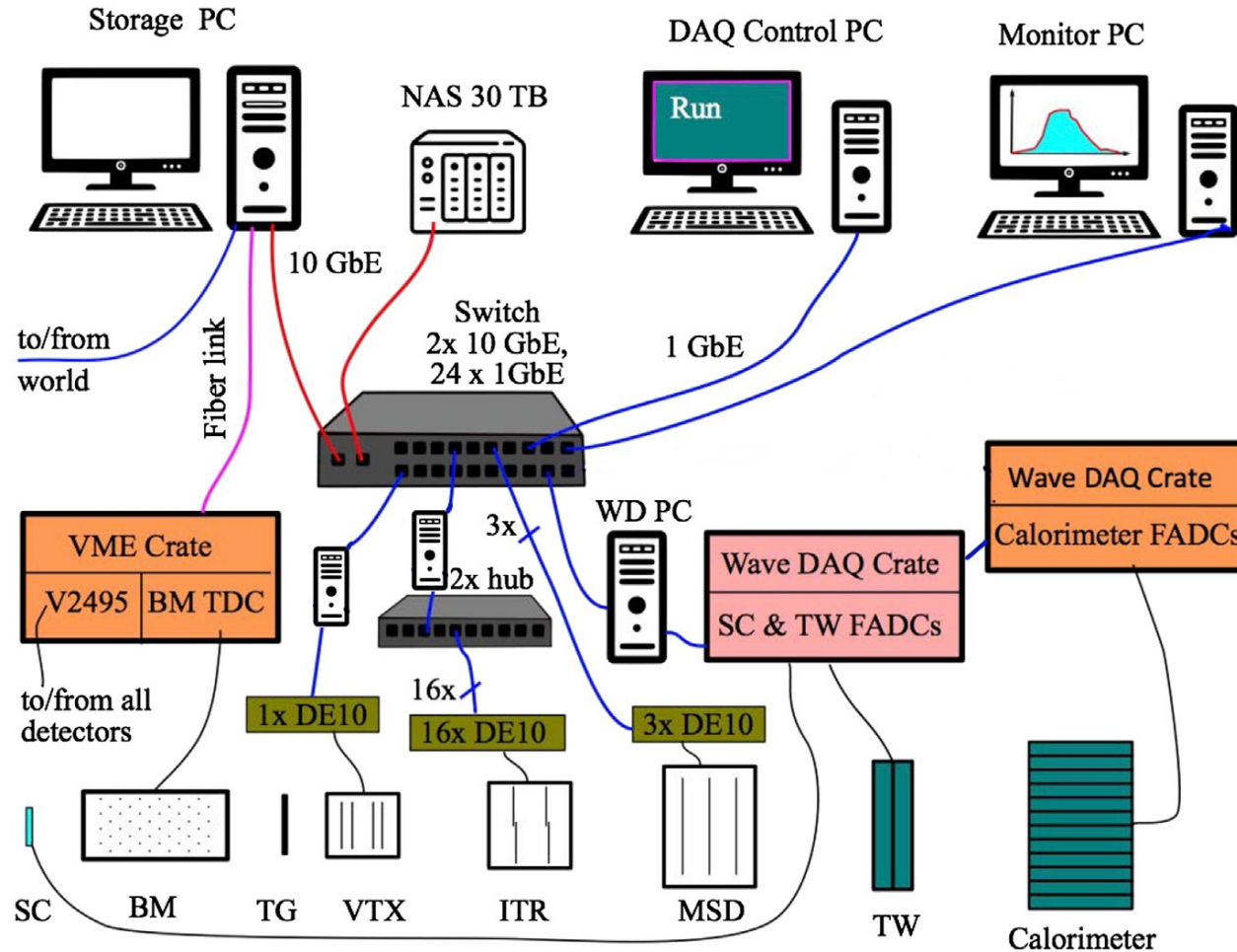




DAQ performance and new developments

Riccardo Ridolfi, Mauro Villa, Sofia Colombi

TDAQ infrastructure



DAQ summary of GSI data taking

-Storage:

Data written on SSD, then NAS, VIRGO and TIER3

On **VIRGO** cluster (GSI account needed): /lustre/bio/foot/GSI2021

On **TIER3**: /gpfs_data/local/foot/DataGSI2021

~2.3TB of data collected!

