

A detailed wireframe model of a particle accelerator, showing a large circular ring and various smaller components and structures. The model is rendered in a light gray wireframe style, highlighting the complex geometry of the facility.

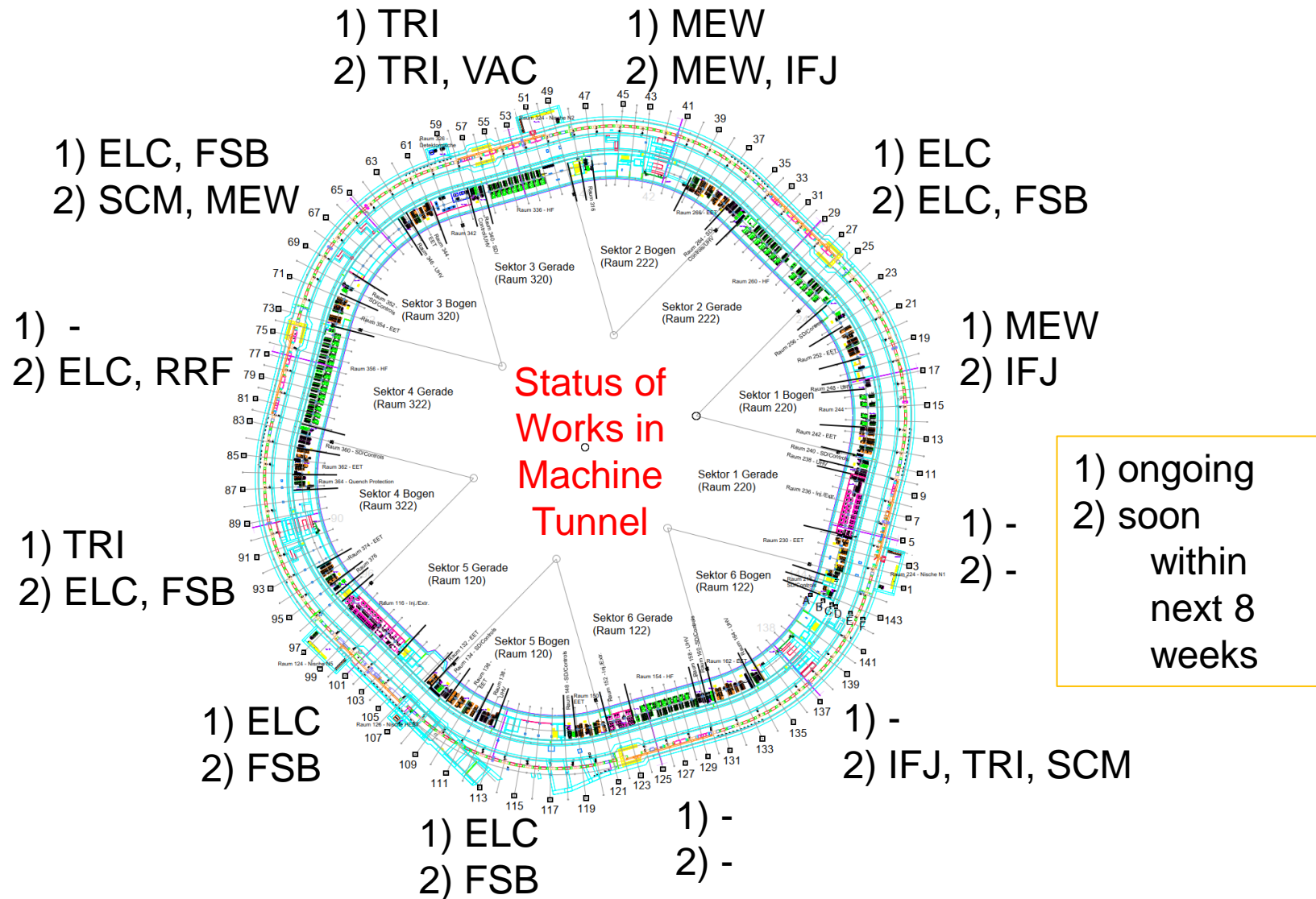
Lessons learned from practical and daily installation process

