

## FAIR HEBT System - status report

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### Modifications in the HEBT System Layout

Based on a decision of the project lead FAIR@GSI and FAIR the direct connection from SIS18 to the Collector Ring (CR) via the last part of the Ring Branch of the Super-FRS was included into the planning of the modularized start version.

The concept for the positioning of safety beam plugs in the HEBT system was further worked out in coordination with the radiation protection department. For the beam plugs in four beam line sections detailed FLUKA studies were performed for accidental beam deposition to determine the expected radiation level in neighbouring areas and to optimize length and material of the beam plugs [1].

Pressure profile calculations of the vacuum system were started to determine number, type and location of pumps.

### Status of procurement

In July 2014 the CR-like HEBT magnets (2 dipole, 5 quadrupole magnets) were assigned by FAIR Council resolution to the Budker Institute (BINP, Novosibirsk, Russia) whereas the bulk of the HEBT magnets was already assigned in 2011/2012 to the Efremov Institute (NIIIEFA, St. Petersburg, Russia; batch1-3). All related vacuum chambers will be built by BINP. The production of the first pre-series dipole magnet (type dip1s\_0) of batch1 (51 dipole magnets and vacuum chambers) started in 2014, the coils are produced (see Fig. 1), the laminations punched and the magnet is expected to be finished in May 2015. The vacuum chamber is expected to be ready in June 2015. The preliminary design review for the second pre-series dipole magnet (type dip13\_0) was successfully concluded, currently the manufacturing drawings for the final design review are in preparation. The detailed specifications of batch 2 (17 dipole, 102 quadrupole, 80 steering magnets and vacuum chambers) were released in August

2014. The contracts are still under negotiation with NIIIEFA and BINP. The detailed specifications of batch3 (5 dipole, 71 quadrupole, 12 steering magnets and vacuum chambers) are supposed to be available in spring 2015.

In May 2014 a first contract between FAIR, the indian shareholder Bose Institute (Kolkata) and the provider ECIL (Electronics Corporation of India Limited) comprising 78 quadrupole power converters was signed. This contract covers all quadrupole power converters needed for the standard quadrupoles (quad2) in the 18 Tm and 13 Tm beam-lines of module 0-3. In the meanwhile the conceptual design review for two quadrupole power converter types was successfully concluded (Nov 2014, Jan 2015). With respect to a second contract the detailed specifications of the power converter types for the 18 Tm steering magnets and for further quadrupole magnets were recently given into the EDMS release process.

All technical documents for the HEBT beam diagnostic standard vacuum chambers were handed over to the indian shareholder Bose Institute in 2014. In the tendering process the indian partner was supported in the evaluation of possible providers by GSI experts from the vacuum and quality assurance department. A decision will be taken by an indian selection committee in the beginning of April 2015. A contract with the slovenian in-kind partner was signed in November 2014, comprising HEBT BPM pre-amplifiers, Data Acquisition (for BPM, Beam-Loss Monitor System and Beam Current Transformer) and Pressurized Air Drives and Control. Furthermore several beam instrumentation developments for applications in the FAIR HEBT system were conducted successfully in 2014 as for example a new system for scintillating screen based diagnostics [2].

### Building planning

The review of the 5<sup>th</sup> preliminary building shell plan of G0704A and G0702A took place. However 3D collision checks could be done only with the 3D model of the buildings whereas the 3D model of the technical building equipment was not available. Additionally the 4<sup>th</sup> preliminary building shell plan of H0705A was checked informally.

### References

- [1] S. Damjanovic et al., "FLUKA Simulations of the FAIR HEBT System: Optimization of the Safety Beam Plugs (Difusors)", GSI Scient. Report 2014
- [2] B. Walasek-Höhne et al., "CUPID: New System for Scintillating Screens based Diagnostics", GSI Scient. Report 2014



Figure 1: Set of coils for pre-series dipole magnet dip1s\_0

