

FAIR & GSI

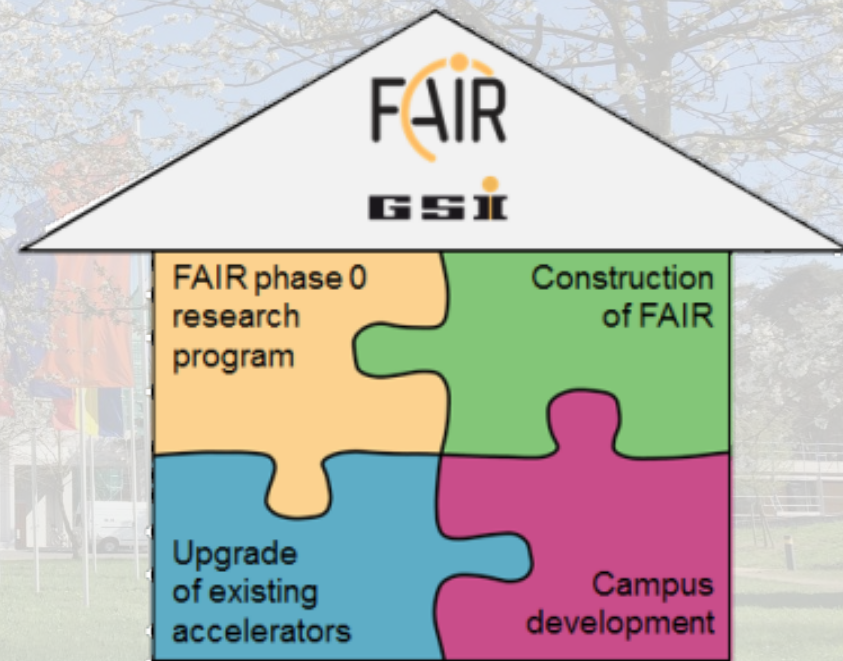
- Strategy, Organization, Campus, Status -

J. Blaurock

9th November 2020

Four strategic objectives

- Construction of FAIR
- FAIR phase 0 research program
- Upgrade of existing accelerators
- Campus development



- Developing the buildings and facilities in view of the future operation of FAIR is one of the strategic goals of both FAIR and GSI.
- Two Measures taken to develop the Campus as a host lab and to provide a state of the art workplace and accompanying infrastructure are:

FAIR Control Centre

- Hosting the Main Control Room and some 200 work places
- Operation planned during year 2024



Sketch of the building: view of the visitors gallery and main control room in the front.