4th SIS100 Workshop Procurement and Installation

Jan Kollarczyk, for Machine Installation Team
24.09.2025

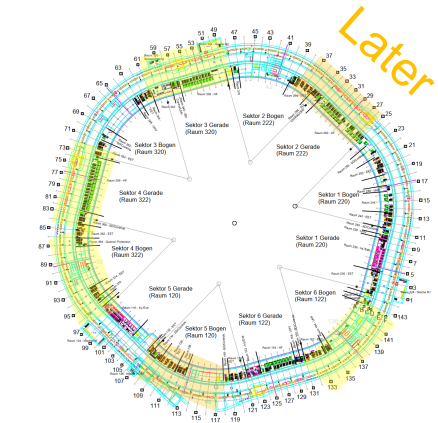
- Process of installation at FAIR [12 min]
 - On-site Machine Installation
 - Interaction with works on Technical Building Equipment (TBE)
 - Lean Construction Managent (LCM) for SIS100
 - Work registration, preparation and documentation
- Discussion [3 min]

On-site Machine Installation

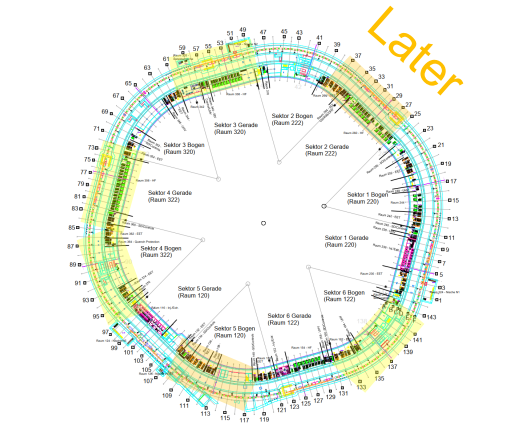


■ TRI

- Backbone team of machine installation
- Machine transport and positioning
- Preparation for other work packages
- Changing conditions and capacities
- LCM plan adjusted for 1 team

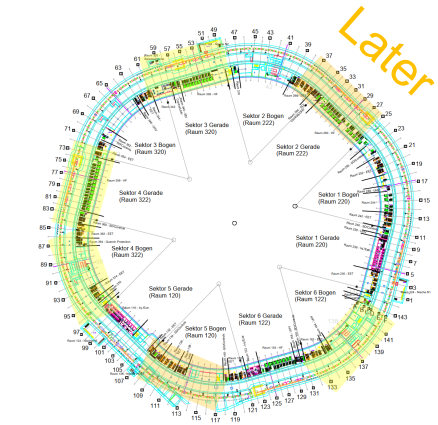
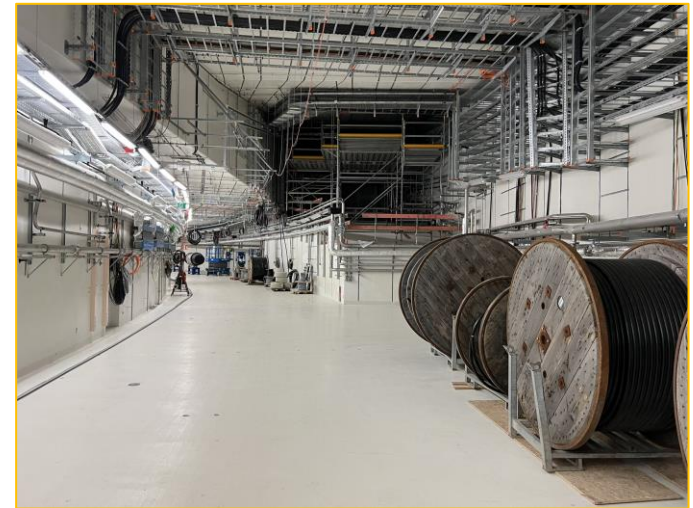
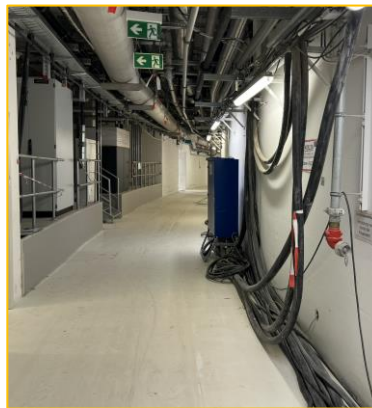


