DAQ performance and new developments

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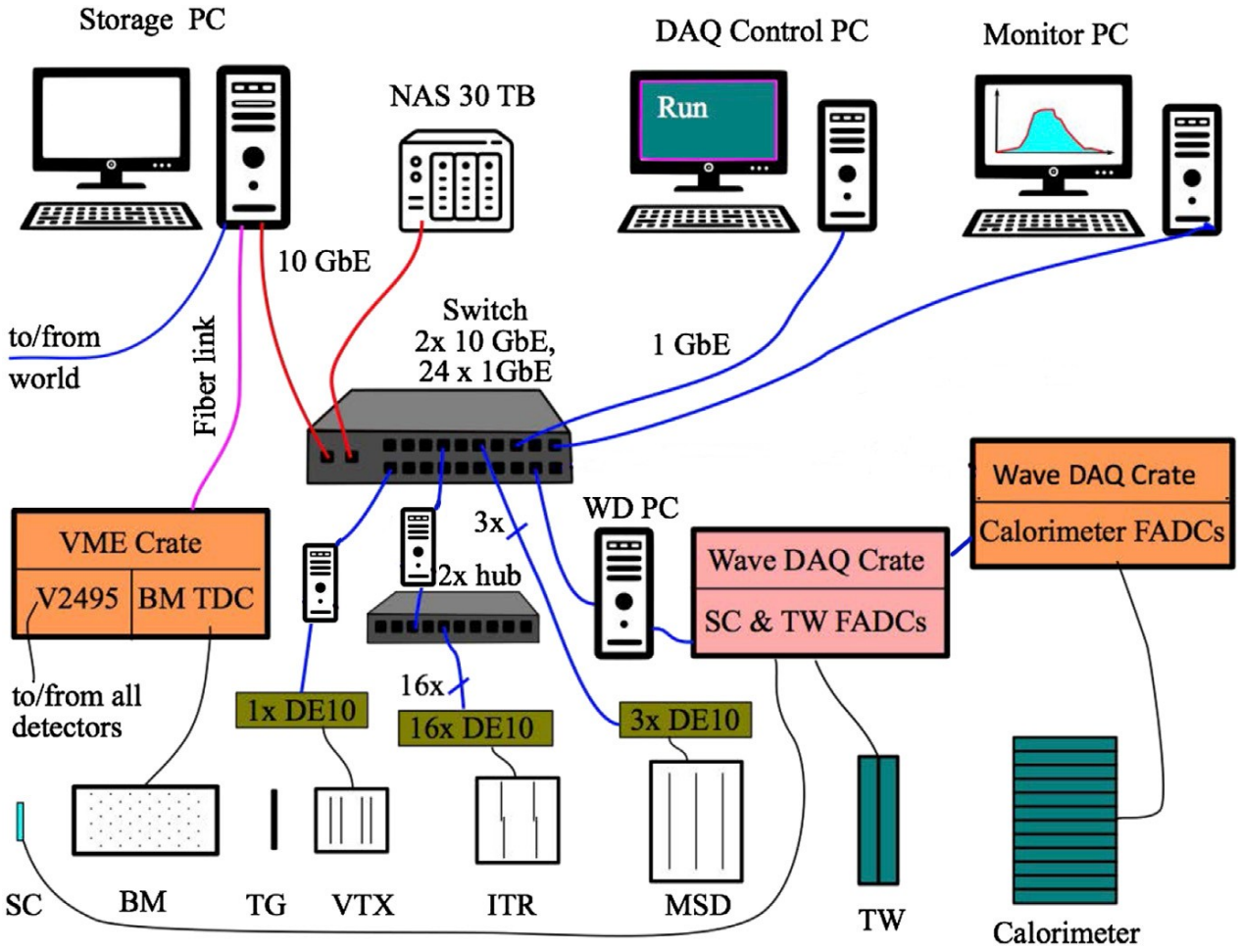
29 November 2021 – XI FOOT Collaboration Meeting

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!

