

of PANDA at BINP

L. Schmitt, GSI/FAIR

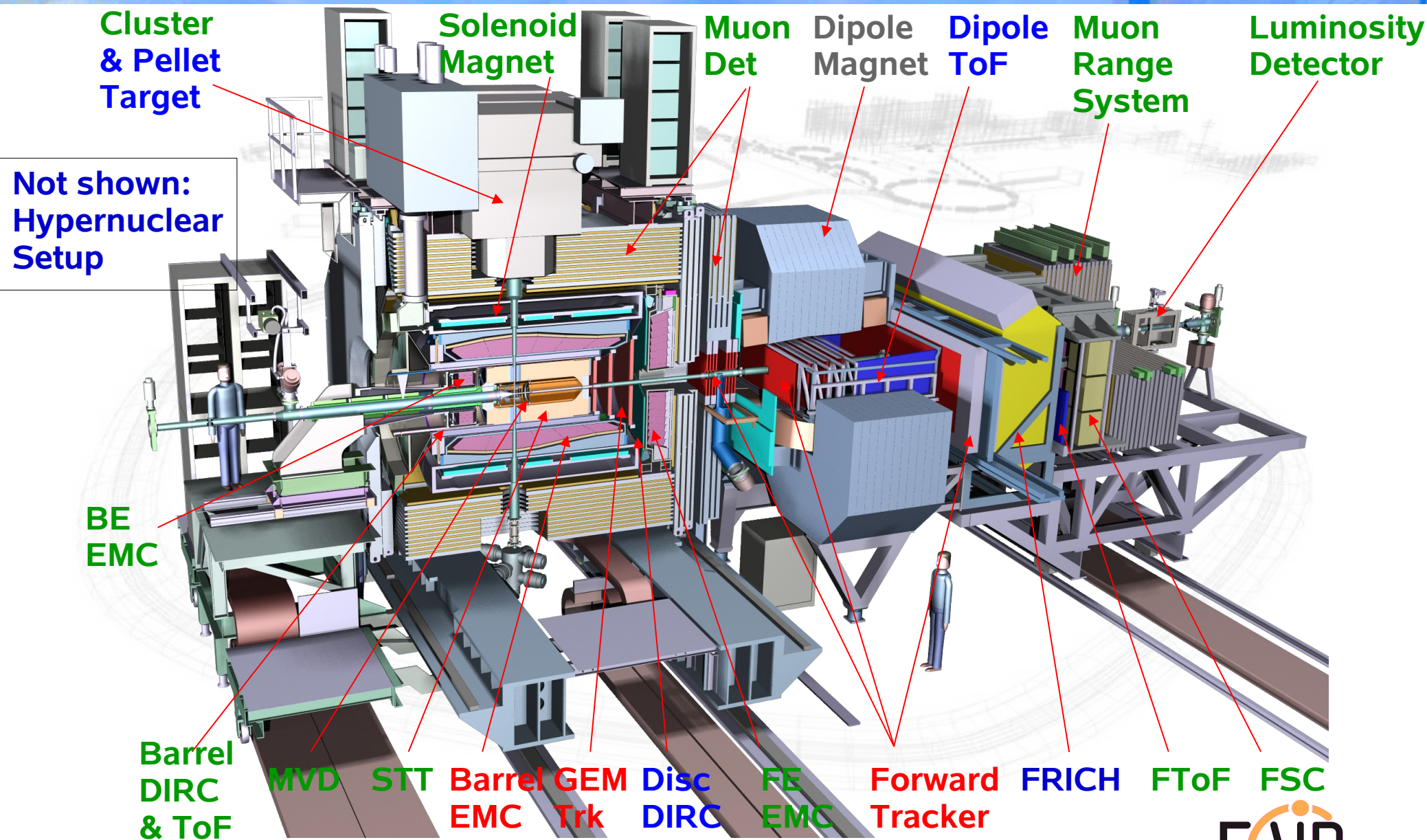
BINP-FAIR Workshop 3,
GSI, November 26, 2019