Parking Garage

- Providing parking space for approx. 800 cars
- Completion planned in Q1 2021



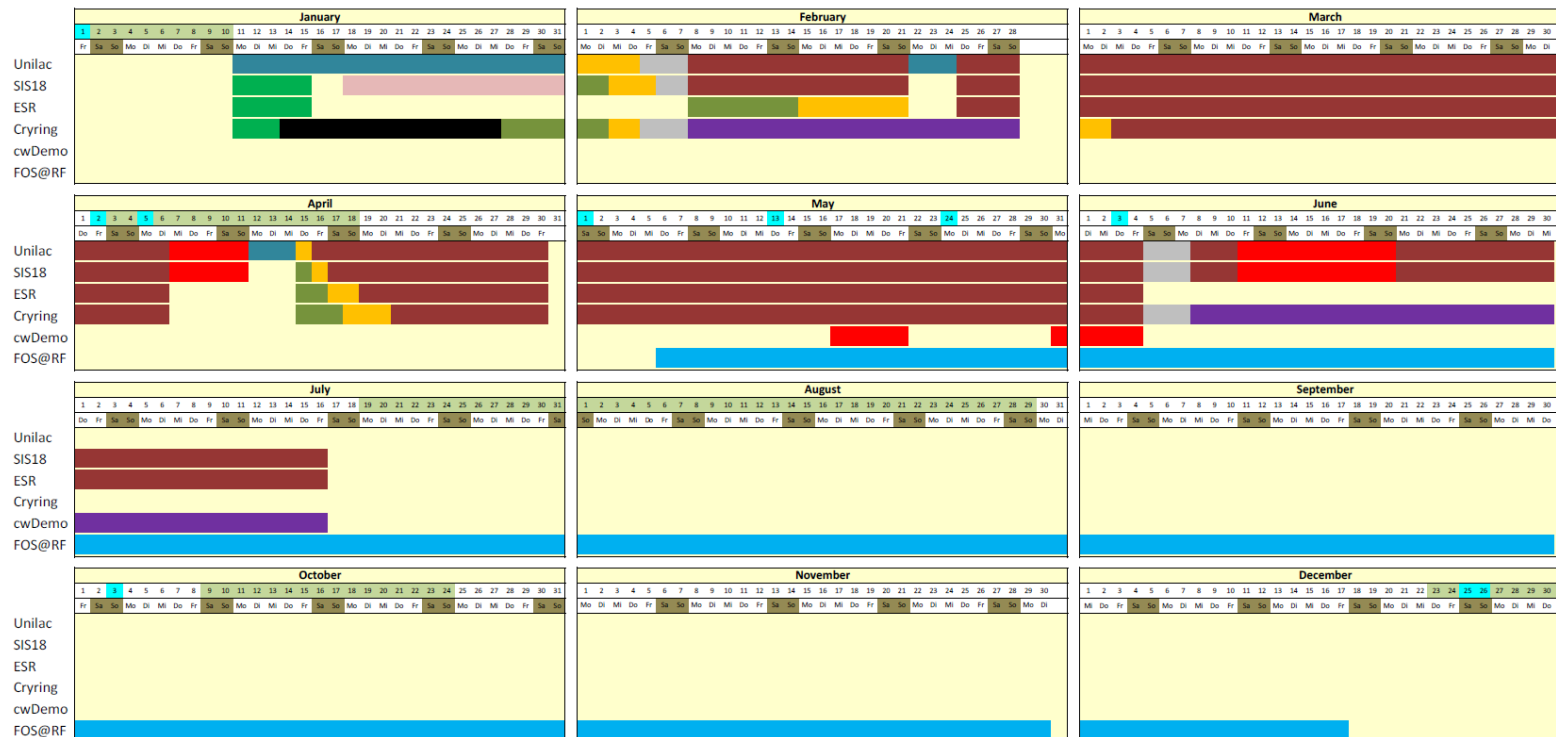
Picture showing the current status of civil works of the parking garage 3rd November 2020.

Accelerator and Experimental Facilities Physics Run 2021



General Plan of Accelerator Operations 2021

release: 19.10.2020



Legend

- Bake Out
- Dry-Run
- Commissioning without Beam
- Beam Commissioning
- Physics Run
- Engineering Run / Beam Studies
- Operator Training
- RF-Conditioning
- Physics Run-Cryring standalone
- Alignment (SIS18 & Transfer)
- Device Testblock

User Beamtime

| | Days: | Shifts: |
|----------------------|-------|---------|
| Unilac | 133 | 399 |
| SIS18 | 104 | 312 |
| ESR | 80 | 240 |
| Cryring@ESR | 0 | 0 |
| Cryring (standalone) | 60 | 180 |
| HKR besetzt | 187 | 561 |

Information

- from Mai 6th, Alvarez 4 is not available --> UNILAC energy limited to 8.6 MeV/u
- from mid June, no parallel operation mode will be provided
- the engineering run in April is planned only in case no major maintenance and repair is necessary
- the engineering runs for cw-Demonstrator in May and June are scheduled preliminary

