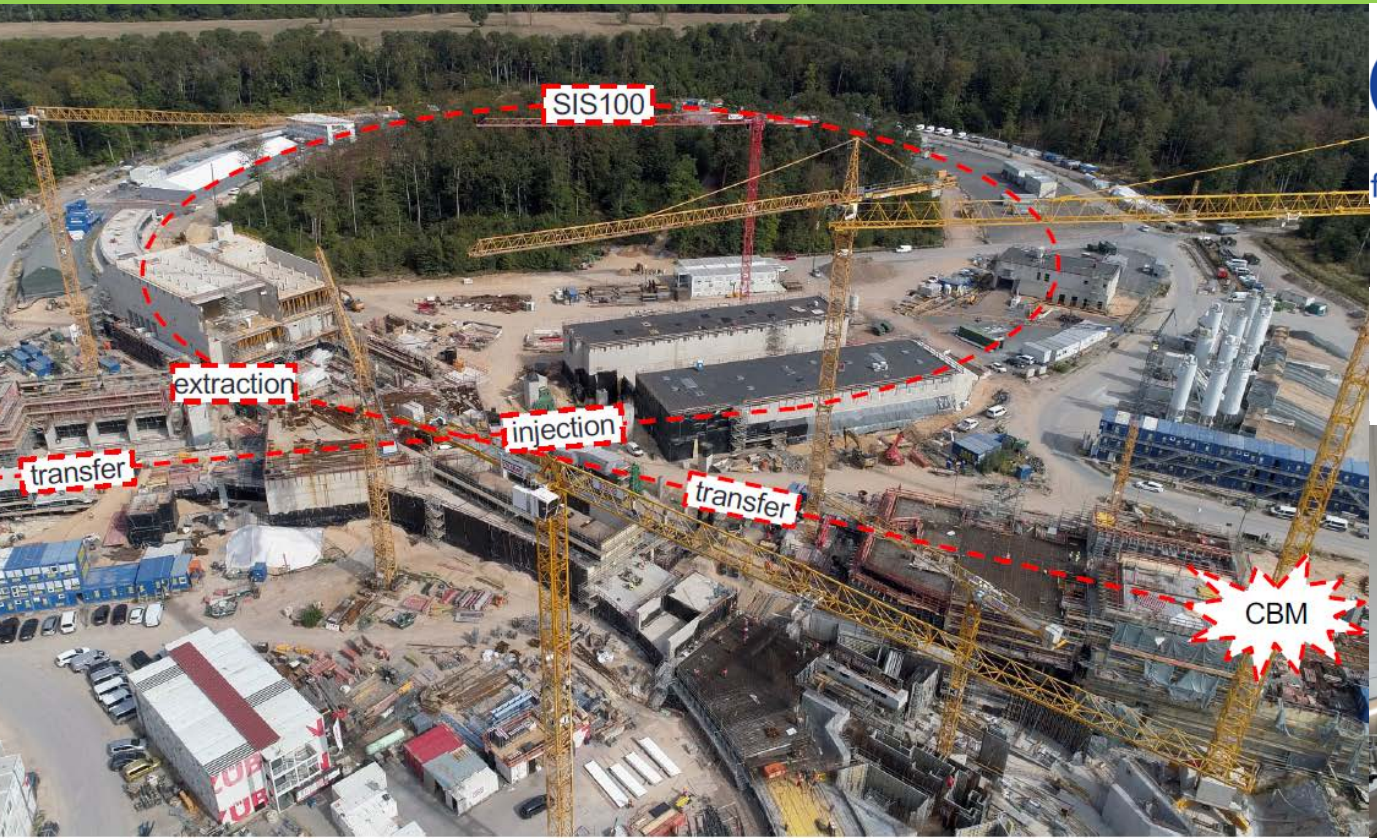
# new scope of WP2 after 24.02.2022

Jürgen Eschke, FAIR

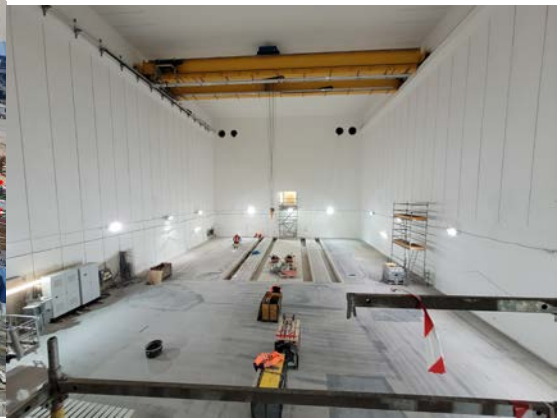
EURIZON Annual Meeting 09.02.2023 at FAIT/GSI, Darmstadt




eurizon

European network
for developing new horizons for RIs

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 871072



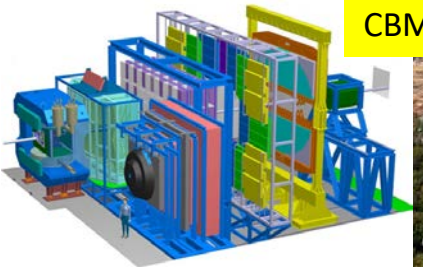
# WP2: Collaboration with NICA – Development of instrumentation for NICA and FAIR/CBM