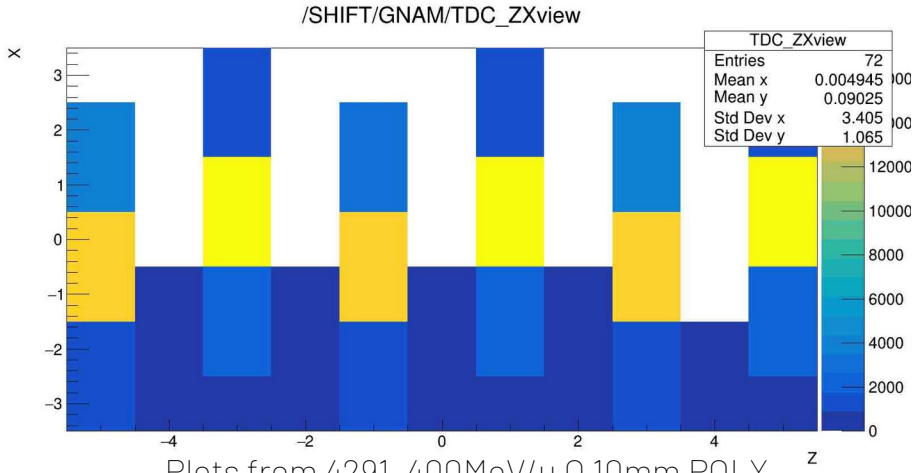
-Rate:
Dependent on the run, 3 kHz with pedestals, 200-800 Hz with beam (with and without VTX)
-Runs:
we chose to make long runs but no more than 1h ("heaviest" run 1.5M events)

Beam monitor@GSI

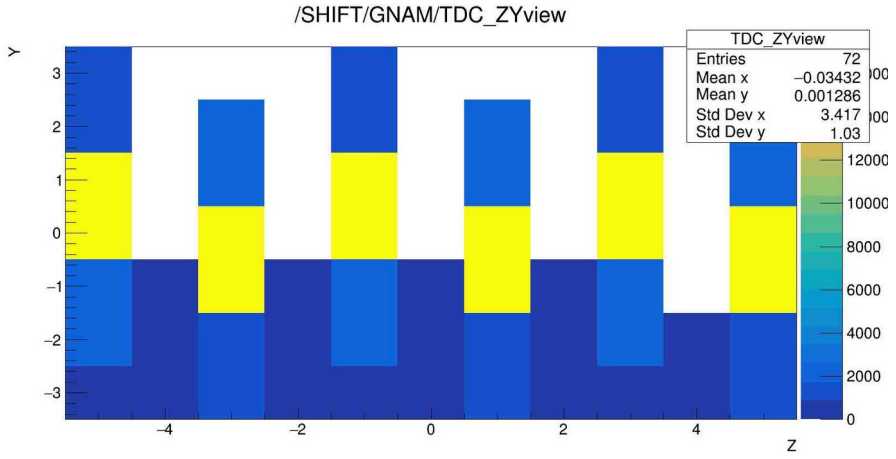
-**update of discriminator configuration** was needed

-**online monitoring (GNAM) very useful** to check the **alignment** in real-time