-Rate:

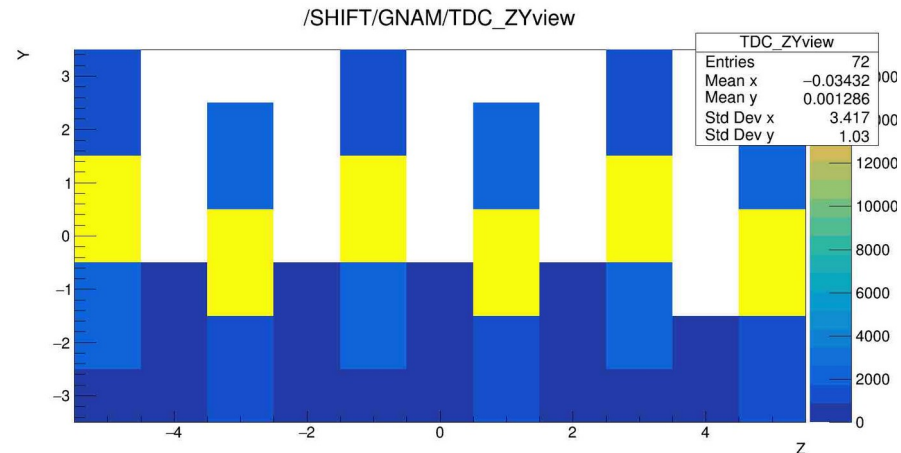
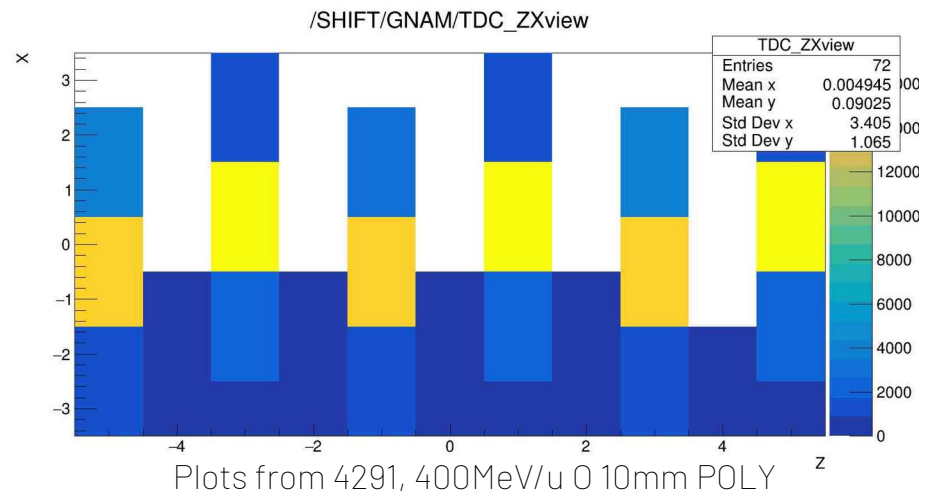
Dependent on the run, 3 kHz with pedestals, 200-800 Hz with beam (with and without VTX)

-Runs:

we chose to make long runs but no more than 1h ("heaviest" run 1.5M events)

Beam monitor@GSI

- update of discriminator configuration was needed
- online monitoring (GNAM) very useful to check the alignment in real-time
- no issues detected from DAQ standpoint