Overview and Schedule

Installation Planning

BINP Systems

PANDA Day-1 / Phase 1 / Phase 2



Day-1 Scorecard Aug 2019

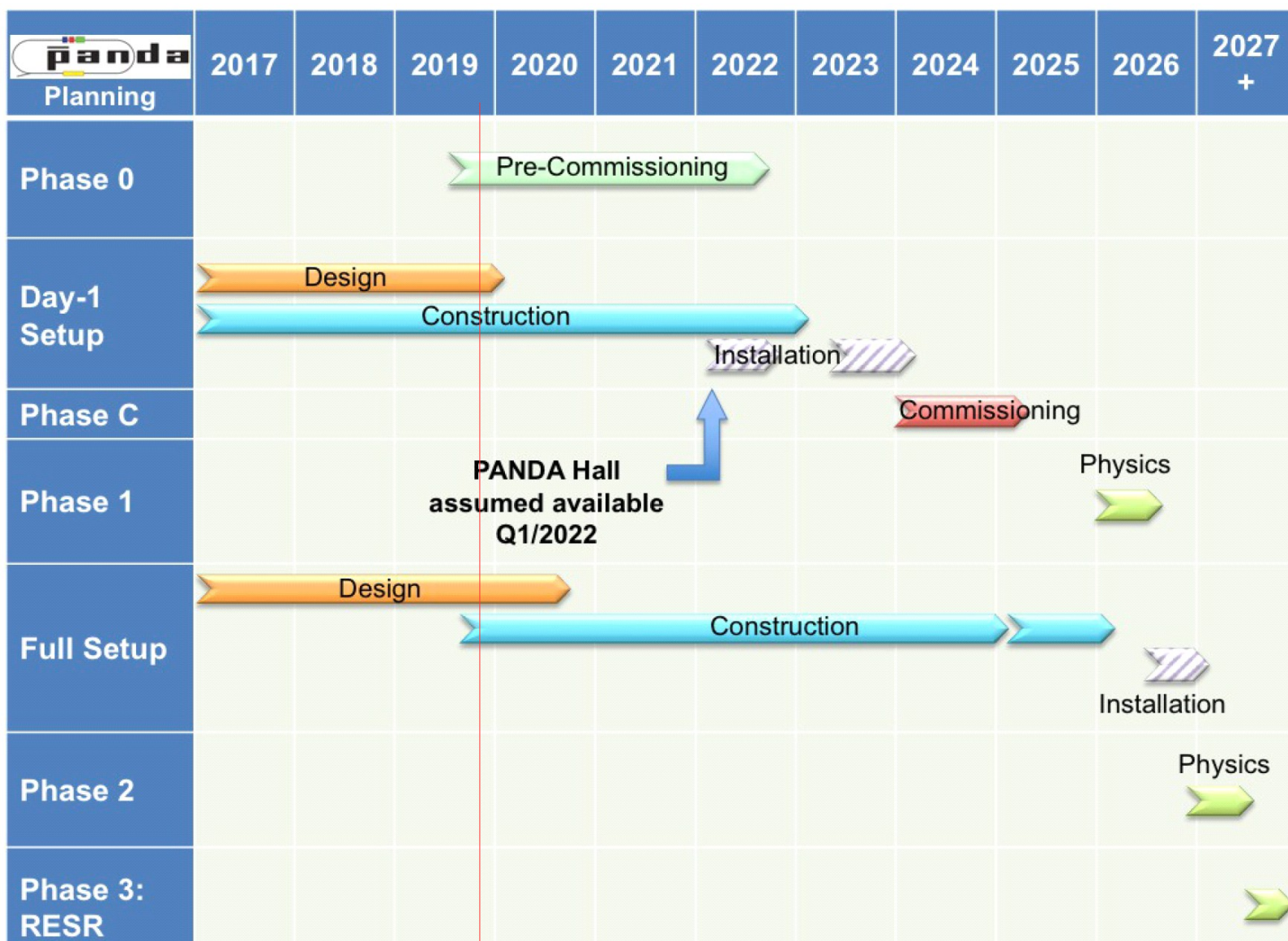


PANDA	TDR / Specs	Cost [k€ 2005]	% Funding (Sec / RUS / EoI / TBA)	Construction	Construction complete	Test/ Commissioning
Cluster Jet Target		771,00			08/2022	
Micro Vertex Detector (MVD) - Str		2.550,00			05/2023	
Micro Vertex Detector (MVD) - Pix		2.091,00			05/2023	
Straw Tube Tracker (STT) (1)		2.603,00			09/2023	
Planar GEM Tracker - 50%		555,00			03/2022	
Barrel DIRC		2.782,00			04/2023	
Barrel Time of Flight (TOF)		310,00			01/2023	
Forward Tracking (w/o FT 5/6) (1)		1.145,00			07/2023	
Forward TOF (2)		362,00			12/2021	
Barrel EMC System		8.001,00			03/2022	
Barrel EMC Crystals - 75% (2)		8.634,00			03/2022	
Backward Endcap EMC		1.309,00			06/2023	
Forward Endcap EMC		5.674,00			02/2020	
Forward Shashlyk Calorimeter (2)		1.447,00			06/2023	
Luminosity Detector		666,00			06/2023	
Muon Detectors (2)		2.318,00			06/2023	
Solenoid		5.800,00			10/2021	
Interaction Region		151,00			12/2022	
Infrastructure		4.006,00			01/2023	
DAQ Hardware (3)		1.350,00			12/2022	
	88% <i>value weighted</i>	52.525,00	67% 17% 15% 1%	31% <i>value weighted</i>		1% <i>value weighted</i>

(1) if synergies between STT and Fw. Tracking realised
 (2) if German-Russian Roadmap realised

(3) DAQ computing via operation funds

PANDA Schedule



Construction of Phase 1 systems has started

Installation periods:

- 1/2022 - 8/2022: solenoid, dipole, supports etc.

