

Status of the FAIR accelerators



Udo Weinrich

**GSI Helmholtzzentrum für
Schwerionenforschung,
Division Stored Beams**

Courtesy: to O.Kester for supply of information

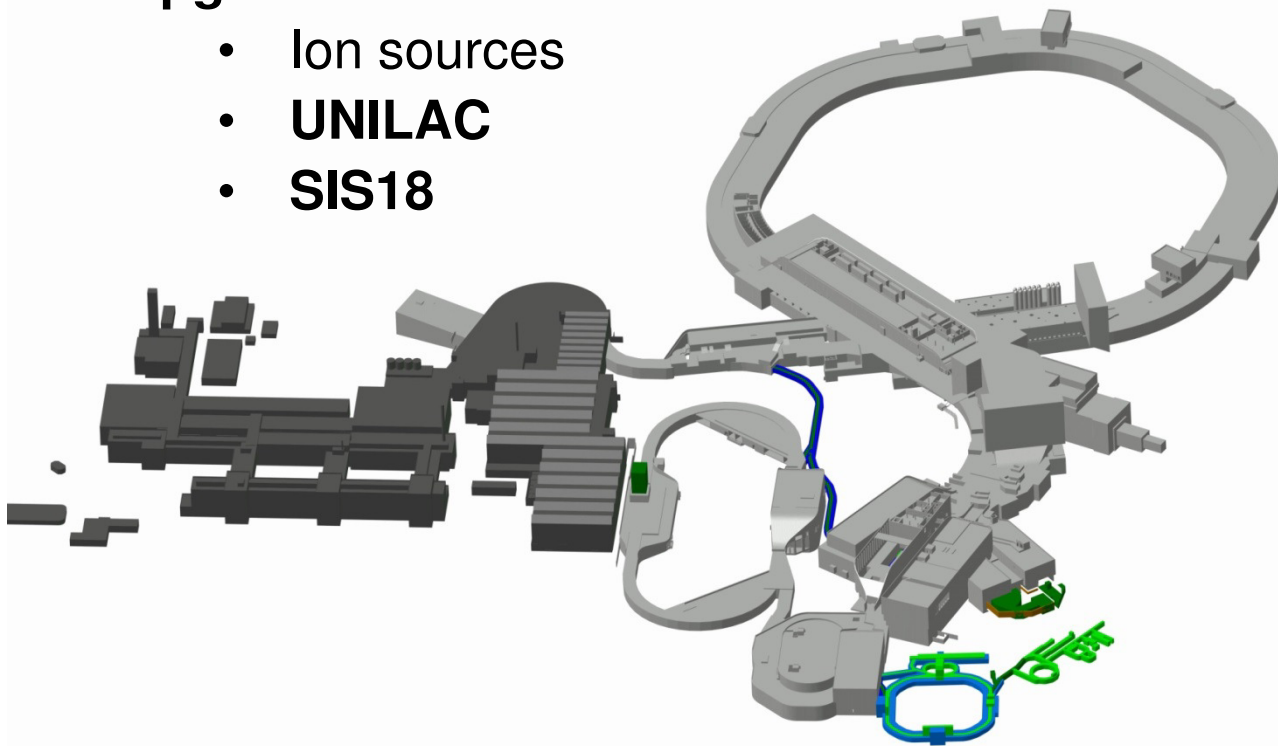
U. Weinrich, QM2014, 21.05.2014



Outline: Upgrade and Extension

Upgrade

- Ion sources
- **UNILAC**
- **SIS18**



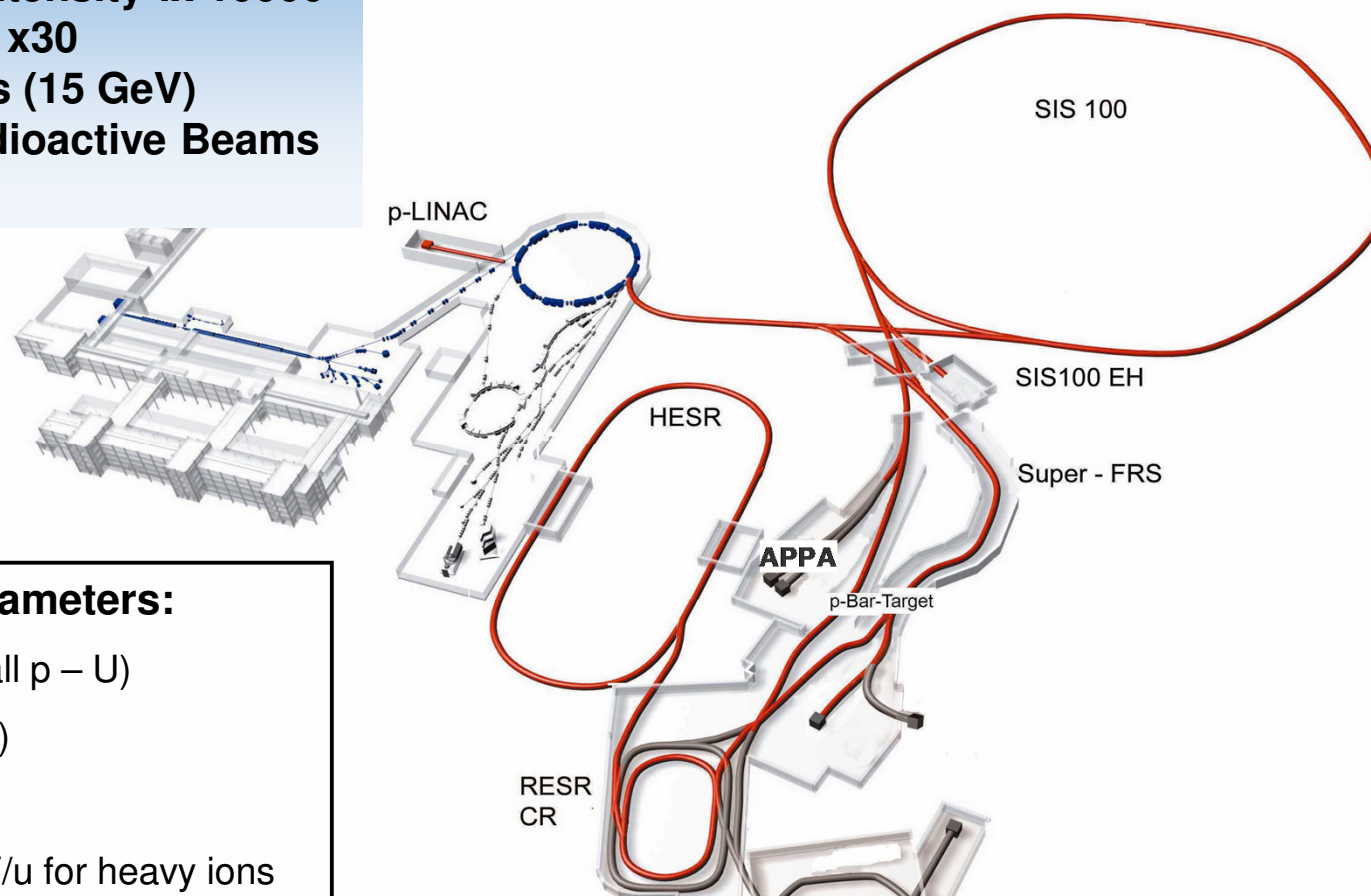
Extension

- P-LINAC
- **HEBT**
- **SIS100**
- Super-FRS
- pbar-separator
- **CR**
- HESR

Summary and Outlook

Extension of accelerator complex is challenging

- Primary Beam Intensity: x100–1000
- Secondary Beam Intensity :x 10000
- Heavy Ion Energy : x30
- Cooled pbar Beams (15 GeV)
- Intense Cooled Radioactive Beams
- Variable duty cycle



SIS100 ion beam parameters:

Ion species : U^{28+} -ions (all p – U)