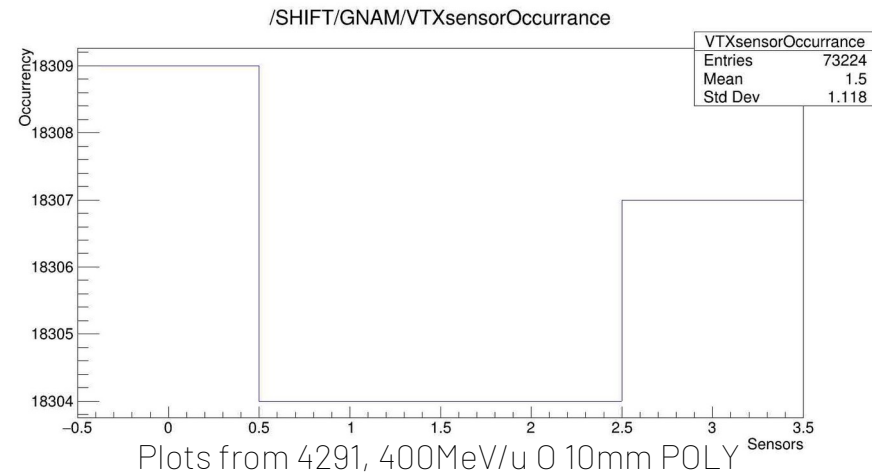
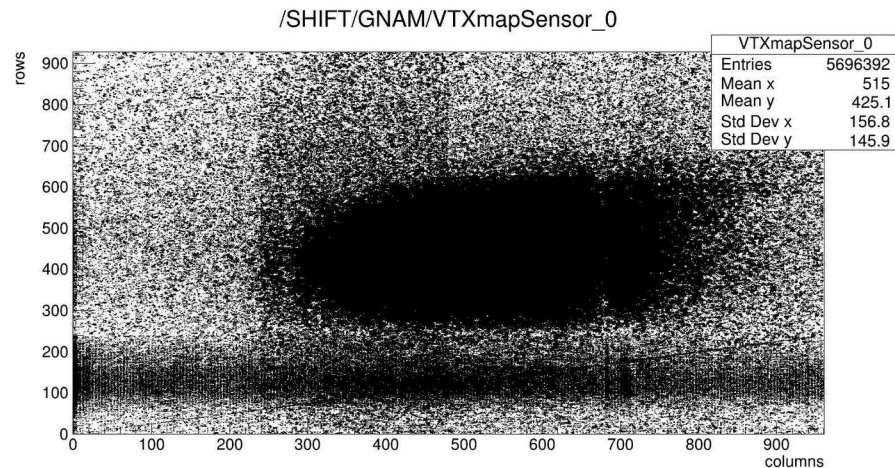


Vertex detector@GSI

-a cabling problem prevented us running >1000 evts during first day of beam → decided to **temporarily remove VTX** from the DAQ (skipped 200 MeV/u O with 5mm C and 5mm Poly)

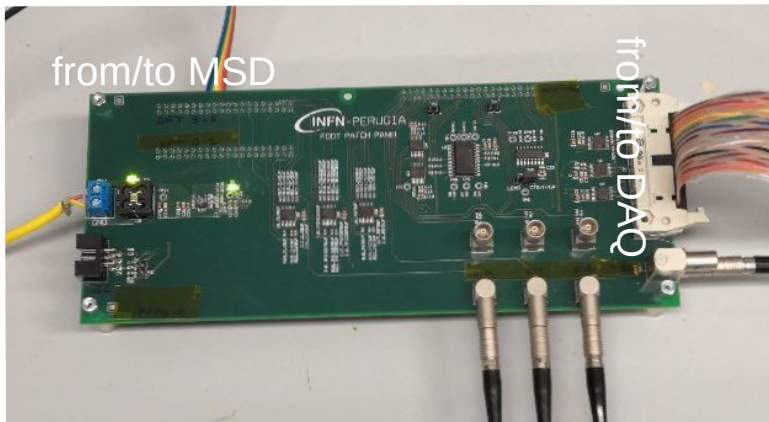
-on Friday morning the problem was solved

-still triggers lost → a dynamic attempt to **realign the VTX** is implemented in SHOE