-**no issues** detected from DAQ standpoint



Plots from 4291, 400MeV/u O 10mm POLY

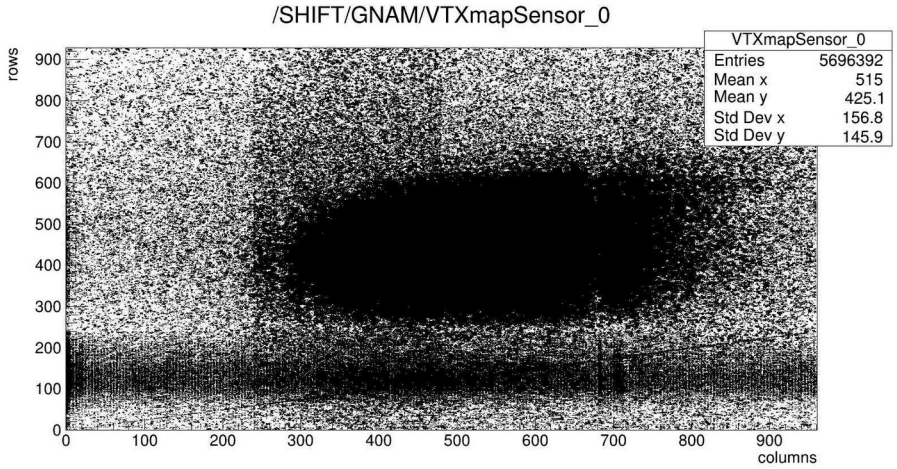


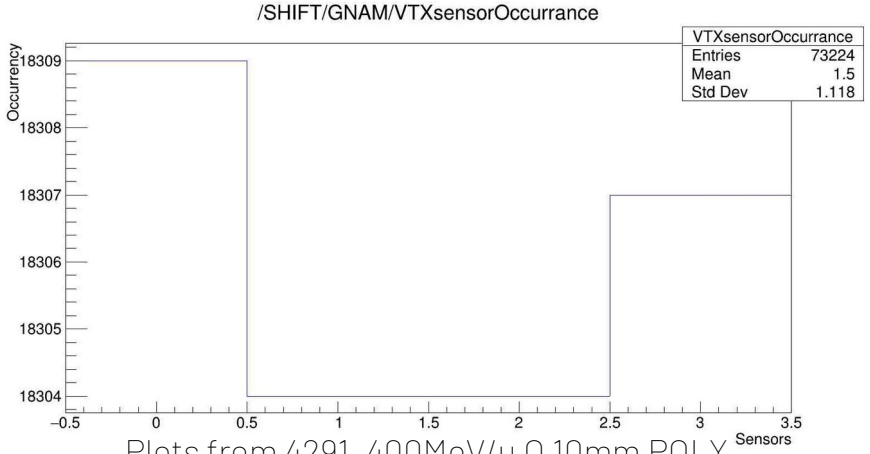
Vertex detector@GSI

-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**

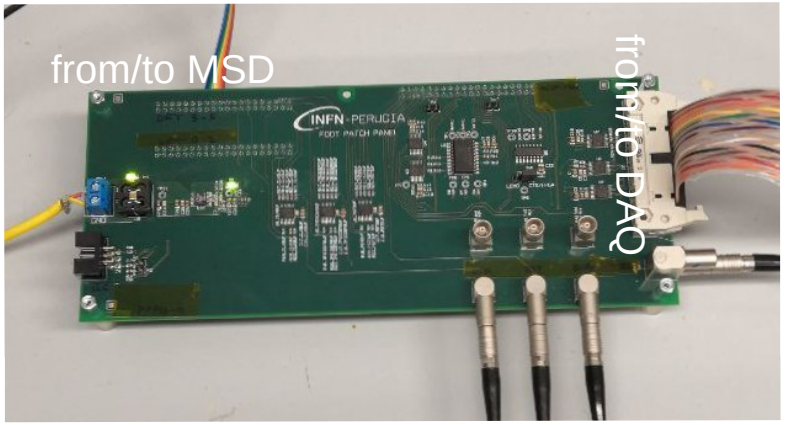


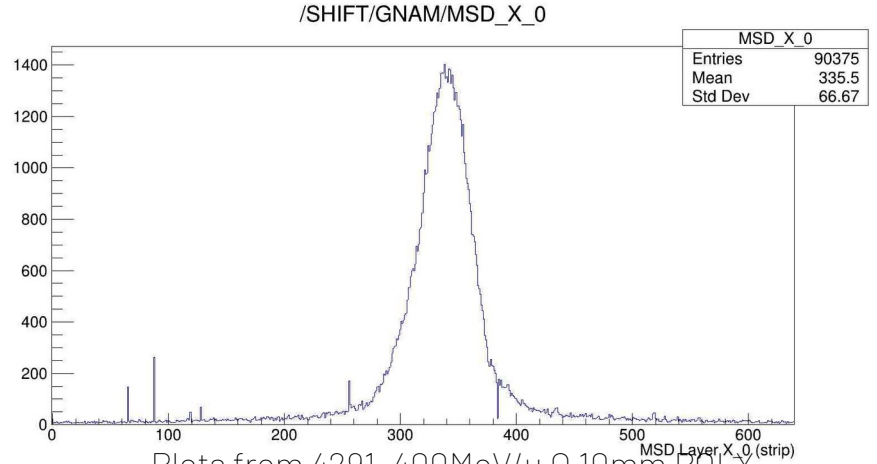


Plots from 4291, 400MeV/u O 10mm POLY