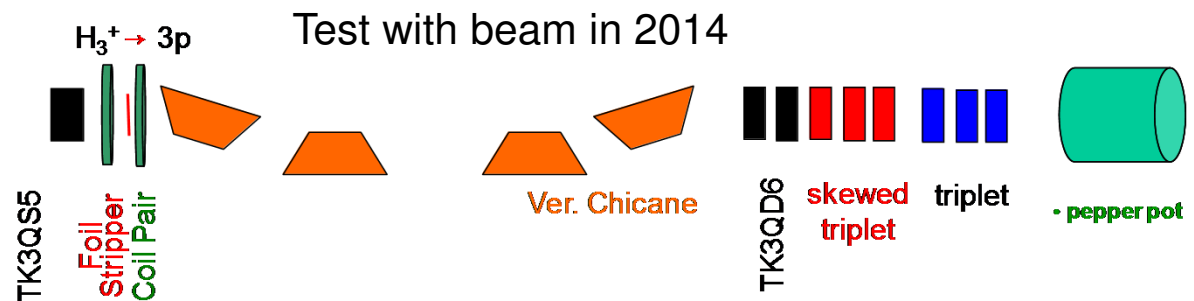
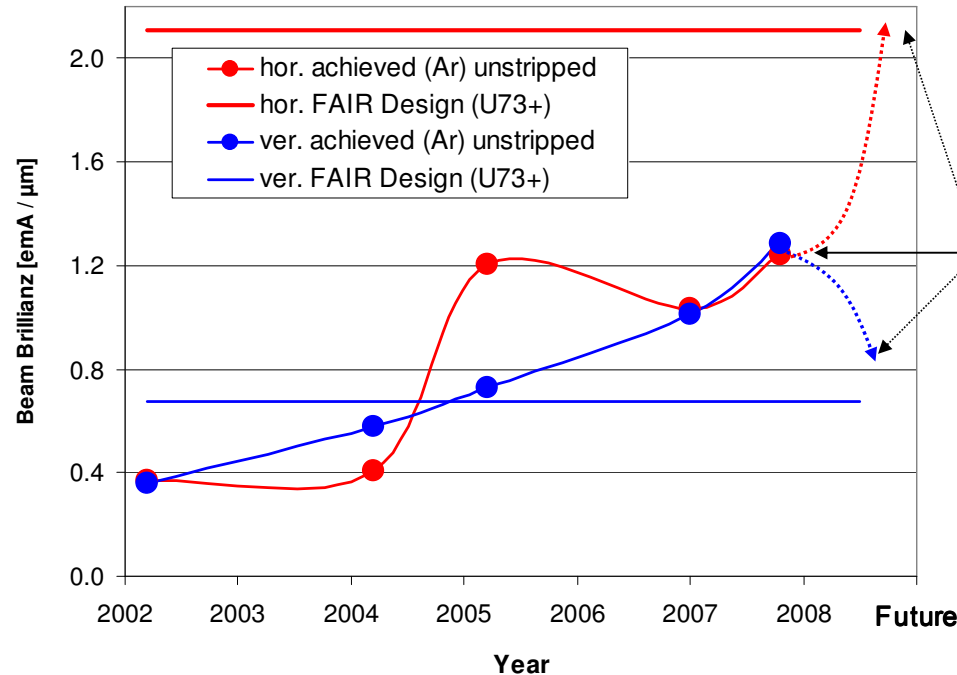
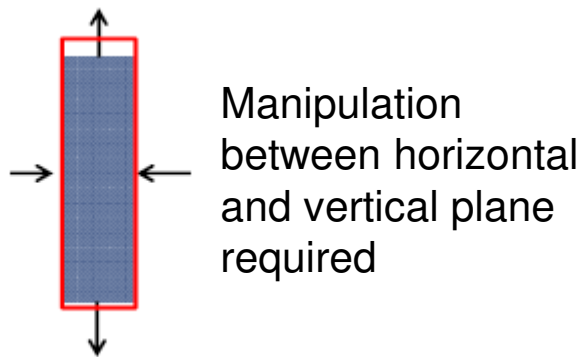
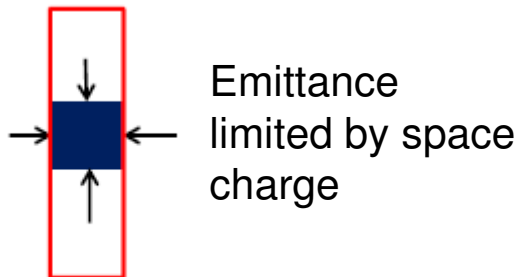
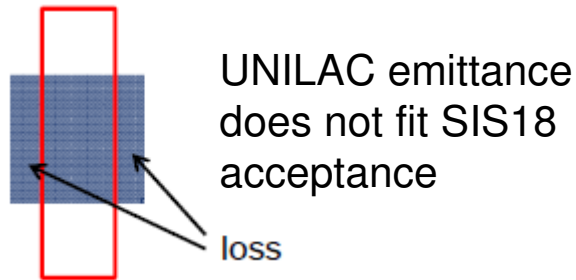
N: 5×10^{11} /cycle (uranium)