- 5/2023 - 3/2024: all other systems

- Commissioning with protons 2025

- Start of physics with antiprotons 2026

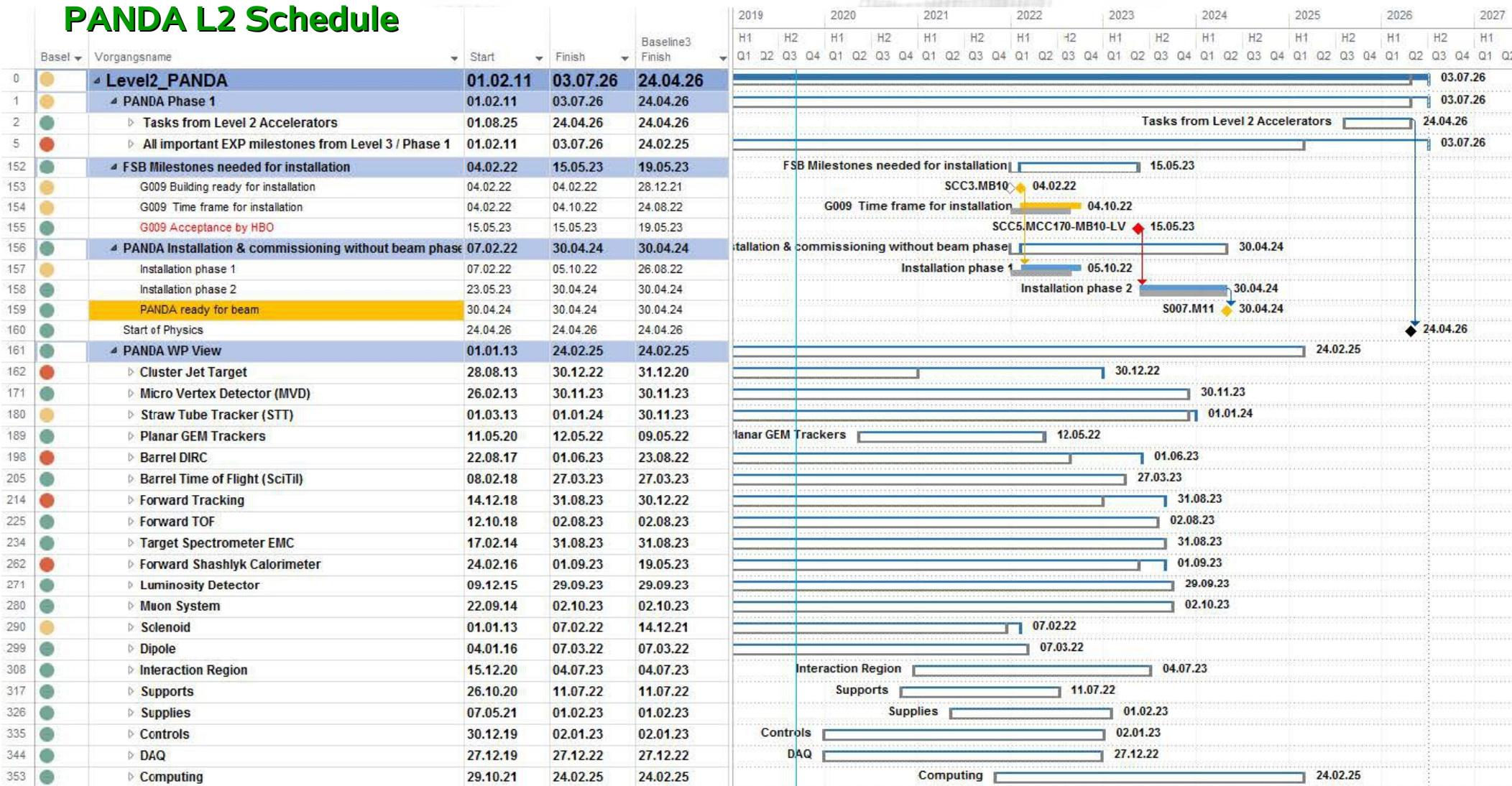
Today

Updates of Project Plans

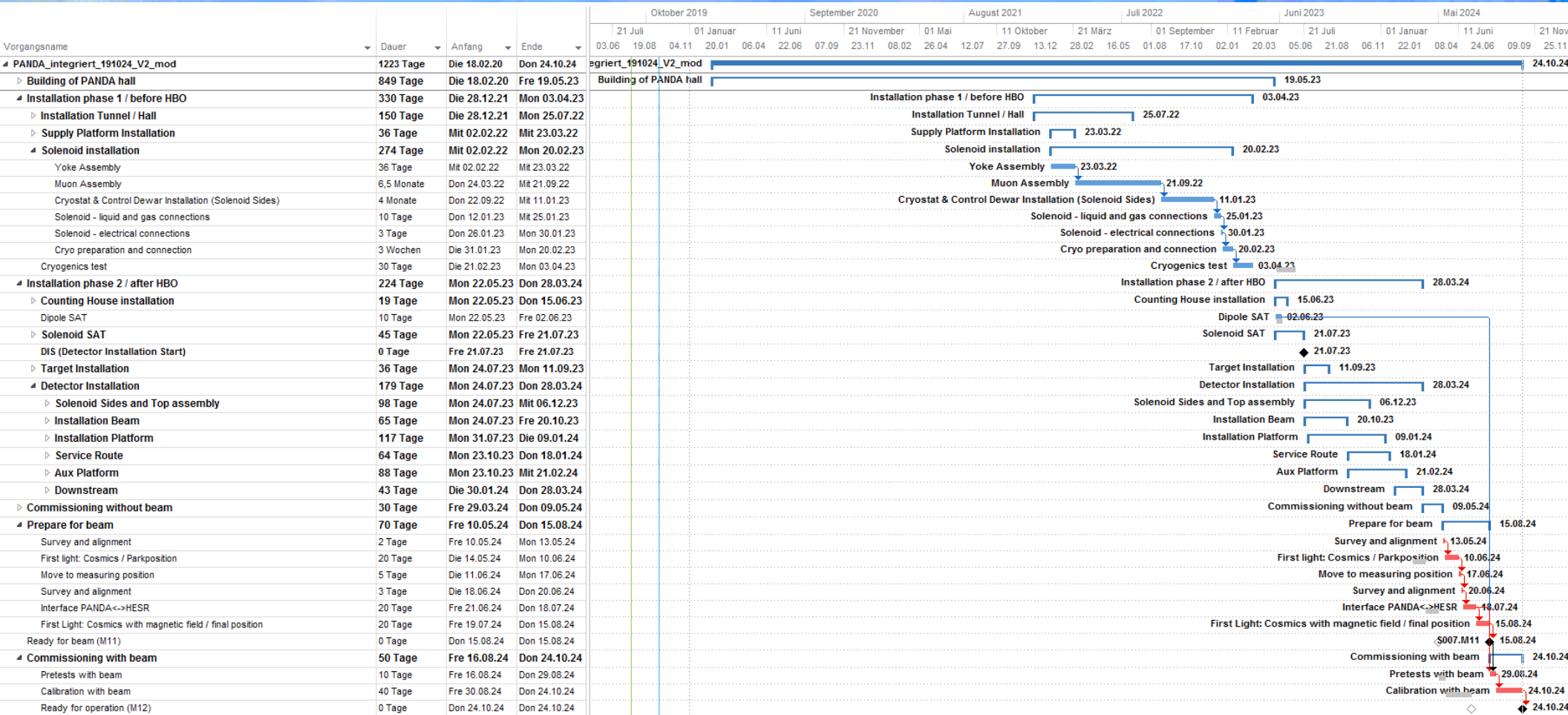


- Update of all FAIR project plans Dec 2018 - Re-baseline of all project plans
- PANDA update July 2019 – Milestones, Risks, Progress status, Scorecard