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Construction of FAIR

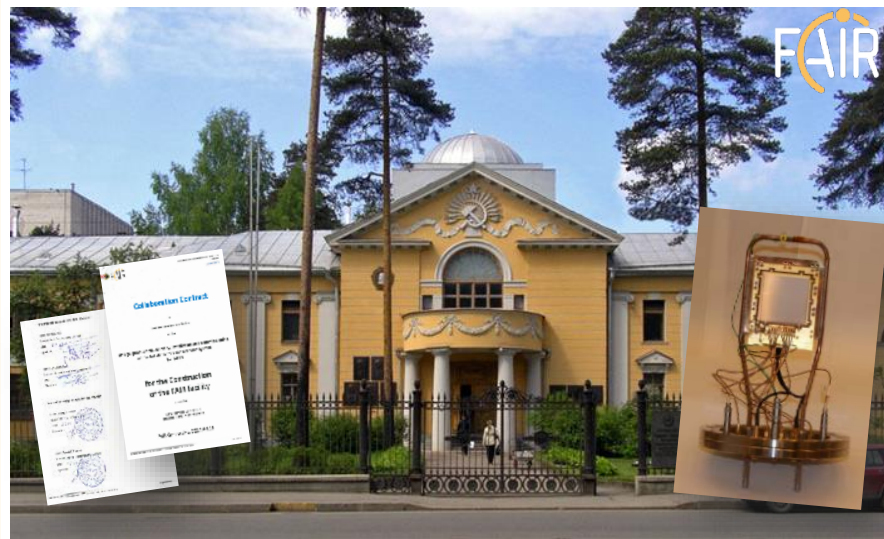
FAIR Project Progress Highlights

- a. Accelerator
- b. Civil Construction
- c. Experiments

FAIR Next Steps

June 2020

SuperFRS Time of Flight (TOF)-
Detectors contract has been signed by
IOFFE Institute (Russia) and FAIR



July 2020

CR- Stochastic cooling Palmer Pick-Up
assembled and prepared for integration
and testing with beam at COSY (FZJ)



July 2020

Prototype of the CR- large size pickup
was assembled at BINP (Russia)



August 2020

The FoS CR dipole magnet is under
assembly at BINP (Russia)



September 2020

Production and testing of the SIS100 laser tube successfully completed. It is now stored in the ESR hall until installation at FAIR.



September 2020

As part of the CBM detector the PSD Support arrived on campus. SAT has been performed successfully. After installation it will support ~25 tonnes of calorimeter modules



Q1-Q3 2020

1st SIS100 Quadrupole Doublet Module tested at GSI with positive result on all functional technical parameters



October 2020

1st SIS100 Quadrupole Doublet Module delivered to Salerno to start implementation and prelearning of the upcoming test process for all modules



September 2020

Transformer building finished at GSI.
Test benches for normal conducting magnets will be equipped with a new 4kA power supply next year. The transformer building is ready to accommodate the 20kV transformer needed for the new power supply



October 2020

First Bypassline for SIS100 Cryo arrived by GSI on 22th of October 2020



FAIR Highlights (Part 6)

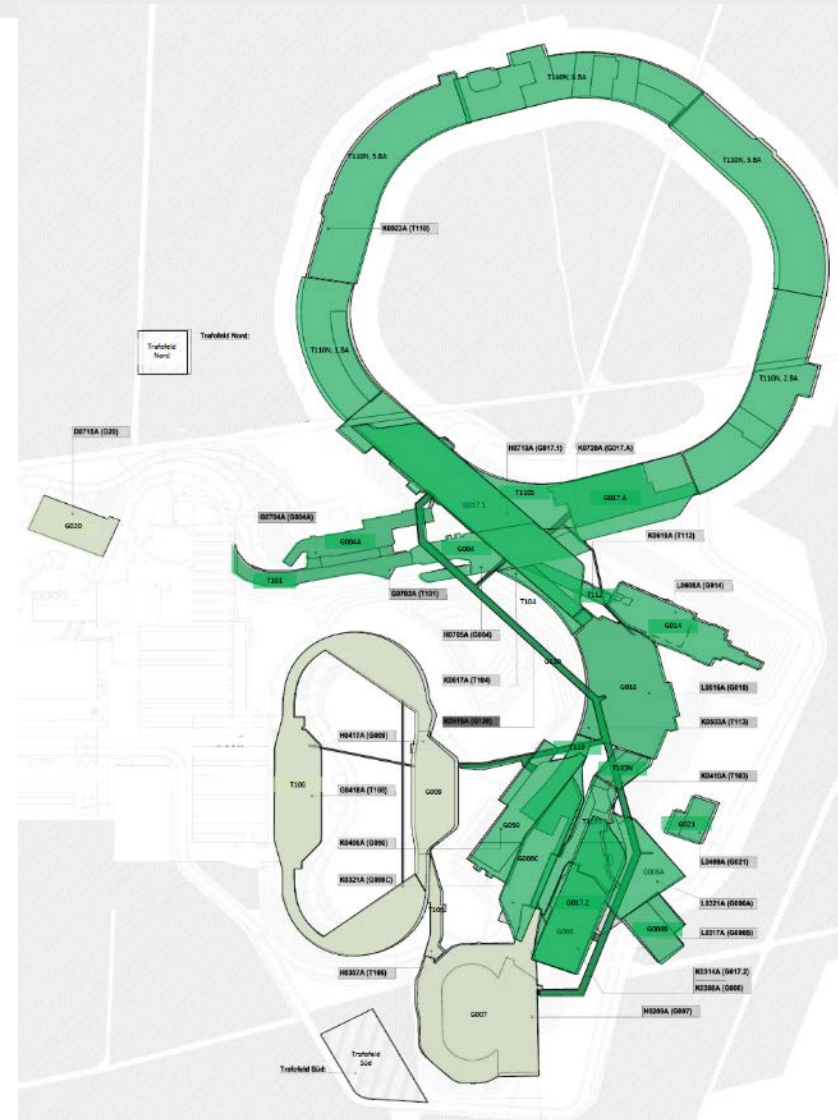
Storage Warehouse Weiterstadt ... filling in progress!