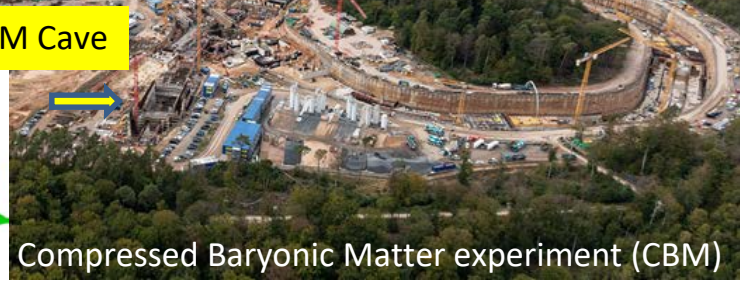
The main objective of this work package is to develop the instrumentation for NICA and FAIR/CBM:

- To perform the prototyping, construction and installation of detectors;
- To develop the data acquisition chain, computing procedures, software packages for simulation and data analysis.

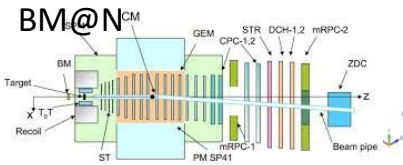

Scope of WP2 in CREMLINplus

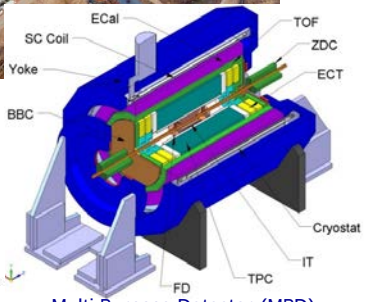

CBM Cave





Compressed Baryonic Matter experiment (CBM)




Multi Purpose Detector (MPD)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 871072.



CREMLIN PLUS

High Energy Physics Department, Head
**Institute for Nuclear Research NAS** Ukraine
03680 Kiev

Participation in WP7

**LTU Kharkiv**
production of micro-cables for CBM, FAIR


continuous war crimes against civilians

Russia‘s war against Ukraine
caused a complete stop of the science cooperation with Russia after 24.02.2022

We are all stunned and horrified by the Russian attack on Ukraine, which is a blatant violation of human rights and of international law and cannot be justified by anything.
Therefore, there is no basis to continue the cooperation with the Russian Institutions in this EU project, following EU sanctions against Russia issued on 4 March (https://ec.europa.eu/commission/presscorner/detail/en/IP_22_1544)!

**March 2022**

# FAIR without Russia

## Stop of communication and cooperation with Russian Institutes in FAIR project and FAIR experiment collaboration

In the context of the sanctions that have been decided, we ask you to comply with the following concrete catalog of measures, which applies with immediate effect:

- All deliveries to Russia are to be stopped.
- No new orders to be placed with Russia.
- Any know-how and technology transfer to Russia is to be stopped.
- Existing cooperation agreements are to be suspended.
- GSI's NICA project is frozen, as other GSI/FAIR bilateral projects with Russia.
- Workshops, talks, scientist exchanges, etc. with individuals from Russian institutions/companies must not be planned and must not take place.
- New visits of Russian partners must not be planned and must not take place.
- Participation of GSI/FAIR staff in advisory boards and activities of Russian institutions/companies and vice versa must be suspended.
- Any official communication with Russian institutes/companies such as BINP, JINR, etc. must be frozen.

Adjustments of the measures will be made depending on the further development of the situation.

Yours sincerely,

Paolo Giubellino  Ulrich Breuer  Jörg Blaurock

## Termination of all In-kind contracts with Russian In-Kind providers

Decision of FAIR Shareholders (council)
executed on 06.10.2022
by FAIR management
to terminate all collaboration contracts
with Russian institutions.

# Suspension of membership of all Russian Institutions (plus JINR) in CBM Collaboration

**CBM Collaboration Board decision on 18.05.2022**

"The CBM collaboration has to follow the instructions by the FAIR/GSI management and therefore has to suspend the membership of Institutions in Russia, including JINR in the CBM Collaboration for the time being.