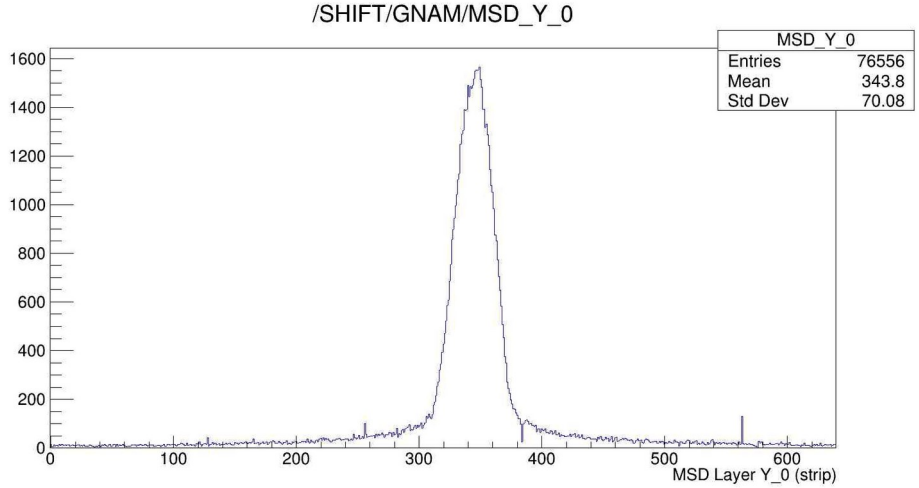
Microstrip detector@GSI

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



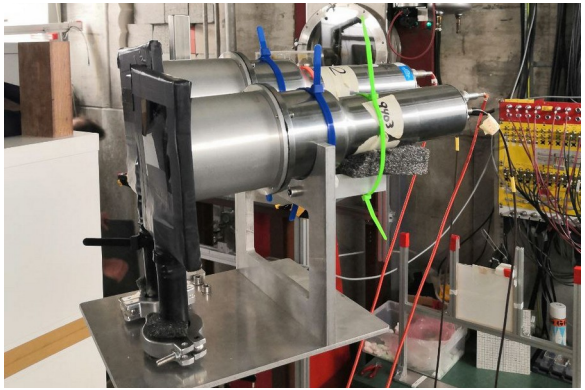


Plots from 4291, 400MeV/u 0 10mm POLY



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



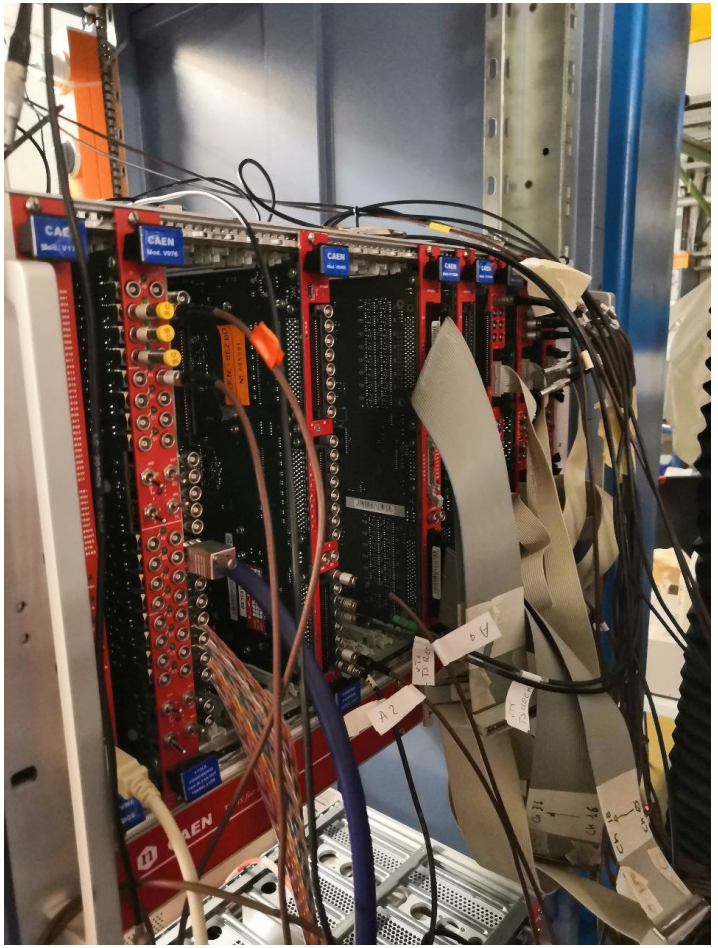
Global TDAQ@GSI

-**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!