PANDA L2 Schedule

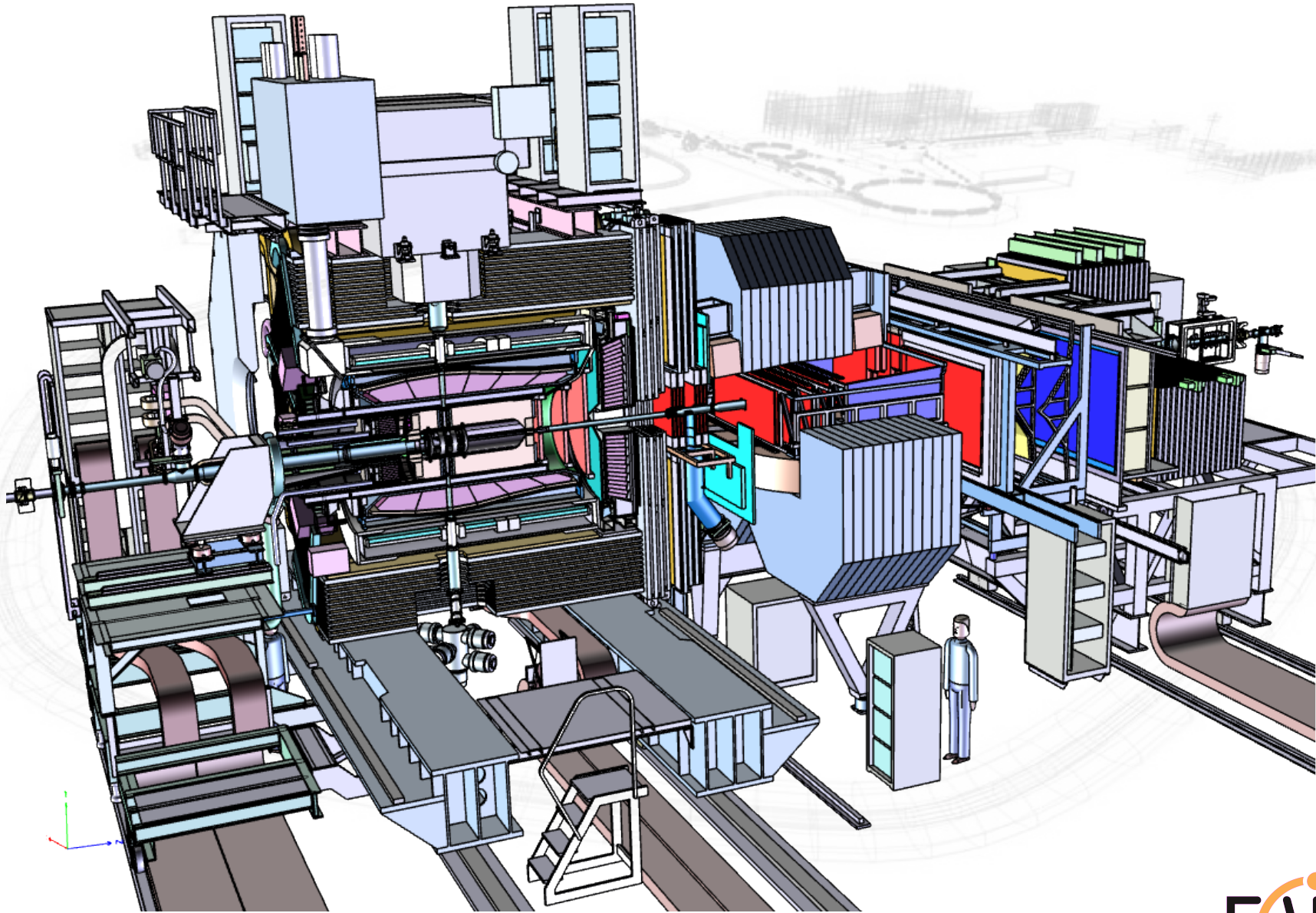


Installation Planning

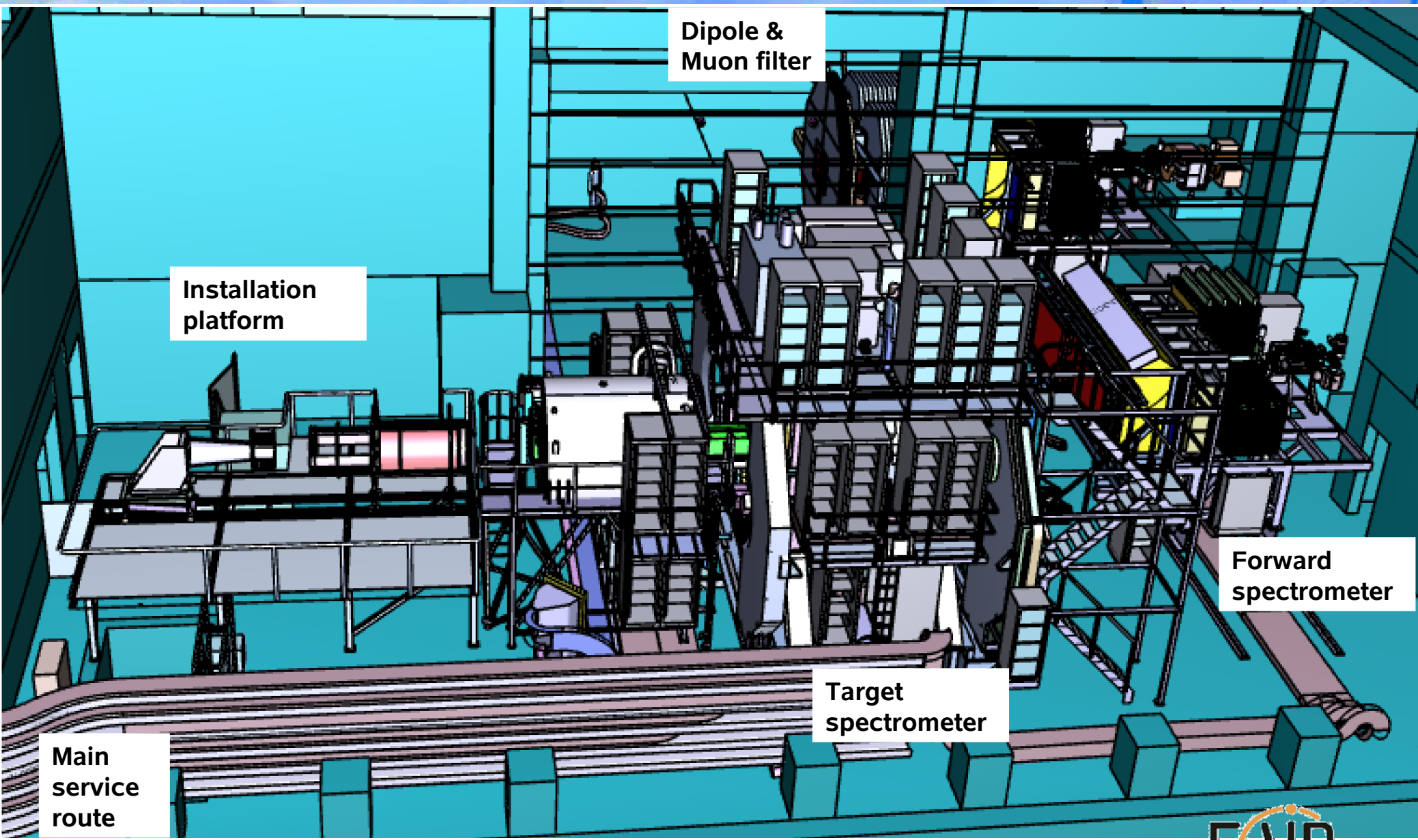


- Start of installation phase 1: Q1 2022, start of magnet installation
- Building take over (HBO): May 2023
- Start of detector installation: July 2023, after Solenoid SAT
- End of installation, start of commissioning w/o beam: Q2 2024

PANDA Installation



PANDA Hall Space



Dipole &
Muon filter

Installation
platform

Forward
spectrometer

Target
spectrometer

Main
service
route



Target Spectrometer Installation

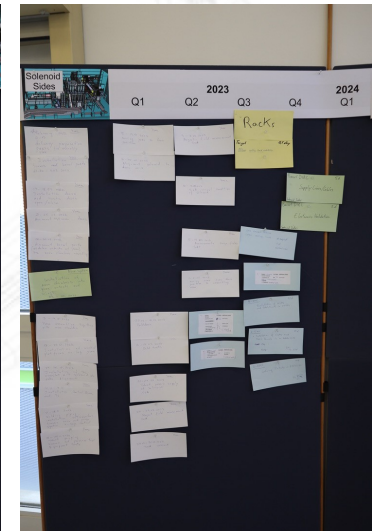
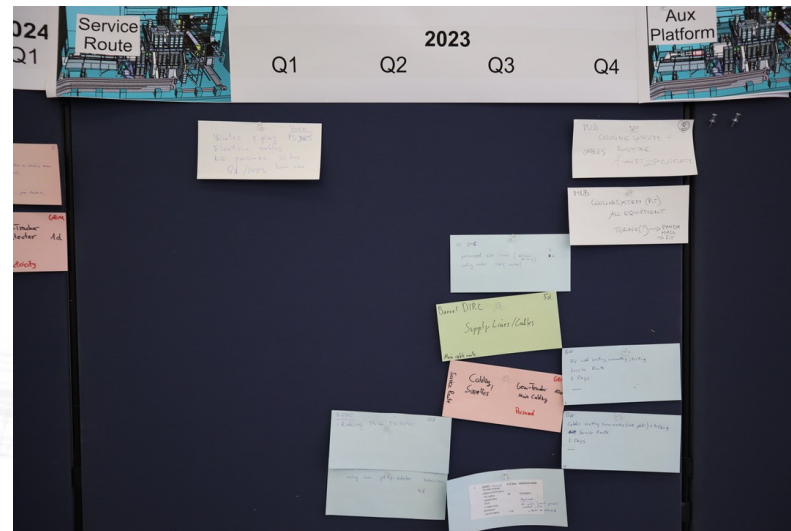
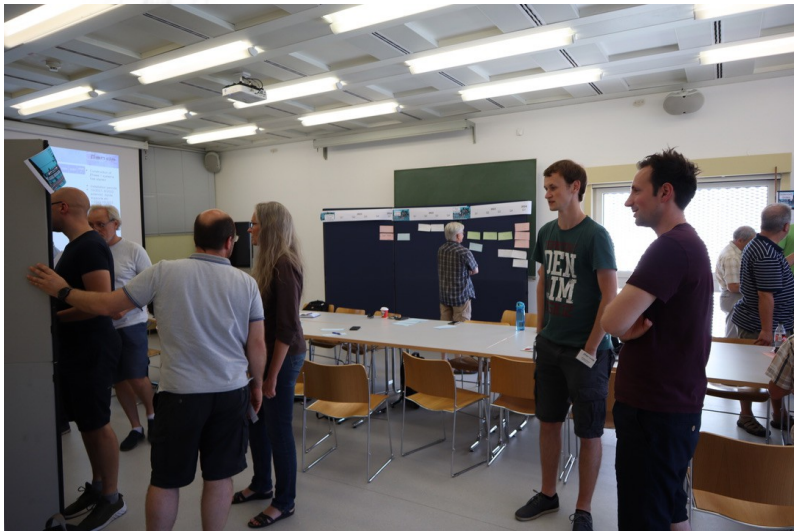


- 1) Rails for Solenoid, Solenoid installation
- 2) Muon detectors (partly interleaved in yoke assembly)
- 3) Installation platform, cable trays, racks and stairs
Infrastructure: cooling plants, supply racks
- 4) Solenoid SAT
- 5) Barrel EMC (partial/complete ?)
- 6) Support beam and Barrel DIRC/ToF
- 7) Central tracker and MVD with target cross
- 8) Cluster target
- 9) Backward Endcap EMC
- 10) GEM Tracker
- 11) Forward Endcap EMC