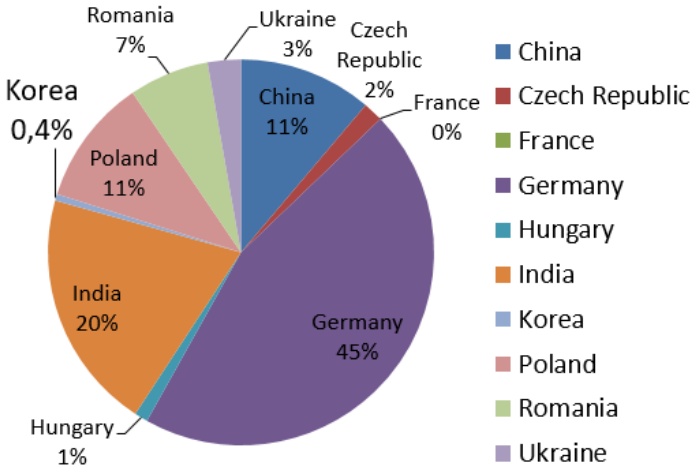
**Following this prerequisite, the CBM Collaboration Board endorses the suspension of the membership of Institutions in Russia in the CBM Collaboration for the time being."**

**The suspension of membership in the CBM collaboration of all institutes in Russia, including JINR was endorsed by the CB without objections, but some abstentions from Indian institutes.**

Composition of CBM Collaboration since 18.05.22

47 full member institutions
10 associated member institutions
from 10 countries

~400 full member – 22% from Russia = ~ 310



# Consequences of the war against Ukraine for this EU project

→ sanctions of the EU countries will stay for long time

→ no more science diplomacy with Russia

→ CREMLINplus (new acronym EURIZON) has changed scope for continuation with the EU partners (+Ukraine) only

Consortium has worked out a concept for the continuation of this EU project
with the EU partners (plus Ukraine) only in close communication with the European Commission.

New **focus of the technical WPs on ESFRI landmarks and EU RIs only**.

We had a series of intense meetings with the DESY coordination team,
the Executive Board (reduced team) and the reduced external Science Advisory Committee (SAC).

**Amendment for continuation with the 25 European (EU plus Ukraine as associated partner to H2020) partners only was submitted**.

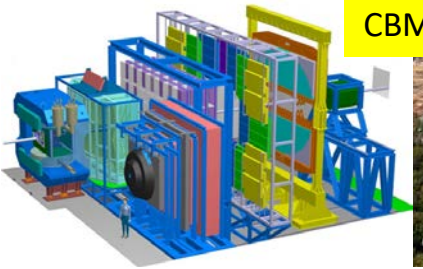
**The structure of the technical WPs is maintained. Only the scope of the tasks is adapted**.

**Clear cut in this EU project of the work before 24.02.2022 and after 24.02.2022.**

# WP2: Collaboration with NICA – Development of instrumentation for NICA and FAIR/CBM

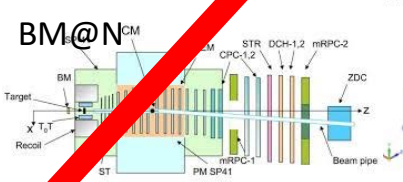
The main objective of this work package is to develop the instrumentation for NICA and FAIR/CBM:

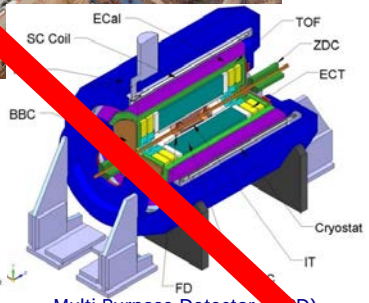
- To perform the prototyping, construction and installation of detectors;
- To develop the data acquisition chain, computing procedures, software packages for simulation and data analysis.

CBM Cave

Compressed Baryonic Matter experiment (CBM)


Multi Purpose Detector (MPD)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 871072.

# EURIZON WP2 Heavy Ions
# Instrumentation for the CBM experiment at ESFRI landmark FAIR

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 871072

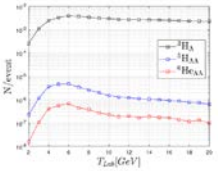
Participants: FAIR, WUT, Wigner RCP, NPI CAS, EKUT

eurizon
European network
for developing new horizons for RIs

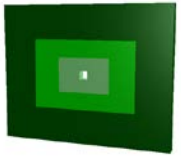
WP2.1: Preparation of the Silicon Tracking System for CBM/FAIR [FAIR, EKUT], Task Leader: [Johann Heuser, FAIR/GSI]

WP2.2: Developments for the data acquisition chain, for data preprocessing and computing for mCBM and CBM at FAIR [WUT, FAIR], Task Leader: [Wojciech Zabolotny, WUT]

WP2.3: Development of software packages for simulation and data analysis, participation in physics performance studies for CBM experiment at FAIR [FAIR, Wigner RCP]
Task Leader: [Ilya Selyuzhenkov, FAIR/GSI]