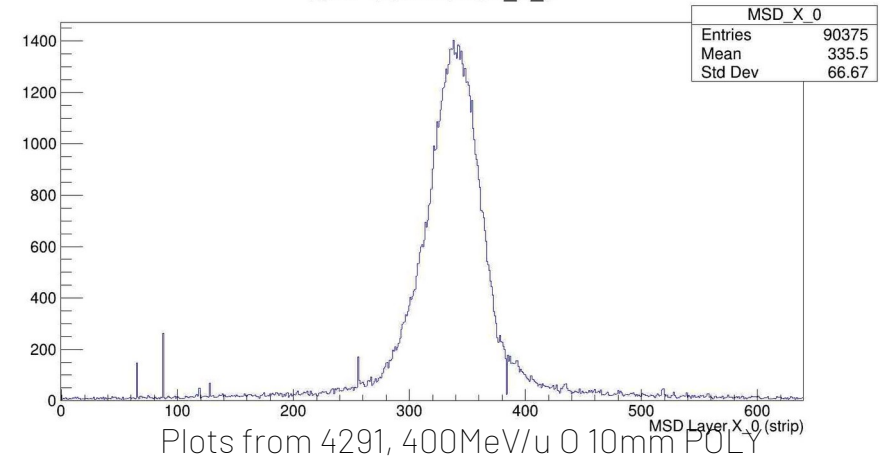


Microstrip detector@GSI

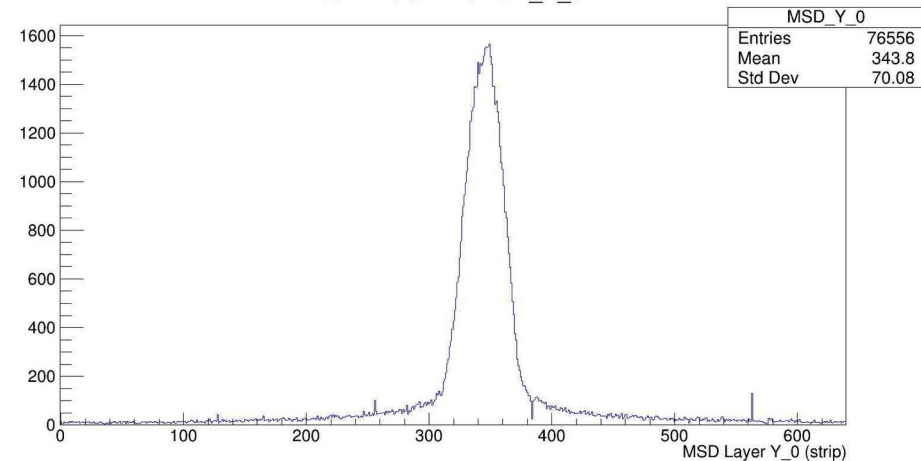
- online monitoring very useful for **alignment** and evaluation of **beam shape**
- the MSD **patch panel** worked very well
- no issues** detected from DAQ standpoint



/SHIFT/GNAM/MSD_X_0



/SHIFT/GNAM/MSD_Y_0



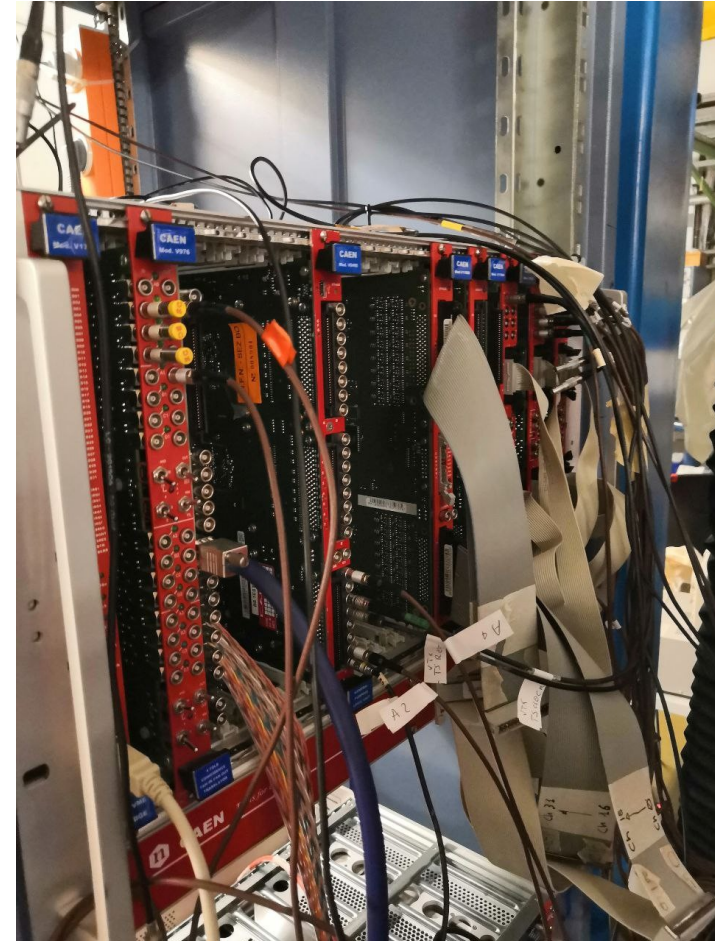
Wavedream@GSI (SC, TW, CALO)

- on SW side an **increase of buffer size** was needed for "heavy" events
- trigger configuration** via general DAQ ran smoothly
- online monitoring** was useful to evaluate the **trigger strategy** and **prescaling**
- 4 WD channels used for **two neutron detectors** and **vetos**
- no issues** detected from DAQ standpoint



Global TDAQ@GSI

- TDAQ system ran smoothly for days except from some minor issues (e.g. exceeded size for vertex detector events, now fixed)
- FOOT patch panel worked very well
- it can forward WD trigger even if DAQ is not running
- no major issues on TDAQ side!