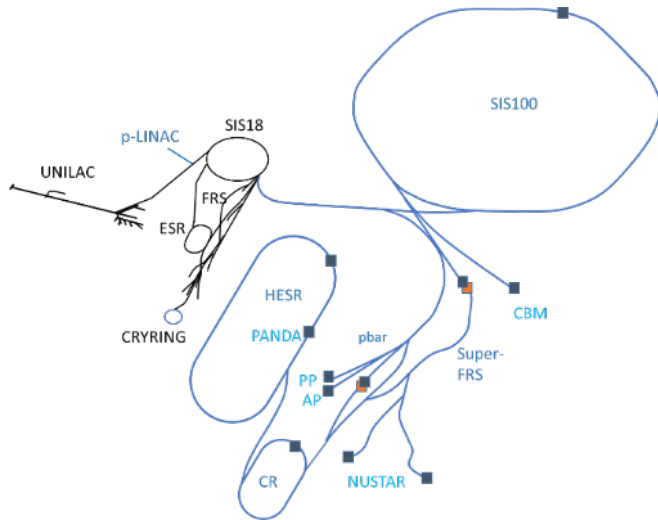


FAIR Intermediate Objective



- The Council decision in February 2020 to build the FAIR Intermediate Objective is a major step in continuing project execution towards the realisation of the FAIR MSV
- Further financing expected in 2021





Essential for the project execution process is the timely delivery of ACC components, especially **Super-FRS Multiplets and SIS100 Quadrupole Units**

1. Prioritization of Super-FRS commissioning with SIS18 beam

Construction of buildings and installation of TBI in south area, delivery & installation of **Super-FRS multiplets (ASG Italy) and local cryogenics (WUST Poland), HEBT components - diagnostics chambers (BOSE India), SEM Grid components (Poland), vacuum chambers (BINP Russia)** - then commissioning works of all machines

2. Sequential realization along the beam line driven by SIS100

TBI Installation area north, Delivery & installation of **local cryogenics (WUST Poland), quadrupole units (JINR Russia), HEBT components - diagnostics chambers (BOSE India), SEM Grid components (Poland), vacuum chambers (BINP Russia)** - then commissioning of SIS100 and the subsequent machines in the south area



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FAIR Project Progress – ACC

SIS100



- All 110 s.c. dipole modules are manufactured (Bilfinger Noell).
- Cold testing of first two (of 166) quadrupole series units completed (JINR).
- Cold testing of FOS quadrupole module successfully completed. All functional parameters achieved. Module under shipment to NAFASSY test facility in Salerno.
- Rf acceleration cavities: 11 of 14 cavities and power converter manufactured and tested (Research Instruments).
- 42 of 110 thin wall dipole chambers delivered (Pink).
- 53 of 61 cryo-ion catcher delivered (Pfeiffer).
- Procurement of main dipole- and quadrupole power converter in progress.
- Order for radiation hard quadrupole magnets of extraction system awarded to Buckley.
- First bypass line of series production manufactured and in FAT process (Kriosystem).