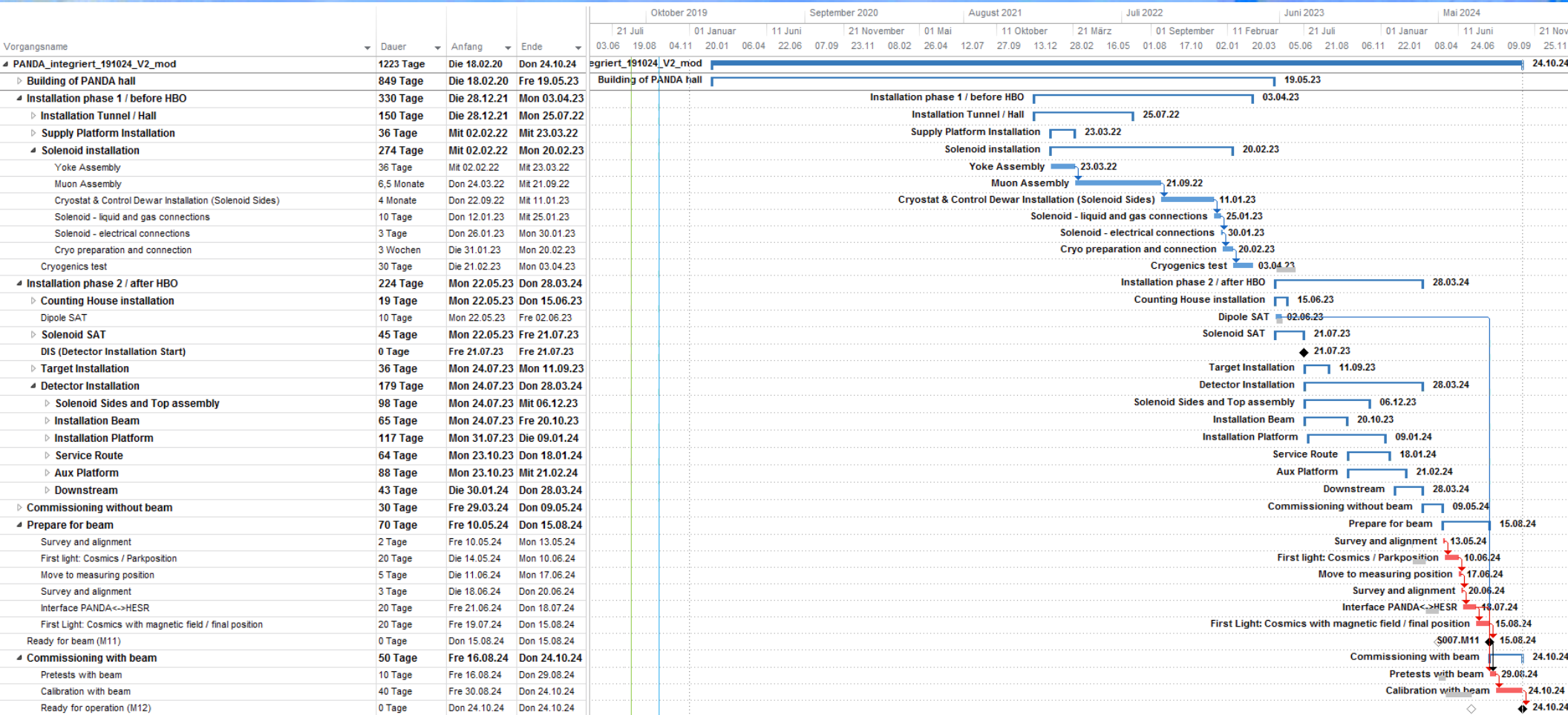
Interactive Workshop



- Installation of different systems in parallel:
→ Manage locations and resources
- Collection of individual procedures in previous workshop
- 3rd Workshop:
 - Pin boards designate different locations
 - Cards denote activities: task, requirements, duration
 - Colors denote different systems / groups of systems
- Discussion of needs, ordering, interferences