Latest news

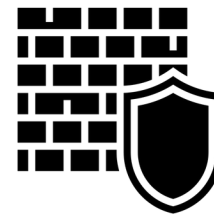
-**fast storage increased:** from 1TB shared with OS to 4TB dedicated SSD



-**NAS storage increased:** from 8TB to 32TB (RAID0 configuration, no redundancy but faster read/write operation > 125MB/s), 10GbE connection available



-**new router** due to arrive in next months: required by IT security but then faster DAQ installation in experimental scenarios and shared Internet connection



TDAQ improvements

- new trigger configuration:
fragmentation, MB, TOF/CALO
alone, pedestal, neutron detectors
triggers

- fixed vertex detector data size
issue

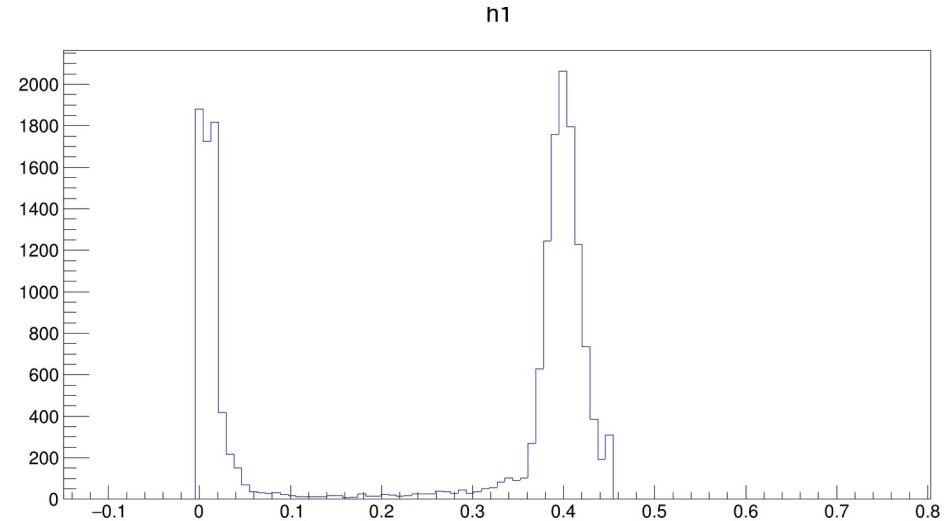
The screenshot displays the FOOT TDAQ SOFTWARE interface, titled "Partition FOOTVMEBridgePartition (on footbo1.tdaq.it)". The interface is divided into several panels:

- Run Control State:** Shows "NONE" and includes buttons for SHUTDOWN, INITIALIZE, UNCONFIG, CONFIG, STOP, START, HOLD TRG, and RESUME TRG.
- Run Information & Settings:** Shows "Run number 4357" and various configuration options like Max Events (150000), Run Type (Pedestal), Beam Type (NoWaveDream), Beam Energy (GeV) (Fragmentation), Tier0 Project Name (MargaritaMajority), File Name Tag (CALOalone), and Recording (NEUTRONalone).
- Run Control Segments & Resources:** A tree view showing "NONE" as the selected segment, with sub-segments "Online Segment" and "Infrastructure". The "Infrastructure" segment is expanded to show "ABSENT" and "FOOT_RCA".
- Dataset Tags:** A list of resources including CHIP, DDC, DF, DFConfig, DQM, Histogramming, ISRepository, MTS, Monitoring, PMG, RDB, RDB_POOL_1, RDB_RW, and Resources.
- Subscription criteria:** A table with columns for TIME, SEVERITY, APPLICATION, NAME, and MESSAGE. The table shows a series of log messages from 15:01:11 to 15:01:10, all with "INFORMATION" severity and "IGUI" application, detailing the initialization of various panels.

At the bottom, there is a "Subscription criteria" section with checkboxes for WARNING, ERROR, FATAL, and INFORMATION, and a "Subscribe" button. Below this is a table with columns for "Clear", "Message format", "Visible rows" (set to 100), "Current ERS subscription", and "sev=ERROR or sev=WARNING or sev=FATAL".