Cryo-ion catcher



Rf acceleration cavities and power converter in storage are



Bypass line at FAT at Kriosystem

FAIR Project Progress – ACC SuperFRS



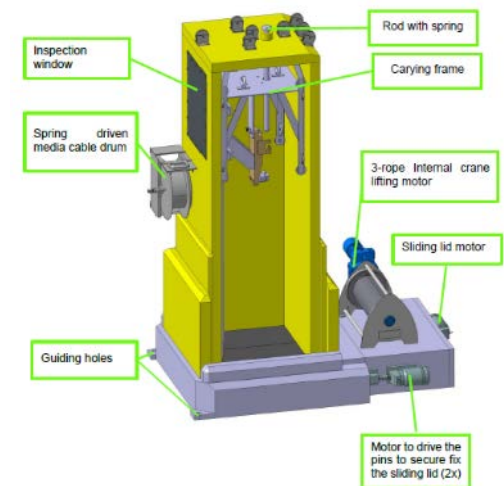
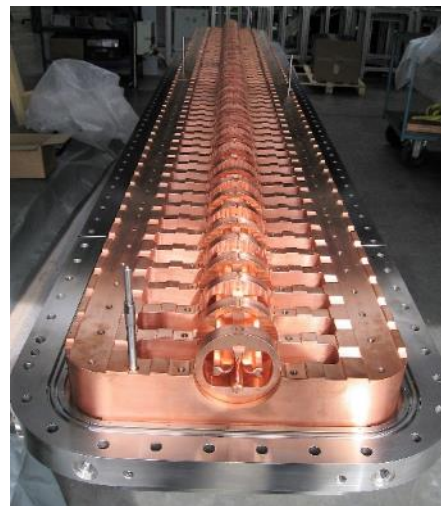
- Test FoS sc magnets at CERN: CERN allowed an early start of test facility after Covid lockdown -> qualification of sextupole successfully done
- Commissioning of the 2nd testing bench started
- Series production multiplets and production FoS dipoles on track again (after Covid lockdown)
- FAT of FoS long multiplett successfully completed. Arrival at CERN for testing in Q4 2020.
- Contract for sc branched dipoles signed with Elytt, Bilbao, Spain (4th May)
- BINP R&D NC multipoles completed (27th July)
- Design works for S-FRS Local Cryogenics at WUST (Poland) progressing
- ToF detectors: Contract with IOFFE (Russia) signed (26th June)
- Production plans for SEM detectors and for detector ladder done (27th May) with HIP, Finland



FAIR Project Progress – ACC pLinac/ pbar Target



- Proton source and the low energy beam transport (LEBT) delivered to GSI in October 2020
- Ladder RFQ transported to Frankfurt for further tuning steps.
- Bidder qualification for pLinac CH cavities finished. Five companies asked for offers.
- Negotiations for pbar shielding flask with three companies in progress.



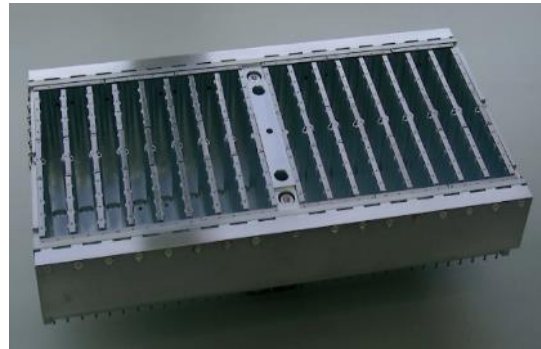
FAIR Project Progress – ACC Collector Ring



- FoS CR dipole magnet is under assembly at BINP. FAT is planned in October 2020.
- Prototype of BPM has been assembled and now under test at BINP
- Stochastic Cooling: 7 power amplifiers have passed SAT
- Stochastic Cooling: Design of RF-electrodes and Pick-up tanks has been finished. Tendering process started for series production.
- 9 CDRs and 3 FDRs done by BINP have been accepted by FAIR.
- Assembling space for CR magnets is under preparation at GSI