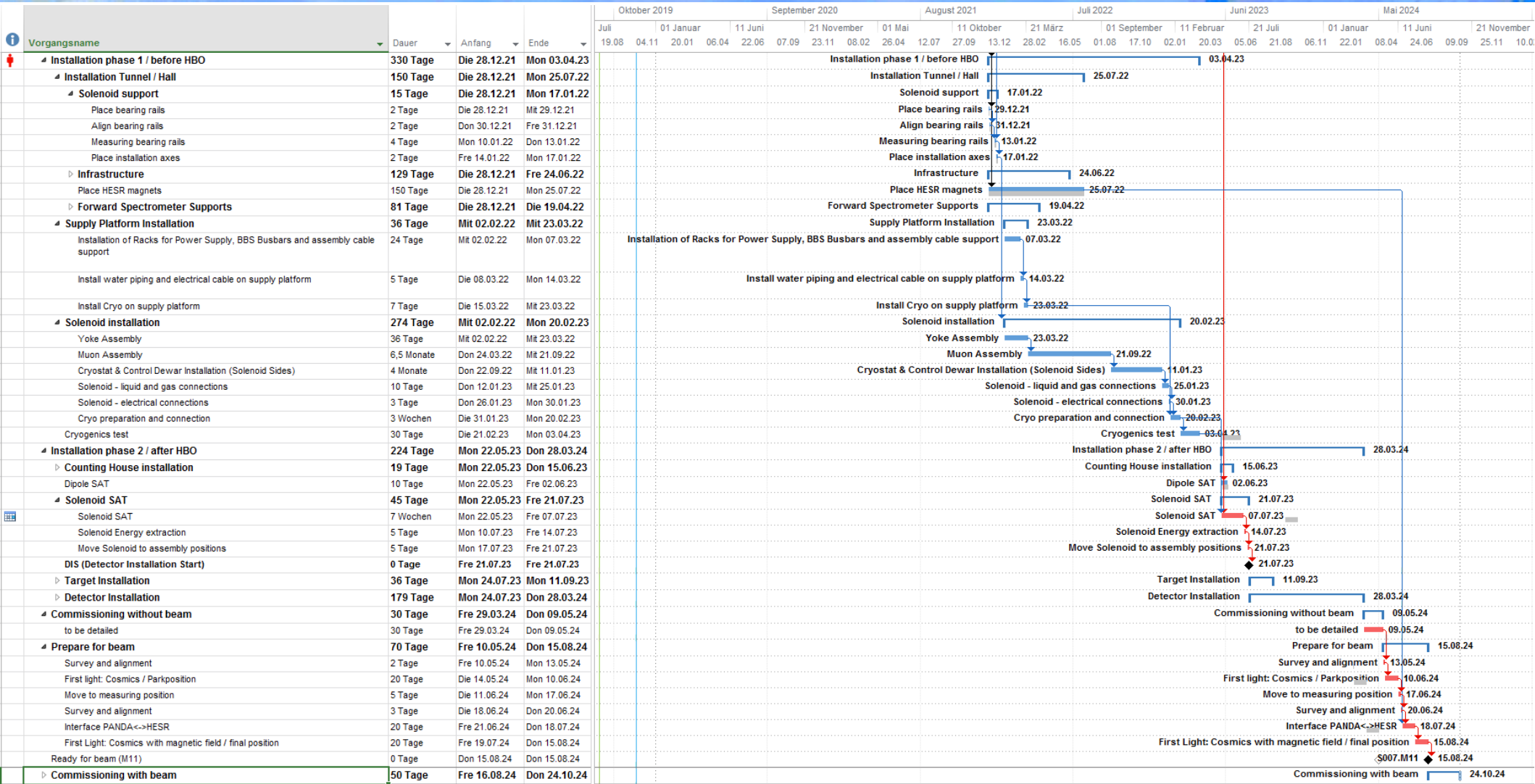


Installation Planning

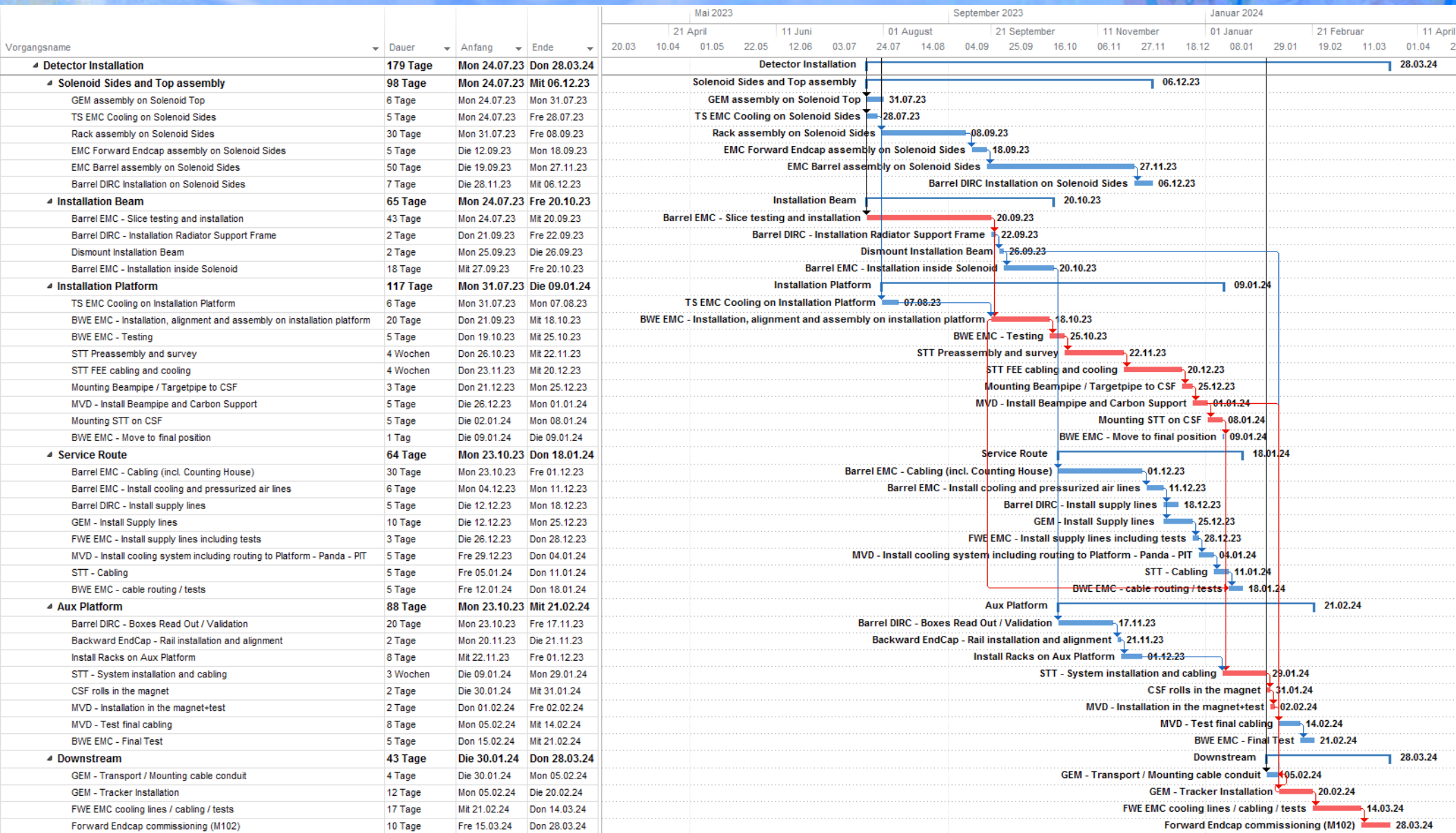


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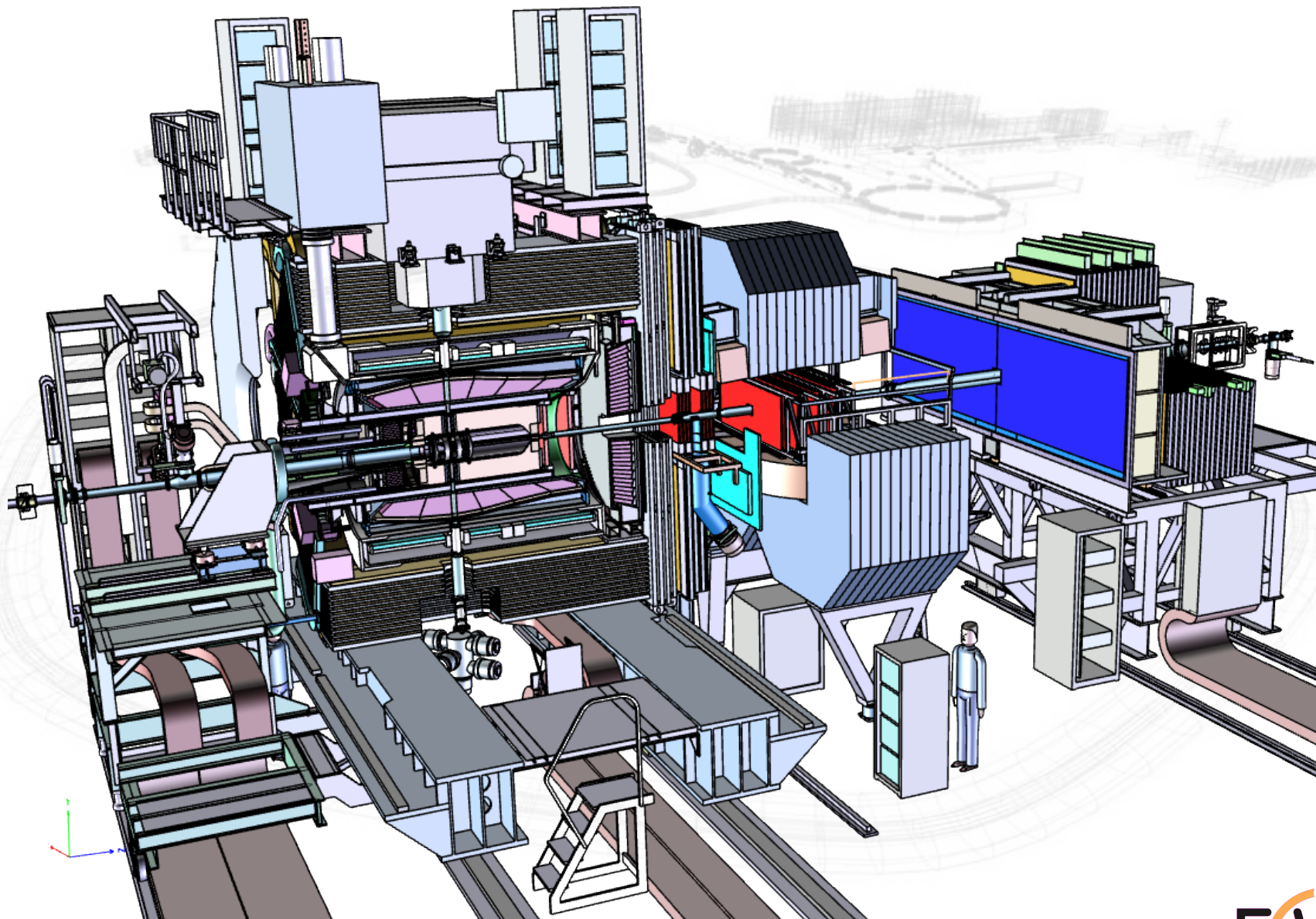
Solenoid Installation