Rep. rate: 0.5 Hz

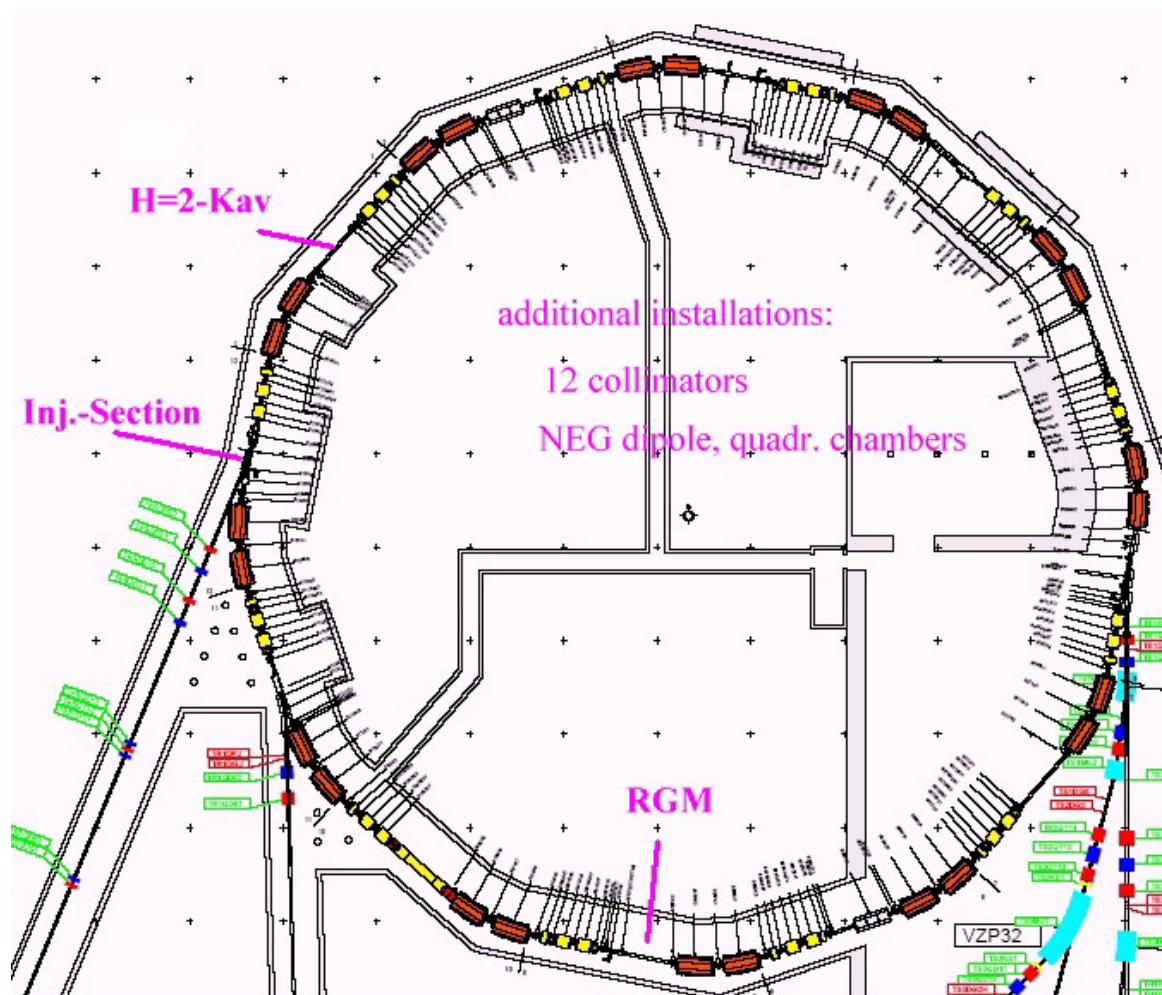
Energy : 400 – 2715 MeV/u for heavy ions