BPM Wide pickup prototype

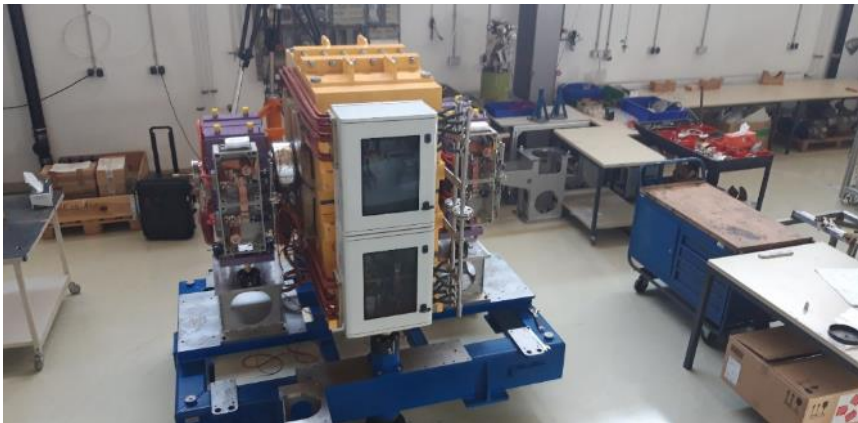


RF-electrode prototype
for stochastic cooling



Assembly of dipole and quad chambers prototypes
test: nominal vacuum achieved!

- 46 Dipoles are delivered. 4 (SPARC) are in Jülich, 42 are in storage hall Weiterstadt
- All 84 Quadrupoles are in Jülich. Assembly of magnet groups on common girders has started.
- Romania: continuous delivery of sextupoles, steerers and their power converters to Jülich. EMC measurements (SAT) in progress
- Most other power converters are in Jülich
- Assembly of scrapers and beam diffuser in progress



Common girder for quadrupole and 2 sextupoles

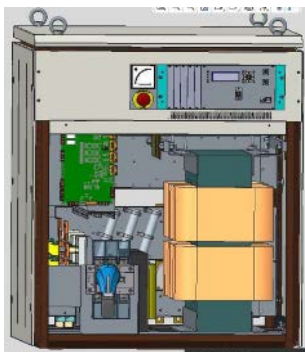


Hor./vert. Scraper unit

FAIR Project Progress – ACC COMMONS



- HEBT: Delivery of 18 power converters (6x HB.Q2, 12 HB.C1) from ECIL/India to Weiterstadt
- GSI Ion Sources (upgrade for FAIR): FDR for new PIG Power Converters, 3D-planning.
- Prototype of QUAD11 was delivered and tested. Field quality within round aperture fulfills specification. Optimization for magnets with elliptical aperture in preparation.
- Prototype of vertical deflecting dip10_0 was delivered and tested in horizontal position. Field quality fulfills specification. Mechanical improvements for series magnets are in discussion.
- Build-up of production facilities in Bangalore/ India for Vacuum techniques