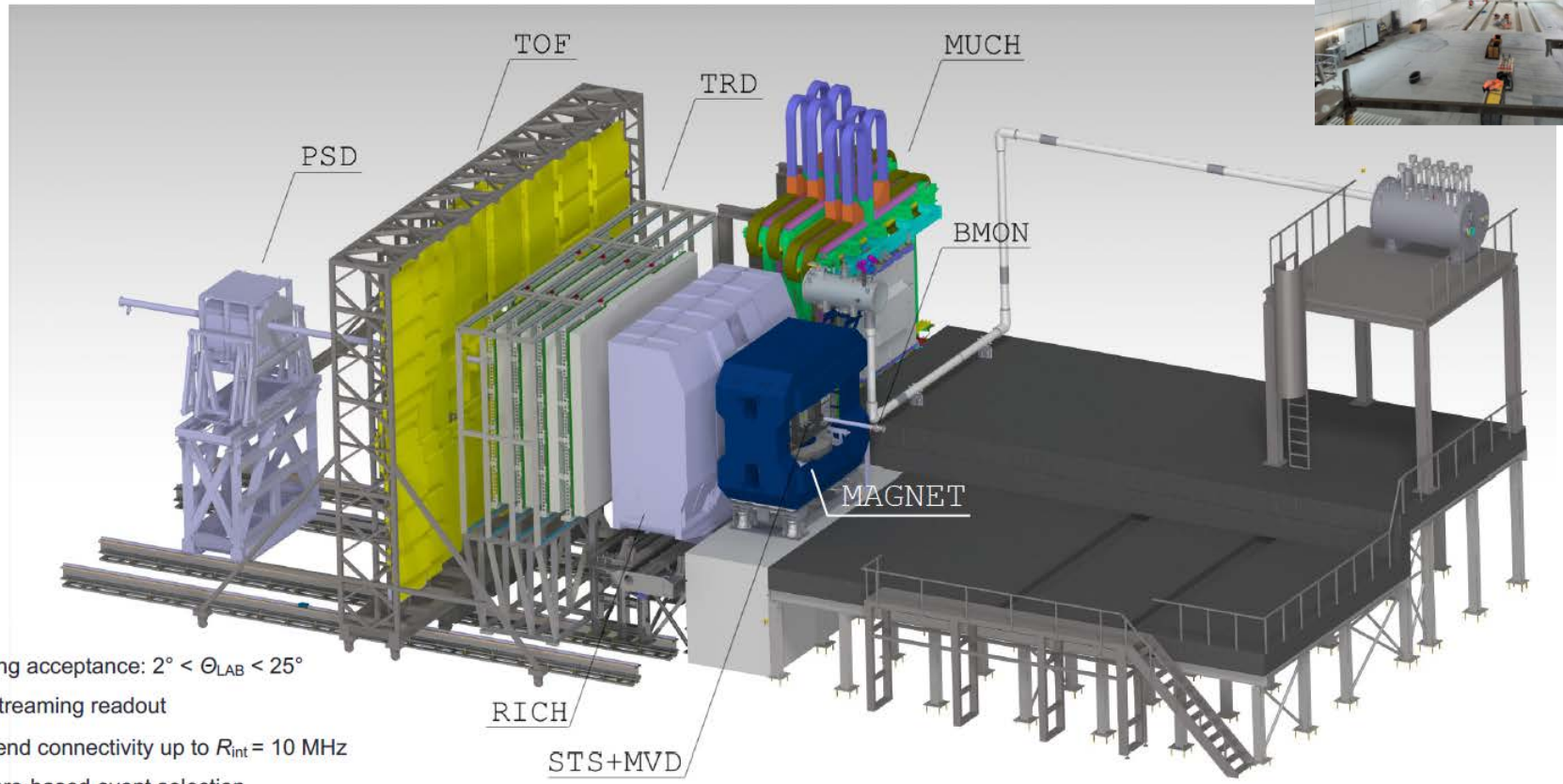


WP2.4: Development and construction of beam monitors, target chamber and beam pipe for the CBM experiment at FAIR [FAIR, NPI CAS] Task Leader: [Peter Senger, FAIR/GSI]



WP2.5: Development of new PSD detector for CBM [NPI CAS]
Task Leader: [Andrej Kugler, NPI CAS]