Pulse length : 30 – 90 ns

Matching LINAC/SIS18 will be optimised

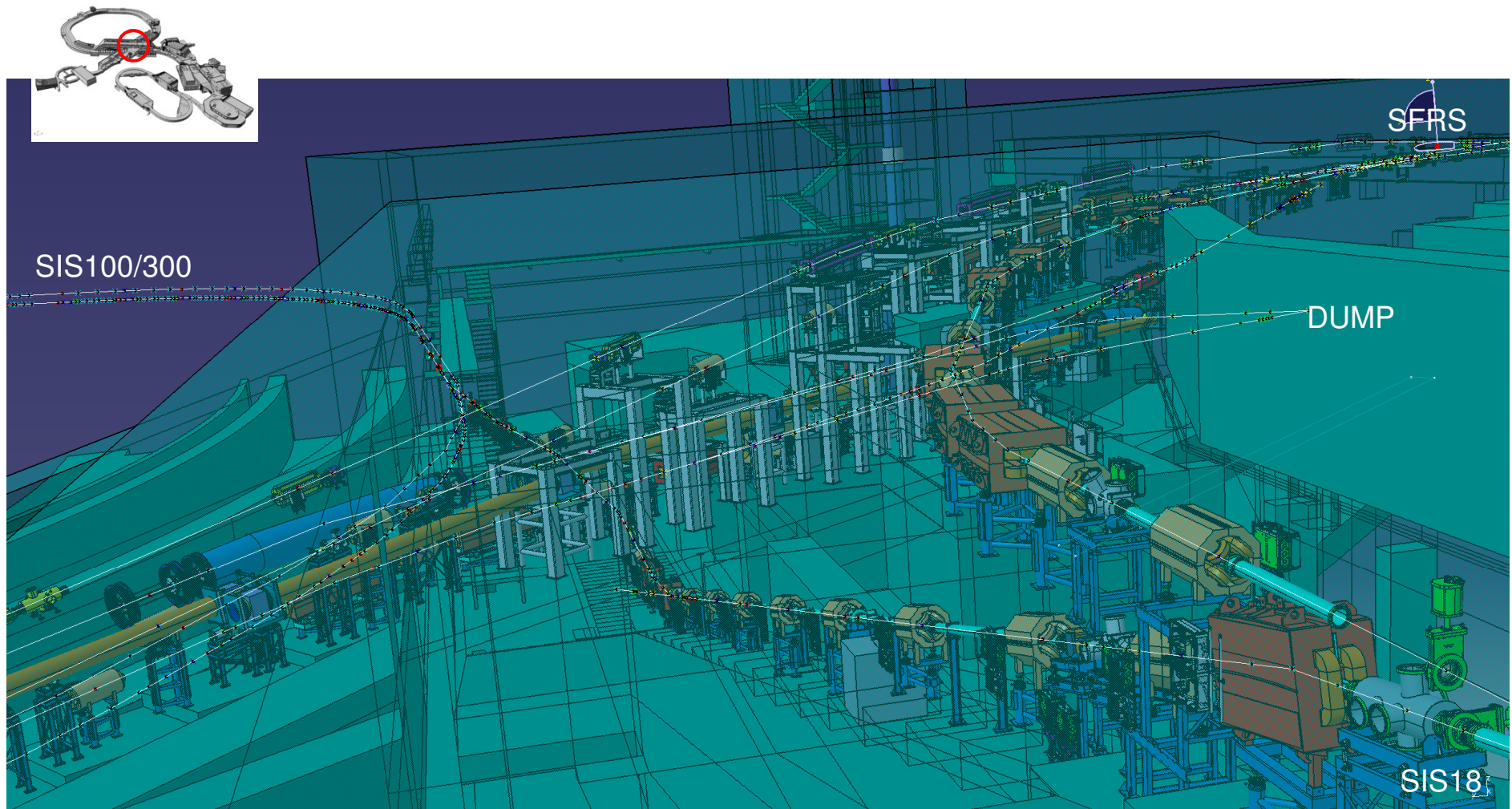


SIS18 ring performance increase ongoing

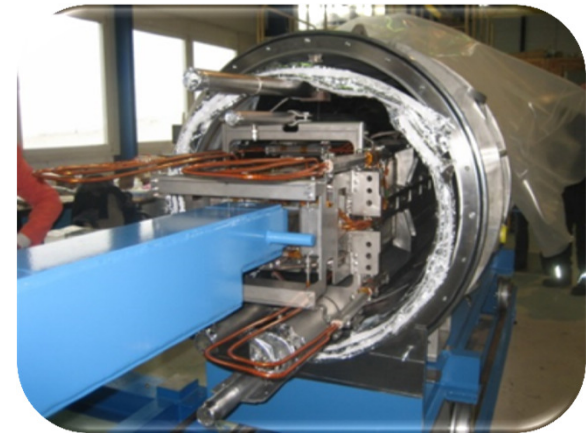


- upgrade of pulse power supply for faster ramping
- new NEG coated chambers for better vacuum
- new injection septum with improved loss tolerance