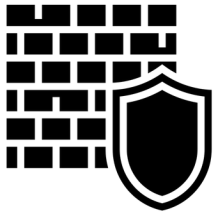


Latest news

-**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

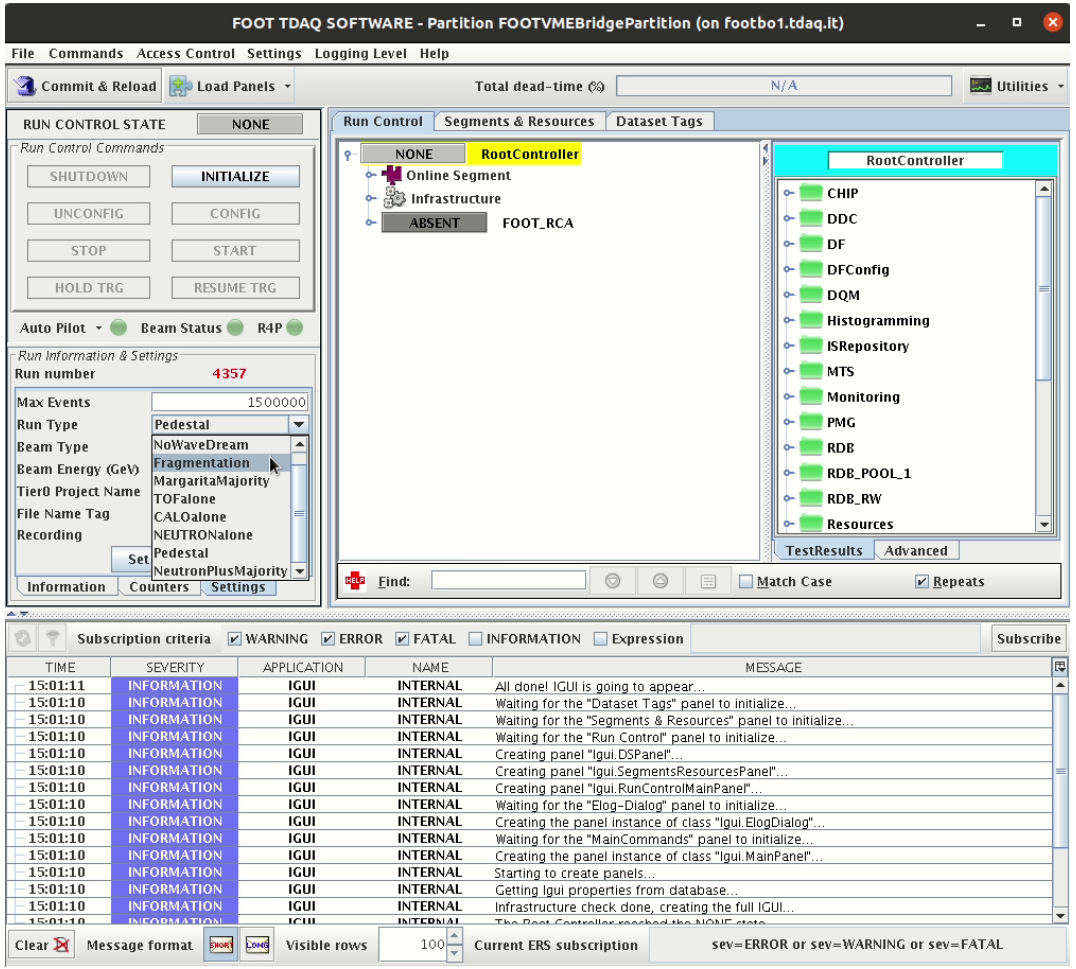
-**new router** due to arrive in next months: required by IT security but then faster DAQ installation in experimental scenarios and shared Internet connection