# CBM experiment

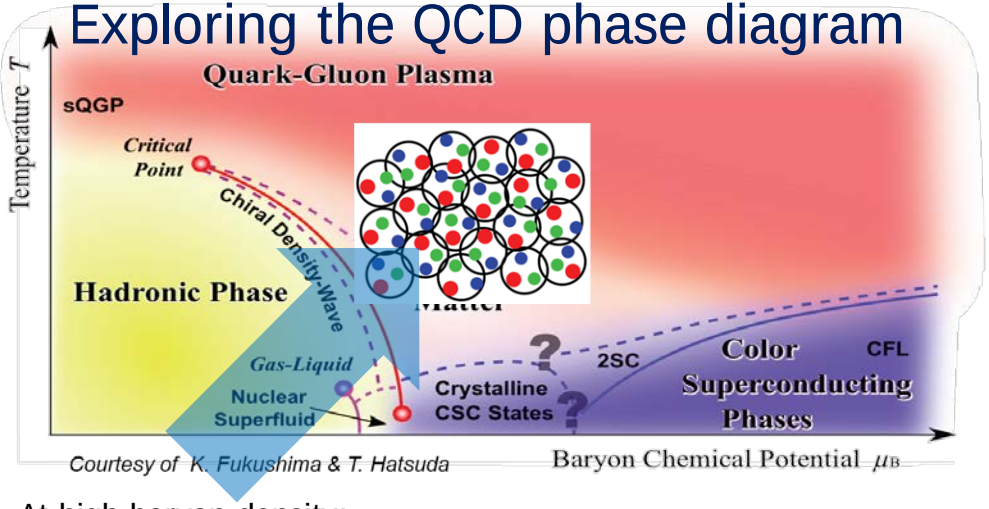

Tracking acceptance: $2° < \Theta_{LAB} < 25°$

Free streaming readout

Front-end connectivity up to $R_{int}$ = 10 MHz

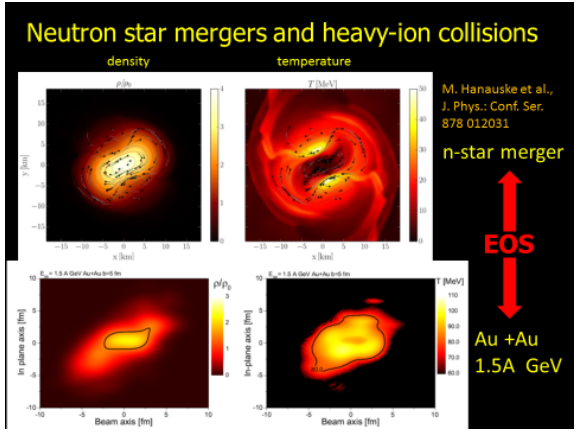
Software-based event selection

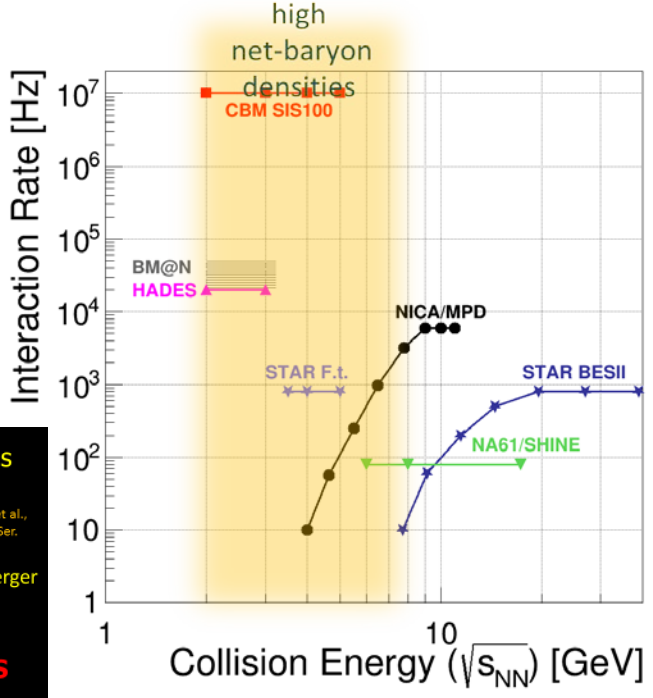
# Exploring the QCD phase diagram




<u>At high baryon density:</u>

- N of baryons >> N of antibaryons
  Densities like in neutron star mergers
- L-QCD not (yet) applicable
- Models predict first order phase transition with mixed or exotic phases
- Experiments: STAR@RHIC, NA61@CERN, CBM@FAIR, BM@N and MPD@NICA , J-PARC



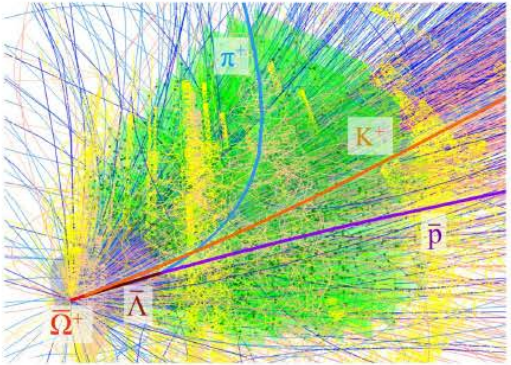




This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 871072.