- new ion catcher system to avoid pressure bursts
- new residual gas monitor to enable non destructive profile measurements
- H=2 system to increase flexibility in longitudinal plane

Detailed Integration Planning for HEBT existing



First SIS100 dipole delivered and tested on site

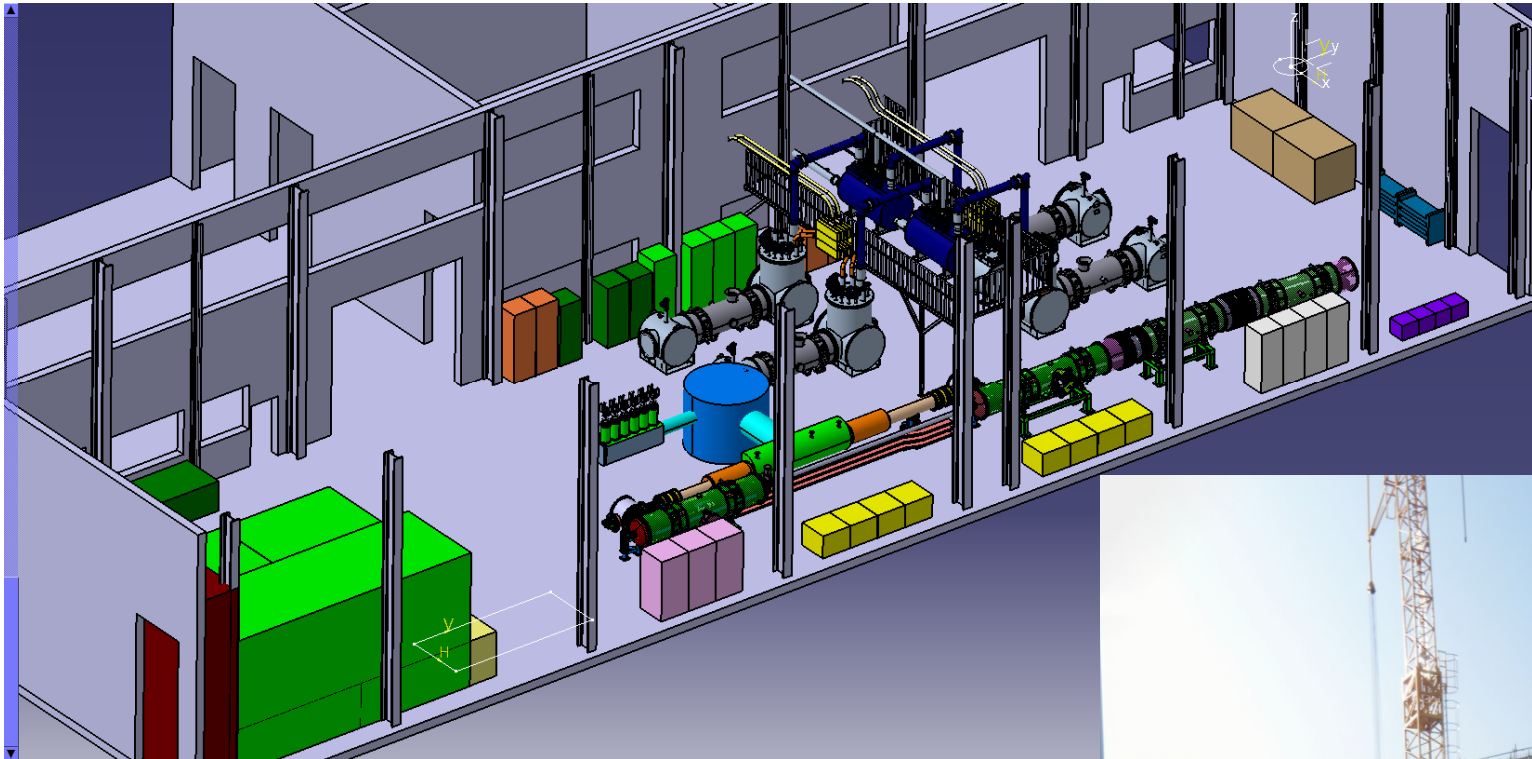


Assembly on dedicated rig:

1. Place thermal shield in cryostat
2. Pull magnet into cryostat and suspend on rods
3. Align with laser-tracker



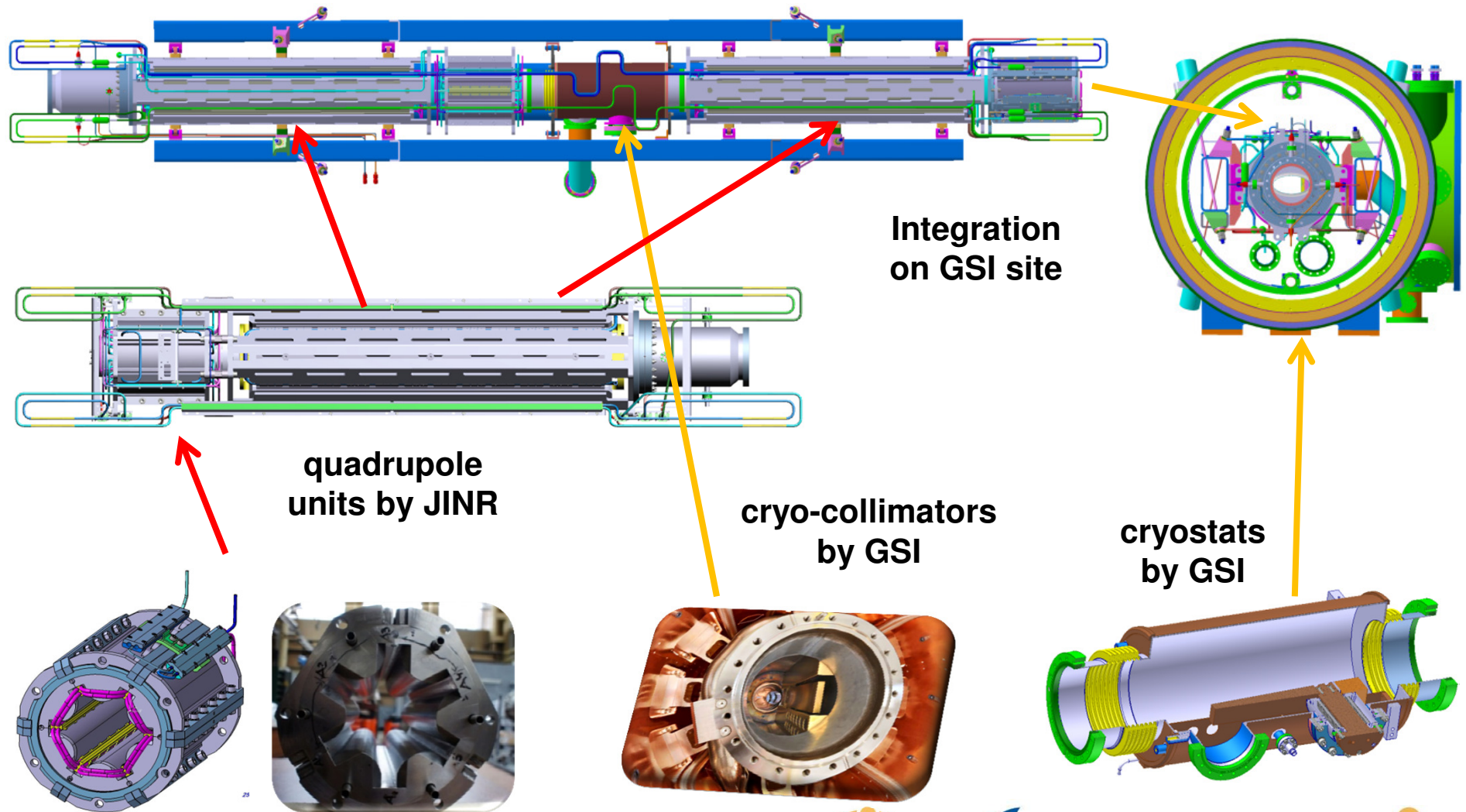
SIS100 Dipole Test Facility under construction