TDAQ improvements

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

- fixed vertex detector data size issue



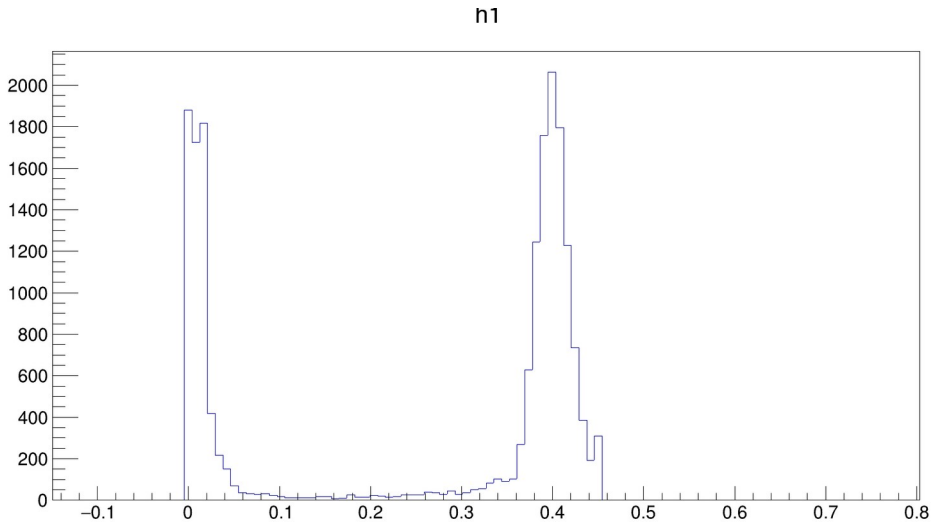
Online Monitoring improvements

-fixed WD **trigger pattern** histogram;

-added **XML configuration** for online monitoring
histograms (e.g. MSD charge), no need to recompile the whole DAQ

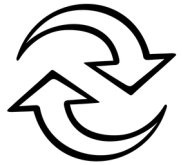
-added **trigger amplitudes** histograms for central
bars (up to 12 channels) including XML calibration for each channel→ **real-time evaluation of fragmentation trigger threshold**

-further histograms can be added

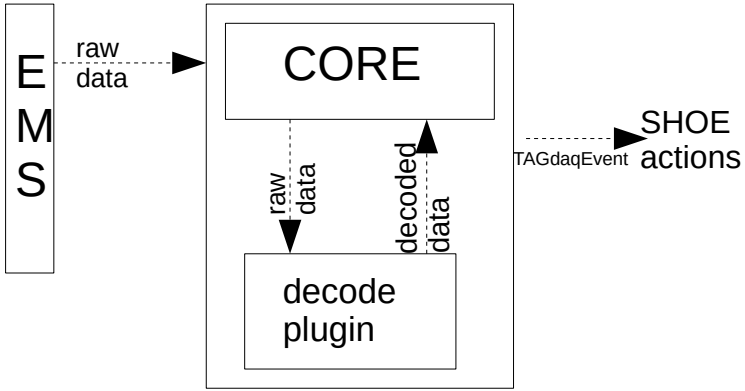


Future improvements

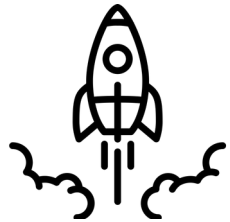
- **update** all **TDAQ** libraries and **OS** to latest version for better reliability



- **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)



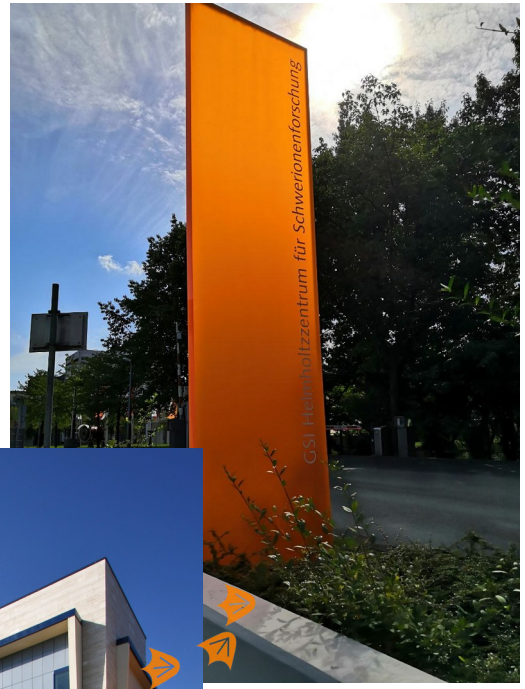
Conclusions

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!