# Physics goals realization (rate challenge)

- High event rates, up to $10^7$ Hz Au+Au collisions
- Fast, radiation hard detectors & front-end electronics
- Free-streaming readout and 4D (space + time) event reconstruction
- PID: hadrons and leptons, displaced (~50 µm) vertex reconstruction for charm measurements
- High speed data acquisition and performance computing farm for online event selection

**CBM simulation, central Au+Au @ 10*A* GeV/*c***



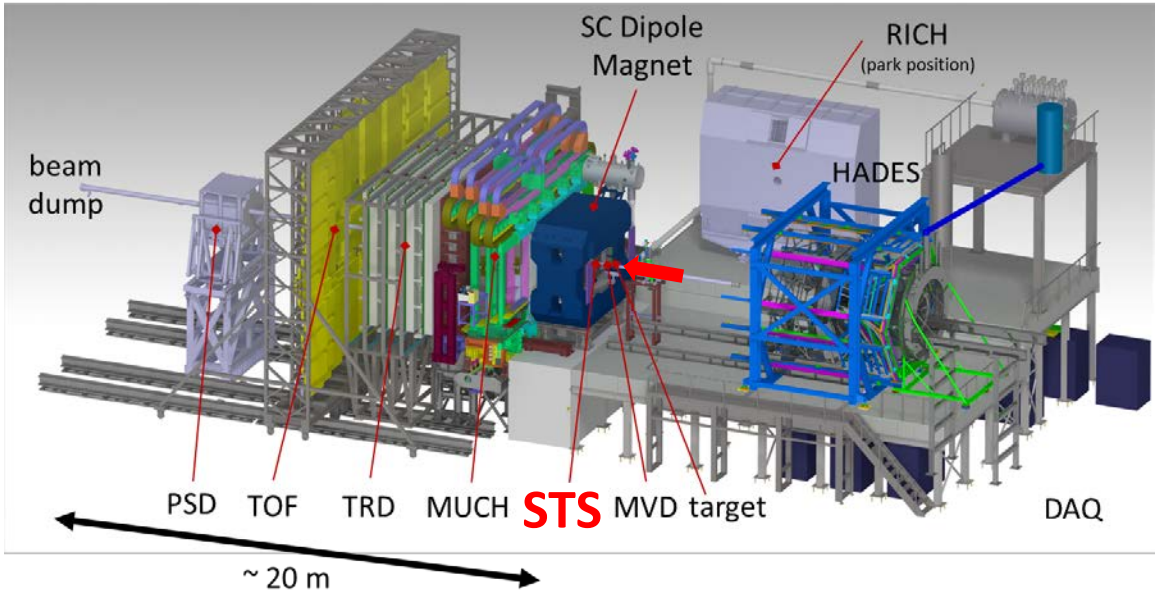

**Green IT Cube @ GSI**

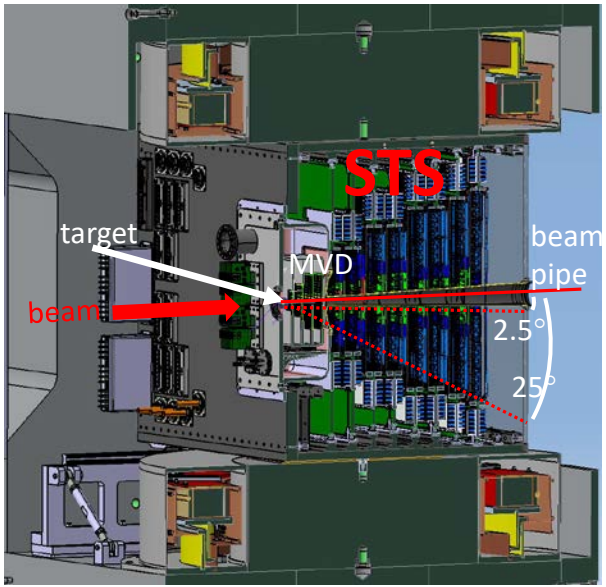
# **WP2.1** Silicon Tracking System (STS) for CBM/FAIR

- STS = main CBM detector for charged-particle trajectory measurement
- installed in dipole magnet's gap
- thousands of high-tech components

Task Leader: [Johann Heuser, FAIR/GSI]