- ✓ 3 — 4 Test benches for SIS100 dipoles
- ✓ 1 Test Bench for String test
- ✓ Cryo and power supply in Annex building



SIS100 Quadrupoles shared with JINR, Dubna

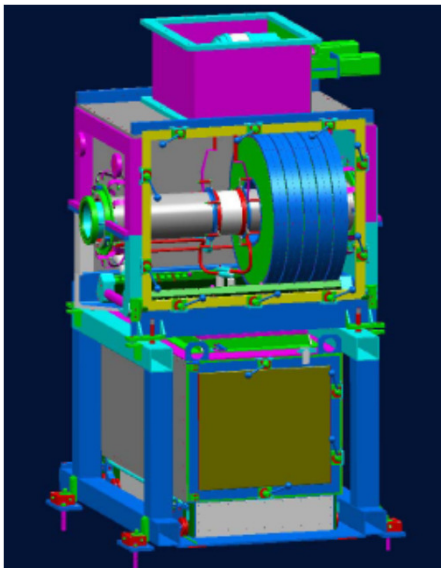


CR Debuncher System in production

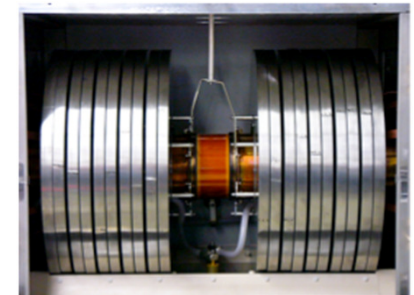
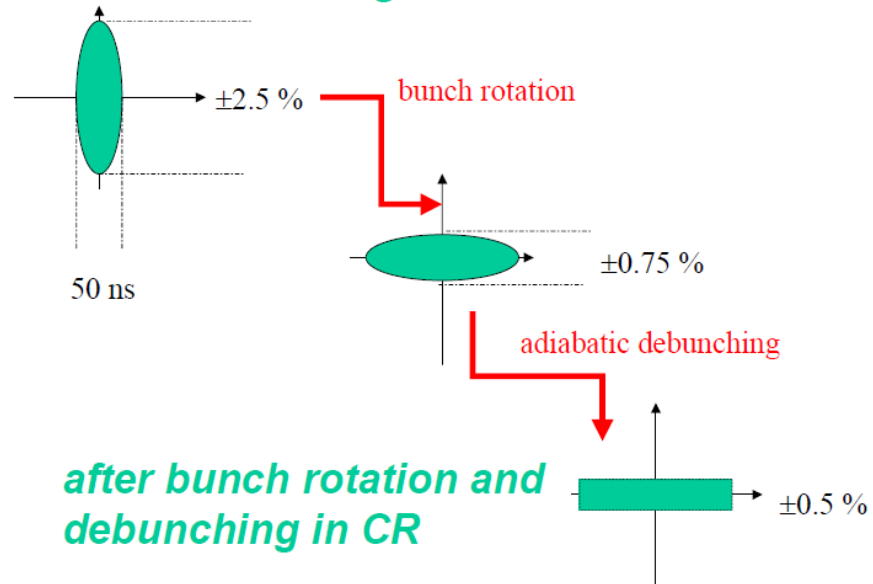
- SIS100 proton beam energy spread too large for direct stochastic cooling

=> Debunching of beam with a Debuncher System within 100 μs

5 units
Gap voltage 40 kV
Unit Length 1 m



SIS100 bunch after target



Summary and Outlook

- Upgrade of existing accelerators progressing well
 - Planning of work is detailed and well advanced
 - Long lead items are in production or close to it
 - Sharing of work between participating accelerator institutes and companies mostly defined
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- Accelerator logistics planning will be synchronised with updated after building logistics planning
 - Exploration of ESR/Cryring potential during commissioning and operation phase

FAIR Accelerator work is and will remain challenging, exiting and full of perspectives