Detector Installation



PANDA Systems



Solenoid Magnet

WPL E. Pyata, BINP

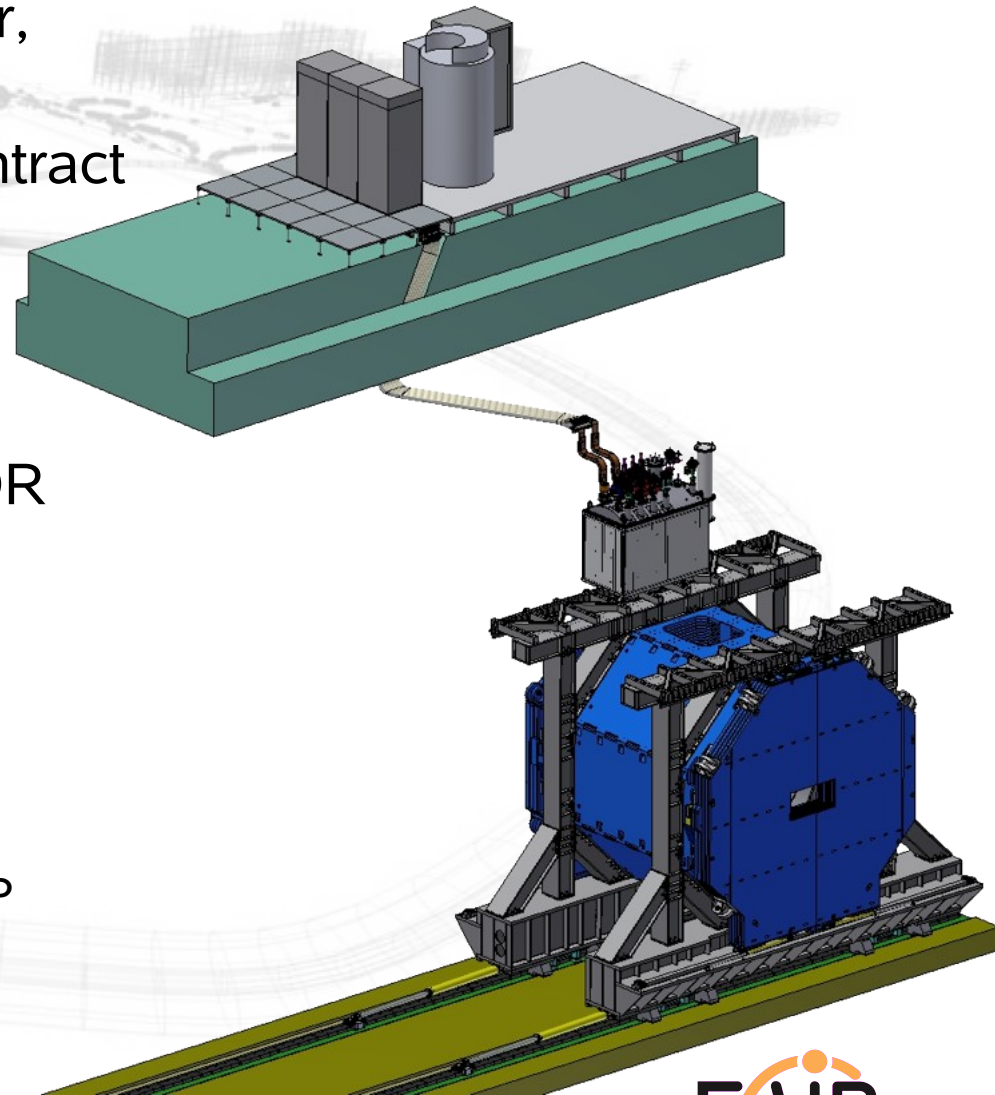


Project Status:

- New design with optimized conductor, sub-coils and outer winding (CERN)
- Scope: field mapping in separate contract
- Main contract signed in March 2017
- CERN team for technical follow-up
- All octants produced
- Cryostat, PS & Energy Extraction FDR

Critical Items:

- Superconductor procurement
- Schedule:
 - Installation at FAIR planned for Q1 2022
 - Field-mapping to be done before at BINP
 - Insertion of muon detectors



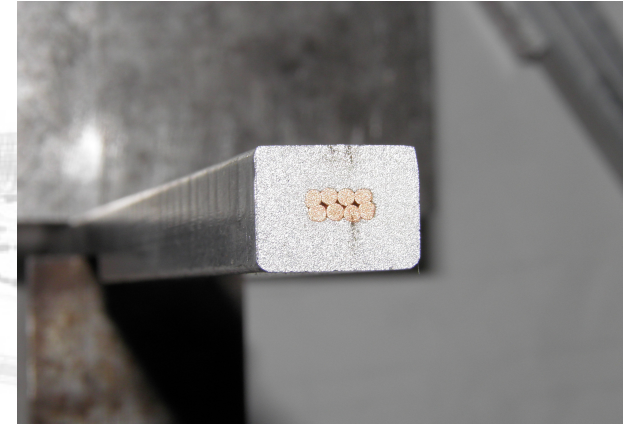
Solenoid Yoke Status



- All octants manufactured
- Door plates in preparation
- Components of platform ready
- Yoke test assembly in preparation:
 - adjustment shims for octants
 - flat area for assemble to be prepared
- Completion in Q1 2020

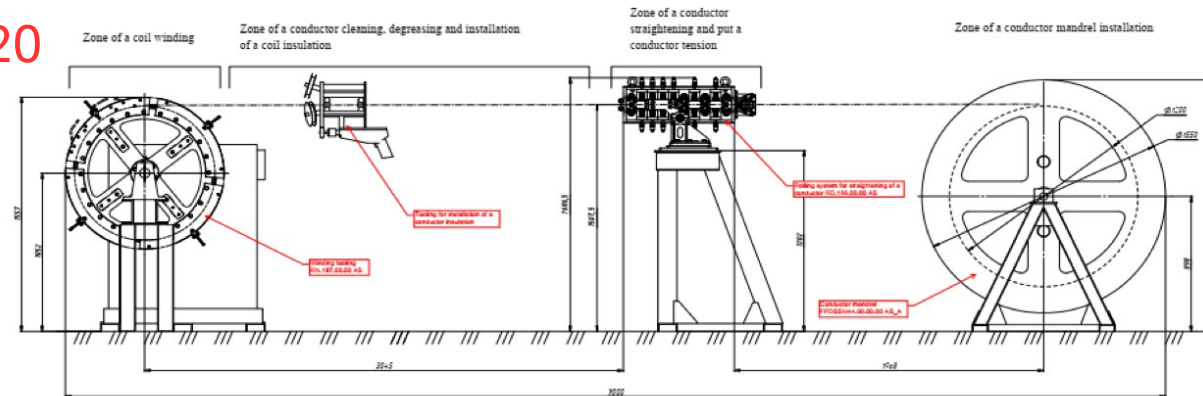
Superconductor:

- Furukawa currently cannot deliver, but is interested to provide parts
- Russian joint venture in R&D phase, BINP & Russian Institutes
- Several prototype runs of extrusion
- Final pure Al / SC cable end 2020



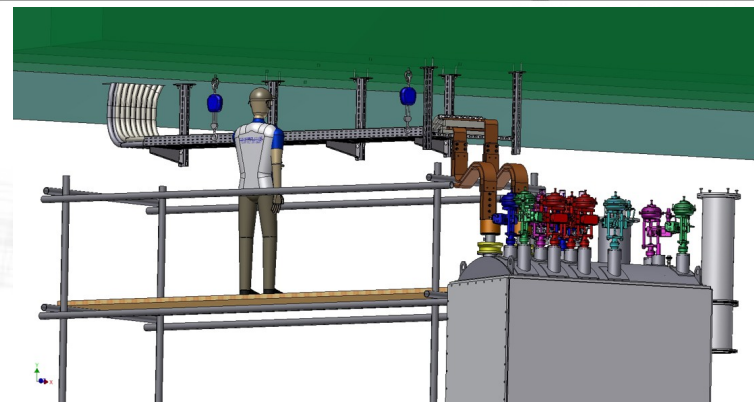
Cold mass and coil winding:

- Procedure defined
- Tooling in production
- Next step: dummy coil
- Local cryogenics: 1st design review



Electrical systems:

- Procurement of material
- Planning of power cable layout



HESR-PANDA Dipole Magnet

WPL E. Antokhin, BINP

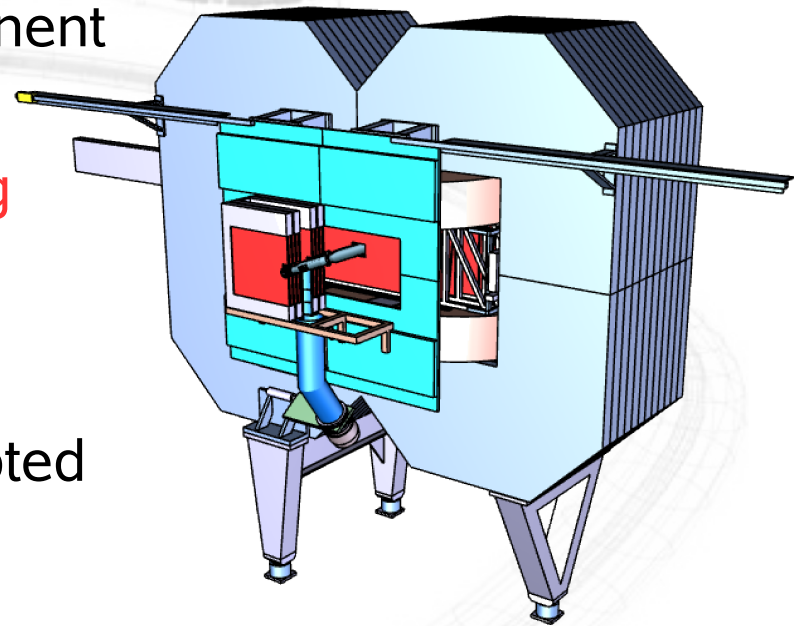


Project Status

- Magnet is part of HESR IOL, used also by SPARC and NUSTAR
- Dipole considered as HESR component
- EoI by BINP
- Design contract FAIR-BINP ongoing
- Production contract in 2020

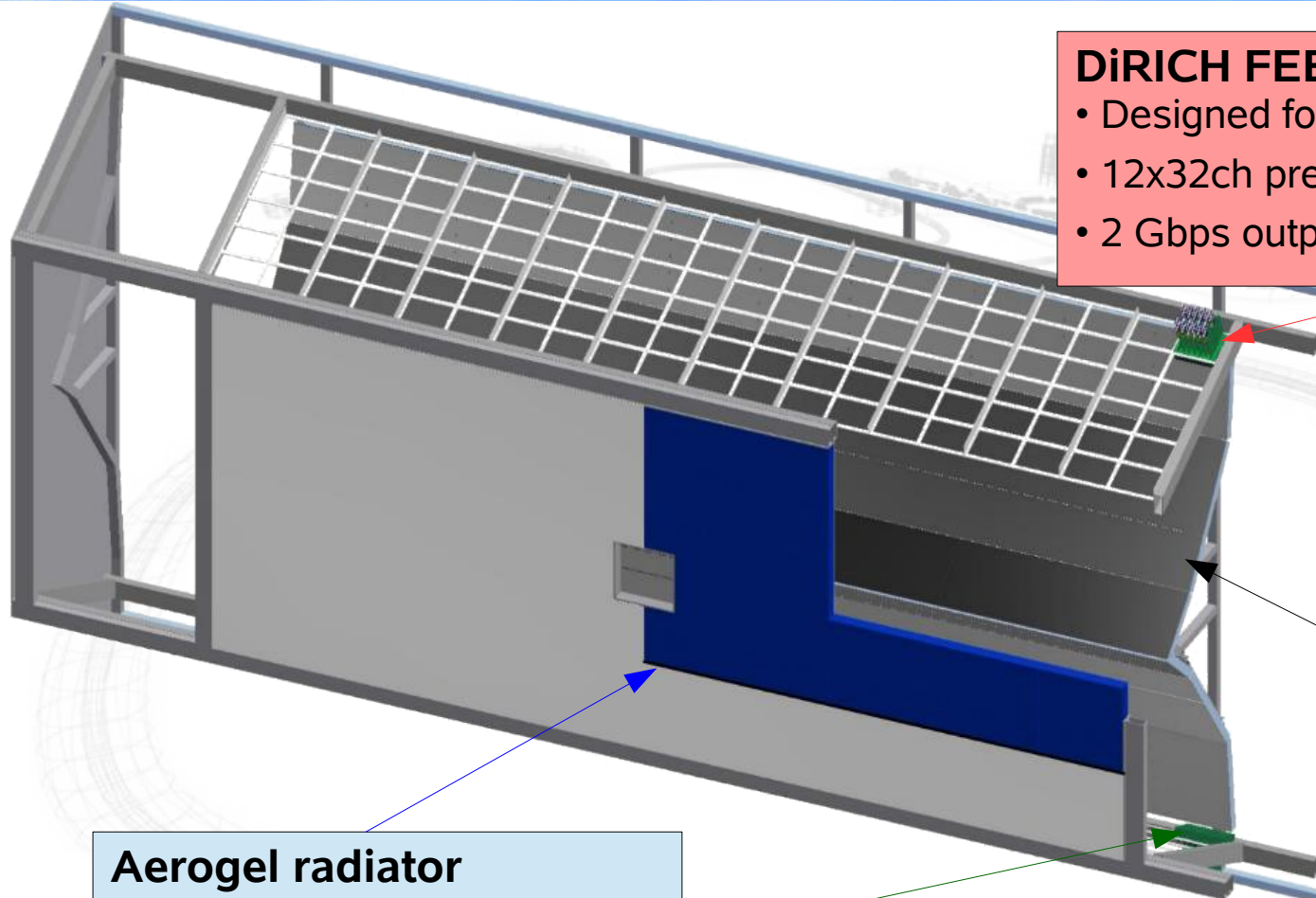
Technical Progress

- Specs for design circulated & accepted
- Design work started at BINP:
 - Design of yoke, coils, support structure
 - Dynamic field calculations
 - Seismic stress calculations
- Candidate companies for yoke



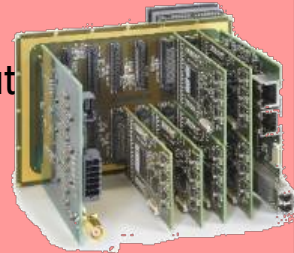
Forward Aerogel RICH

WPL S. Kononov, BINP



DiRICH FEE (GSI)

- Designed for H12700 readout
- 12x32ch preamp+disc+TDC
- 2 Gbps output link



Mirrors

- Flat segments
- 2 mm float glass
- Al+SiO₂ coating

Aerogel radiator

- Focusing 2-or 3-layer aerogel
- $n \approx 1.05$
- 3 x 1 m² area
- 40 mm thickness

Photon Detector

- H12700 MaPMTs(Hamamatsu), 1400 pcs
- flat panel
- 87% active/total area ratio
- 8x8 anode pixels of 6mm size

Forward Aerogel RICH

WPL S. Kononov, BINP



- PANDA Forward RICH design is described.
- Different mirror samples were studied. Tomsk mirrors are chosen.
- Preliminary measurement of the absolute QE for H12700 shown . To be studied in more detail and negotiated with the producer.
- Study of light forward scattering in aerogel: negligible for PANDA F-RICH
- Results of the test beam in 2019:
 - Single photon radius resolution agrees quite well with the calculation.
 - Discrepancy in the photoelectrons is observed (probably due to low DQE).
- TDR will be drafted in 2020, installation in 2026

Conclusion



Main achievements:

- Solenoid construction in full swing – test assembly delayed till January '20
- Dipole design work ongoing, construction contract in preparation
- Installation planning for TS completed

Upcoming milestones:

PANDA Solenoid:

- Yoke construction complete **spring 2020**
- Super-conductor production **to finish by end 2020**

HESR-PANDA Dipole:

- Intermediate report **by end 2019**
- Final report **draft March 2020**
- Contract **spring 2020**

PANDA Forward RICH:

- TDR **draft June 2020**

In summary: PANDA is on track at BINP