## The CBM experiment



W. Zabołotny, M. Gumiński, P. Loizeau WUT, FAIR

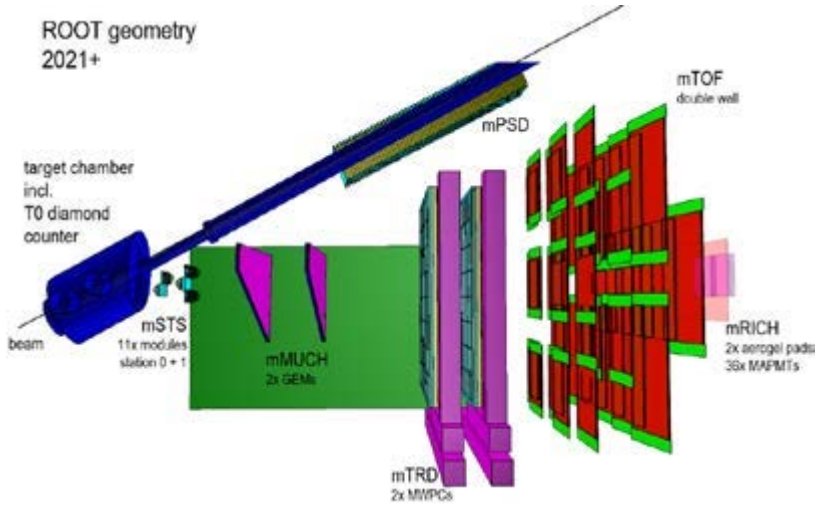
# Developments for the data acquisition chain, for data preprocessing and computing for mCBM and CBM at FAIR

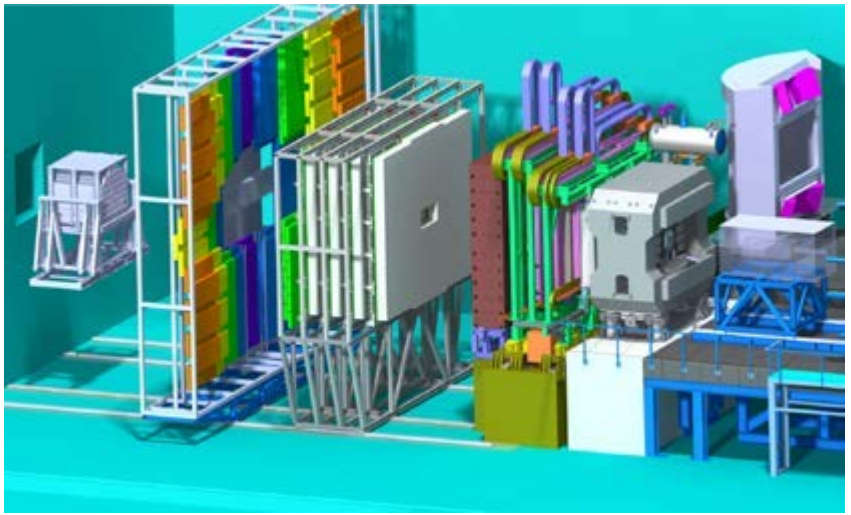
## Development of the GERI+GBTxEMU based readout chain

Status in 2022

- Cooperation with JINR group stopped after February 24th
- Only WUT staff left involved in firmware development (Marek Gumiński and Piotr Miedzik as the project's staff, Michał Kruszewski, Krzysztof Poźniak and Wojciech Zabołotny as volunteers)
- Tests planned in JINR in April 2022 were impossible. Development tasks related to application in BM@N experiment were suspended (abandoned in fact?)
- The package was reoriented for preparation of GERI+GBTxEMU based readout chain for mCBM, CBM and other experiments cooperating with FAIR
- GBTxEMU part completed (only maintenance, functionality adjustment, bug corrections needed)

# Development of common software packages for simulation and data analysis, participation in physics performance studies of the CBM & mCBM experiments at GSI/FAIR