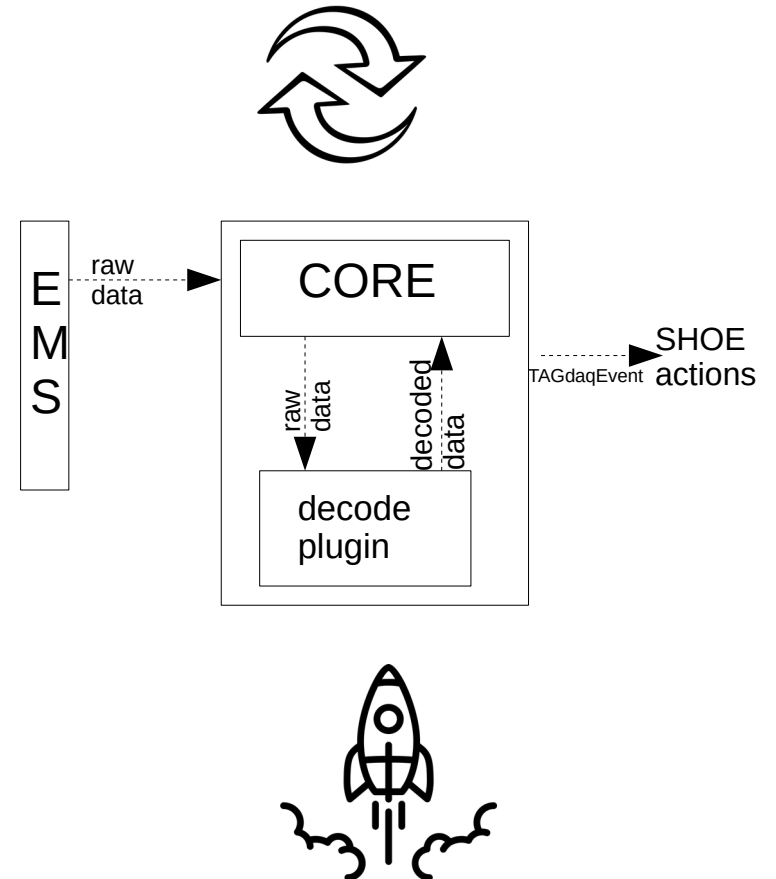
Online Monitoring improvements

- fixed WD **trigger pattern** histogram;
- added **XML configuration** for online monitoring histograms (e.g. MSD charge), no need to recompile the whole DAQ
- added **trigger amplitudes** histograms for central bars (up to 12 channels) including XML calibration for each channel → **real-time evaluation of fragmentation trigger threshold**
- further histograms can be added



Future improvements

- **update** all TDAQ libraries and **OS** to latest version for better reliability
- **real-time decoding** with SHOE (or custom software) can be **foreseen** on a dedicated machine
- **optimization of network and boards** settings to increase the transfer rate (e.g. for DE10 boards)



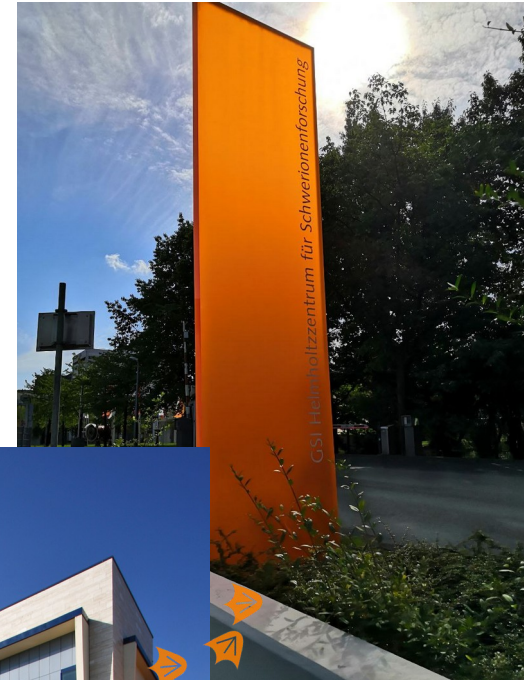
Conclusions

More than 40M events collected in physics runs@GSI

No major issues from DAQ point of view except for vertex detector

First data taking with (almost) all detectors in was very successful!

A lot of improvements are already implemented and foreseen for the future



Thanks for your attention!