- TRI
 - examples of issues during assembly
 - Deliveries of material for assembly
 - Resonance Sextupole Assembly
 - Laser cooling beamline on the ceiling
 - Missing tool for bellow interconnections



On-site Machine Installation

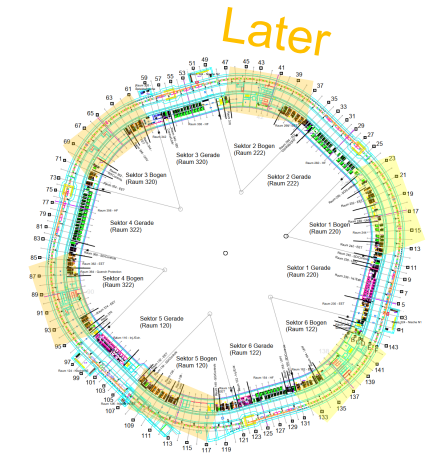
- TRI
 - Transport issues
 - Space in Machine & Supply tunnel
 - Magnet Modules under fire protection walls



On-site Machine Installation

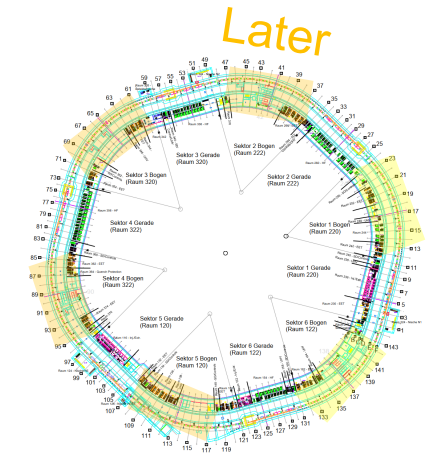
■ IFJ PAN

- Welcome back
- Scope of works defined
- Restart in October 2025



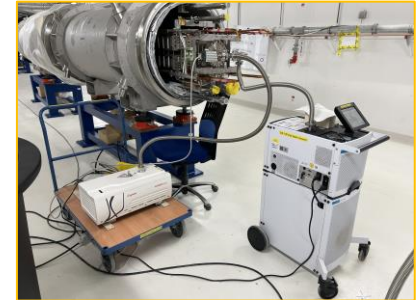
SIS100	Integration of cryo-magnetic system	Dipole-Dipole Magnets Interconnections	1.1	Cleaning of beamline for Dipol Magnets	108 DMs
			1.2	Replacement of vacuum chamber holders	
			1.3	Installation of telescopic elements	
			1.4	Beamline connections	120 DMs
			1.5	Leak checks of beamline	
			1.6	Soldering of bus bar joints	
			1.7	He Leak test process pipes	
			1.8	Installation of bus bar clamps	
			1.9	Installation of process pipes support structure	
			1.10	Thermal screens installations	
			1.11	Multi-Layer Insulation (MLI) wrapping	
			1.12	Opening and closing of telescopic bellows	
		Dipole-Quadrupole Magnets Interconnections	1.13	Installation of telescopic elements	64 QDMs + 2QDM (special)
			1.14	Beamline connections	
			1.15	Leak checks of beamline	
			1.16	Soldering of bus bar joints	
			1.17	He Leak test of process pipes	

- IFJ PAN
 - Coming activities:
 - String test
 - Dipole-Dipole Magnet Interconnections, arc 6
 - Leak test of process pipes, arc 1
 - input from VAC: work instructions



On-site Machine Installation

- VAC – vacuum acceptance tests, straight 3
- MEW – welding of interconnections, arc 2
- SCM – electrical tests, arc 6
- RRF – RF cavities, sector 4
- BEA – racks in niches
- NCM – Survey and Alignment
- EPS – power systems planning



- Dealing with contractors of GSI
 - Registration at FAIR
 - List of necessary documents
 - Installation concepts
 - Time schedules
- GE Vernova
 - Installation of SIS100 Power Converters



- Basic features:
 - Work registration
 - safety measures and work coordination considerations
 - Regular communication
 - Reflection in LCM plan for Machine installation