mCBM data taking started in 2019

CBM operation planned for > 2028

# **WP2.4:** Beam detectors and beam pipe for CBM

Peter Senger, FAIR/GSI

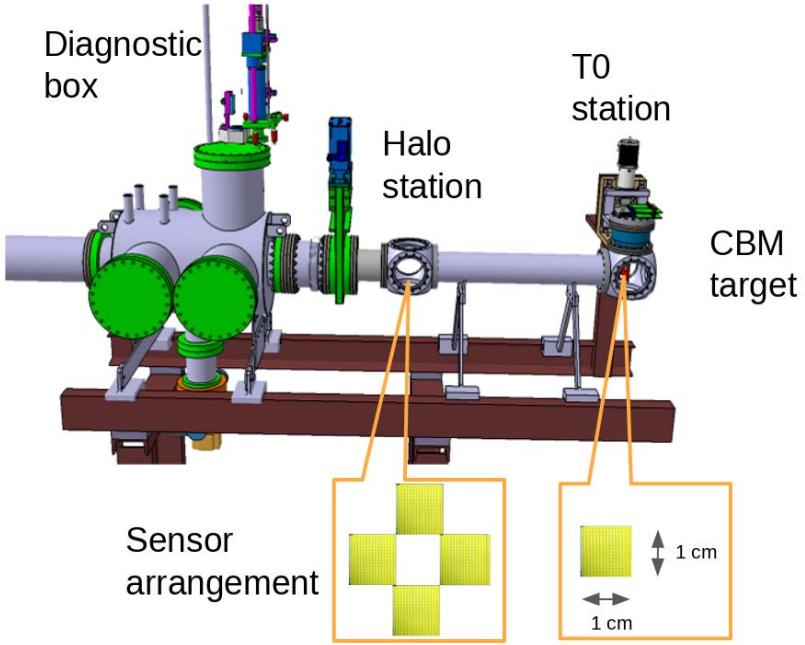
## T0 and beam detectors for CBM

A. Rost FAIR

**Applications and requirements:**

- ➔ Measure start time of reaction (T0) with precision of 50 ps (RMS) at beam intensities up to $10^7$ ions/s
- ➔ Beam quality monitoring: position (< 50 µm resolution), halo, time structure, …
- ➔ Part of fast beam abort system
- ➔ Low material budget and in-vacuum operation

- T0 and HaloBAS detector stations will employ pcCVD diamond technology
- Detector stations installed in vacuum, in front of the CBM target
- Conceptual design report: Ready in Q3 2023



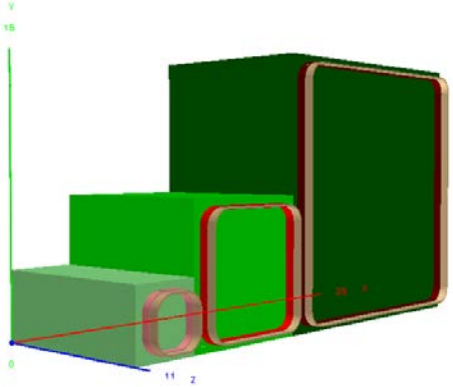
# WP2.5: Development of new PSD (Forward) detector for CBM

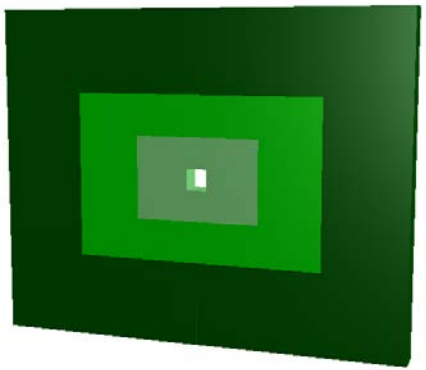
## Software integration - Geometry

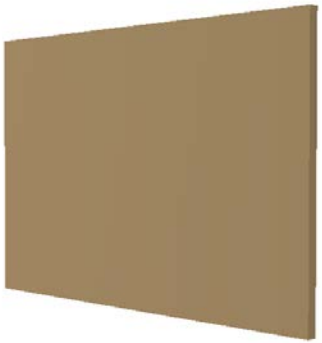
L. Chlad
A. Kugler

Nuclear Physics Institute

- aims to be flexible to fit all requirements put on the FWall
- starting with 3 sizes of cells
- for study purposes use very fine granularity (1x1 $cm^2$) without any hole
  - this will be used to set minimum criteria on final design to meet the reaction plane resolution
  - also with this setup we can determine what size of hole might be optimal in order to not lose the heavy fragments (keeping in mind also limits coming from irradiation of the material)







# WP2 Parallel Session on Feb. 9th, 16:00 h

| Task¤ | Time·¤ | ·Title·¤ | Speaker¤ |
|---|---|---|---|
| 2.1¤ | 16:00·–·16:15¤ | Development·of·the·Silicon·Tracking·System·for·CBM¤ | Anton·Lymanets¤ |
| 2.2¤ | 16:15·–·16:30¤ | Toward·the·GERI-based·open·readout·chain¤ | Marek·Gumiński¶ ¤ |
| | 16.30·–·16:45¤ | Central·components·of·the·CBM·readout¤ | Pierre·Loizeau¤ |
| 2.3¤ | 16:45·–·16:55¤ | Introduction·to·WP2.3·activities¤ | Ilya·Selyuzhenkov¤ |
| | 16:55·–·17:05¤ | Online·software·for·CBM·¤ | Dominik·Smith¤ |
| ¤ | 17:05·-··17:15¤ | CBM·geometry·database¤ | Eoin·Clerkin¤ |
| 2.4¤ | 17:15·–·17:30¤ | Status·of·diamond·based·T0·and·beam·detectors·for·CBM¤ | Adrian·Rost¤ |
| | 17:30·–·17:45¤ | Status·of·CBM·Beam·Pipe·Downstream·Area¤ | Jan·Kollarczyk¤ |
| 2.5¤ | 17:45·–·18:00¤ | Status·of·Forward·Wall¤ | Lukas·Chlad¤ |