FDR for new PIG Power Converters



Prototype of QUAD11

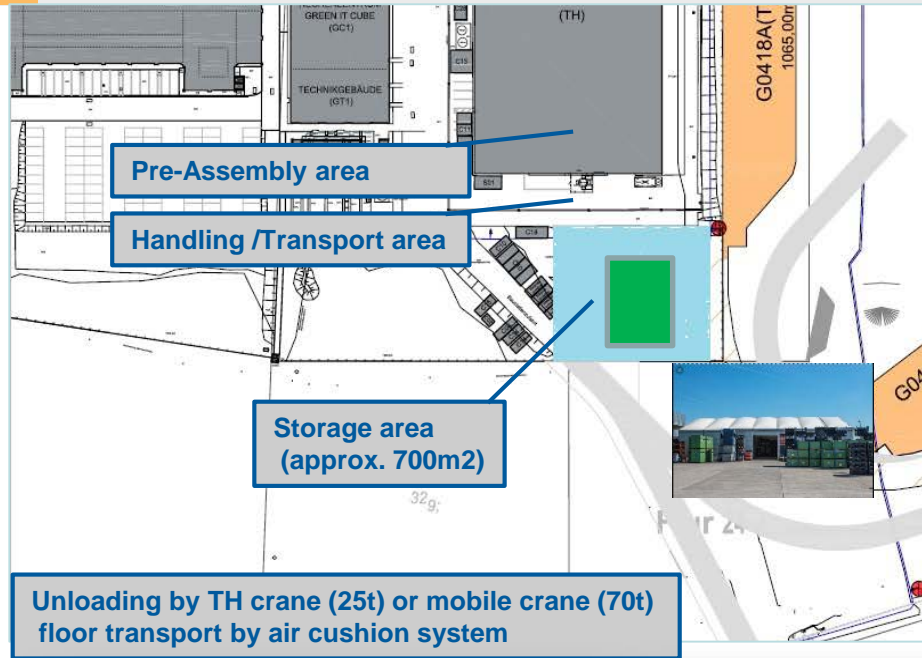


Build-up of production facilities in Bangalore/ India



VacTech Prototype @ GSI

Storage Space for CR Magnets



- Approval for deforestation in February 2020
- Request for Tender in March 2020
- Concrete baseplate for air-cushion transport
- Temporary storage building for 600-800m²
- Start of ground clearing and construction October 2020.
- Facility completed in February 2021





Construction of FAIR

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FAIR Next Steps

FAIR Project Progress – Civil 100 Ring accelerator



New Drone Video Available



FAIR Project Progress – Civil

Aerial view images



12th October 2020

FAIR Project Progress – Civil

Aerial view images



12th October 2020

FAIR Project Progress – Civil

Aerial view images



12th October 2020

FAIR Project Progress – Civil

Aerial view images



FAIR Project Progress – Civil Construction Site North



Construction Site North

FAIR Project Progress – Civil Transfer building



Transfer Building



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FAIR Next Steps

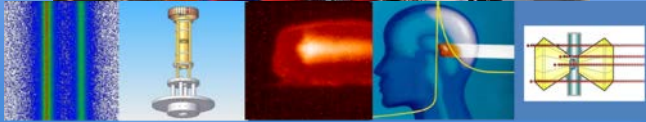
FAIR Project Progress – Experiments

Progress

- Completion of the design - reflected in approved TDRs— is up by 1% over 6 months
- Construction of experimental components, is up by 2.2% over 6 months.

Recent Highlights

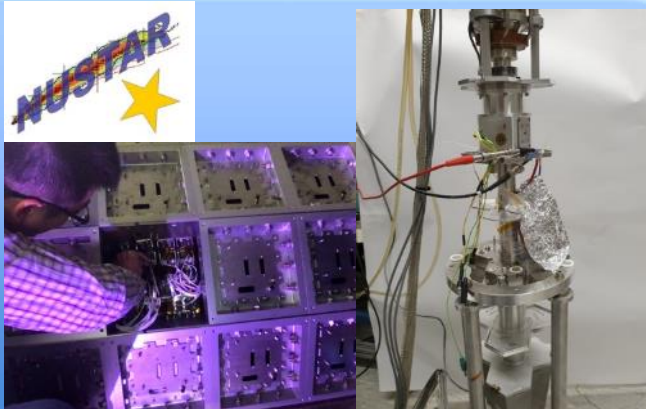
APPA



CBM

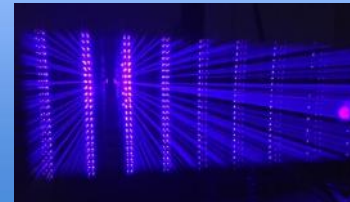


NUSTAR



PANDA

PANDA





Construction of FAIR

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- a. Accelerator
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FAIR Next Steps

- Civil
 - Continue progressing civil concrete works in Area North and ramping up civil works in Area South
 - Award of technical building installation packages (TBI) starting in Q4 2020
- Accelerator
 - Ensure timely delivery of Accelerator components
- Scheduling
 - consolidation process of time schedule started and will be completed at the end of Q1/2021



Thank you for your attention !