- FSB
 - List of rest works for the whole building K0923A
 - List for single areas not existing
 - LCM FAIR: TBE activities

- Example of TBE Works:
 - Dismantling of temporary pipeline with fire-fighting medium
 - **Grouting of water entry points** (Leakage on ceiling)
 - **Cable trays** to the machines on the floor
 - Fireproof insulation of cable pipelines
 - Masonry works and door in arc 5
 - Room temperature sensors
 - Paintwork on the floor
 - **Fire protection walls**
 - **Cable installations**



- Machine installation & TBE works comprised
- Planing on daily level
- **Every activity** captured in LCM plan
- Coordination with all current installation participants
- Coordinated parallel works possible and necessary
- Team capacity considerations
- Prioritising, Flexibility

Work registration, preparation and documentation



- Installation Readiness
- Work Registration at SMG
- DGUV sheet:
 - according to German Social Accident Insurance
 - occupational health and safety
 - installation management
 - on-site supervision
 - work coordination authority
- Work & Test instructions, Work Binders
- EDMS Structure
- Following Quality Control Plan during installation

Registration for machine assembly work					
Complete the form and send it to SMG Maschinenmontage:		Mobile			
Dr. Janet Schmidt	Ja.Schmidt@gsi.de	(0)6159 71 3505	Head of Machine Assembly		
Marcel Kranz	marcel.kranz@fair-center.eu	(0)6159 71 3266	Representative (HEBT Machine Assembly)		
Jörg Bittner	joege.Bittner@fair-center.eu	(0)6159 71 3599	Representative (SFRS machine assembly)		
Jan Kollarczyk	jan.kollarczyk@fair-center.eu	(0)174 3281525	Representative (SIS100 machine assembly)		
Mike Draibach	m.draibach@gsi.de	(0)170 5948954	Representative (supply areas machine assembly)		
Created on: DD.MM.YYYY					
Created by: M. Mustermann					
Description of work to be carried out	The work to be carried out is included as a work step in a work folder: <input type="checkbox"/> yes <input type="checkbox"/> or no <input type="checkbox"/> (please tick) If yes: SAP order number XXX (please enter) If no: please submit an installation concept with this application.				
Is a risk assessment for carrying out the work available?	EDMS:3293883 covers the work to be carried out: <input type="checkbox"/> yes <input type="checkbox"/> or no <input type="checkbox"/> (please tick) Link: https://edms.cern.ch/document/3293883 If no, please submit a supplementary GBU with this application.				
DGUV Sheet	Please send the pre-filled DGUV sheet with your registration. The following must be completed (including signature): Title, installation management, on-site supervision, and coordination authority Everything else will be completed by SMG Coordination. Link to the template: https://edms.cern.ch/document/3328287				
Does the work involve any special hazards?	<input type="checkbox"/> Yes <input type="checkbox"/> or No <input type="checkbox"/> (please tick) The definition of special hazards can be found in EDMS: 3293907 (Def. Major hazards) Link: https://edms.cern.ch/document/3293907				
Period	Start: DD.MM.YY		End: DD.MM.YY		
Building / Room / Axes	Where should the work take place?				
Place of delivery (HAST)	Where will it be brought in?				
Delivery route	Path of the component/assembly from the warehouse to the functional location				
Entry to premises required	<input type="checkbox"/> Yes <input type="checkbox"/> or No <input type="checkbox"/> (please tick if yes, specify vehicle size)				
GSI department	Name of GSI specialist department (EPS, VAC, TRI, BEA, etc.)				
Responsible assembly representative (MV) / team leader	Sample name				
Employees	Name	First aid certificate Yes/No	Fire safety assistant certificate Yes/No	Other safety-related training	Mobile
	Employee			Training XX	
	Employee 2				
	Employee				
SMG actions	Date	Responsible	Completed / approved (signature)	Comments	
Approval / rejection EHS		EHS			
Approval / rejection DEKRA		DEKRA			
DGUV sheet complete		SMG installation coordination			
Registration of work in LCM		SMG installation coordination			
Registration for work in area management / JBL		SMG installation coordination			
Registration for use of delivery opening		SMG installation coordination			
Registration for entry permit		SMG installation coordination			
Approval to start work					
Approval SMG to MV / team leader / GSI department	SSPL machine installation or responsible SMG coordinator (see SMG coordination matrix)				
	Date and signature				

Work registration, preparation and documentation



- Installation Readiness
- Work Registration at SMG
- DGUV sheet:
 - according to German Social Accident Insurance
 - occupational health and safety
 - installation management
 - on-site supervision
 - work coordination authority
- Work & Test instructions, Work Binders
- EDMS Structure
- Following Quality Control Plan during instalaltion

VL_31211_FAIR Koordinationsaushang DGUV V1 - Rev. 1.4 - Sonderedition Maschinenmontage

FAIR Koordinationsaushang nach DGUV V1 sowie DGUV V38 für Arbeiten der Maschinenmontage auf dem FAIR Baustellengelände
 gem. §6 der DGUV Vorschrift 1 Grundsätze der Prävention sowie §3 der DGUV Vorschrift 38 Bauarbeiten als Sicherheitsmaßnahme des Bauherrn (vgl. 5.1.9ff Baustellenordnung)

betroffene LC-Abschnitte:

Beginn der Arbeiten:

_____ um _____ Uhr

Ende durch Entfernen des Koordinationsaushangs

Kurzbeschreibung der Arbeiten:

Beteiligte Verantwortliche der Arbeiten:

Vertreter des Bauherrn:	FAIR GmbH	Dr. Hagelskamp	+49 6159 71-2996
Bauleiter HBO:	Arge ion42	Dr. Leonhardt	+49 69-256262 331
SiGeKo gemäß §3 BaustellV:	Dekra GmbH	Christof Reiner	+49 69 42083-379
Leitung Maschinenmontage:	FAIR GmbH	Dr. Schmidt	+49 6159 71-3505

Verantwortliche FAIR Koordination Maschinenmontage:

Abteilung	Name	Unterschrift	Telefon

Verantwortlicher Montageleiter der Ausführung (DGUV V38 §3(1')):

Abteilung	Name	Unterschrift	Telefon

Verantwortlicher Montageleiter des Nachunternehmers (DGUV V38 §3(1)):

Firma	Name	Unterschrift	Telefon

Verantw. Aufsichtsführender (DGUV V38 §3(2)) der Arbeiten Vor-Ort:

Firma	Name	Unterschrift	Telefon

weisungsbefugter Koordinator (DGUV V1 §6(1)) (kann mit Aufsicht identisch sein)

Firma	Name	Unterschrift	Telefon

Vor-Ort Sicherheitsaufsicht (DGUV V38 §3(3)):

Firma	Name	Unterschrift	Telefon

nur bei gefährlichen Arbeiten notwendig.

Qualifikation: Eignung, Vollzeit Vor-Ort, keine weitere Tätigkeit, ausschließlich Sicherheitsaufsicht

vorhandene Gefahren für Dritte: O keine Gefahren aktiv ### oder Aktivierung durch Einkreisen ###

Sicherheits-Verbote für Dritte: O keine Verbote aktiv ### oder Aktivierung durch Einkreisen ###

Verhaltensanweisung für Dritte:

- 1.) Vor Aufnahme von Arbeiten Dritter in diesem Arbeitsbereich ist der benannte DGUV V1 Koordinator um Erlaubnis im Sinne der Sicherheitskoordination zu ersuchen.
- 2.) Bei Vorliegen von Gefahren ist die Kontaktaufnahme mit dem DGUV V1 Koordinator zur Gefahrenminimierung verpflichtend, bevor der Bereich betreten werden darf.
- 3.) Im Gefahr oder Ereignisfall ist die Notruftaste oder FAIR Notrufnummer: 0152 2105 2401 zu nehmen.

EDMS 3328287 v.1 status Released access Restricted
 VL_31211-SondereditionMaschine.pdf modified 2025-07-29 08:16

* bei Arbeiten ohne Nachunternehmer

- Following installation towards Mechanical Completion
 - Transformation of installation strategy into serial assembly
 - Keeping harmony between Machine installation & TBE
 - Centralised coordination of Machine installation
 - Communication of each intention on first place
 - Ideas for improvements welcome
 - Reflection of weak points



Thank you for your attention