FAIR HEBT System - Status Report

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Modifications in the HEBT System Layout

There were no changes in the ion optical layout since its last official transfer to the building planners in October 2012. However, currently a direct connection from SIS18 to the Collector Ring (CR) is considered without modifying the requirements for the building planning. For this the section TSN1 is modified in a way that the beam coming from SIS18 can be either injected straight into the end part of the Super-FRS ring branch (which is connected to the CR via the sections TFC1 and TCR1) or guided directly to the NESR as before (to avoid a collision with the Super-FRS cryo-supply this branch has to be lifted in this region by about 50cm-100cm compared to its original layout). Whereas the connection to the NESR is part of module 6 the currently discussed new connection to the CR via the Super-FRS would become part of module 0-3.
To fulfill the requirements for the beam halo at the CBM/HADES target, a halo collimation system has to be integrated in the compact beam line from SIS100 to the CBM cave. In a first step suitable positions from ion optical point of view with sufficient available installation space were determined in the sections T1C1 and T1C2. In the next step simulations taking into account the generation of secondary particles in the collimators will be performed.
The concept for the positions of safety beam plugs in the HEBT system was revised in coordination with the radiation protection department. Appropriate interlock magnets were identified and first simulations of the expected radiation level in building H0719A (main supply building north) were performed for beam deposition in the safety beam plug D20 located in section T1X2 in K0923A.
The concept to use the SIS100 machine setup beam dump in the HEBT system in K0619A for emergency dumping of light ions and protons from SIS100 was discarded. The new concept is described in [1].

Technical System Design

A first contract on the production of 51 dipole magnets including supports and vacuum chambers (batch 1) was closed between FAIR and Efremov Institute (St. Petersburg, Russia) in Aug 2013 and between FAIR and Budker Institute (Novosibirsk, Russia) in Jan 2013. The detailed specifications of batch 2 (17 dipole, 102 quadrupole, 80 steering magnets) were brought into the EDMS release process in Jan 2014. The detailed specifications of batch 3 (5 dipole, 71 quadrupole, 12 steering magnets) are currently under preparation and supposed to be available in spring 2014. The delivery of two pre-series magnets of batch 1 and their vacuum chambers is expected for the end of 2014. However, the production order for the series will follow the current partitioning HEBT A/B/C (defined by the project lead FAIR@GSI) which does not directly correspond to batch 1-3. Nevertheless, changes of the production order, e.g. due to changes in prioritization by the project lead or in civil construction, are possible.
In Oct 2013 the detailed specifications for 7 HEBT quadrupole power converter types were released. Currently a first contract between FAIR, the indian shareholder BOSE institute (Kolkata) and the provider ECIL (Electronics Corporation of India Limited) is under preparation. This contract will contain all quadrupole power converters needed for the 18Tm beamlines of module 0-3.
The major part of the detailed specifications required for the day zero beam diagnostics for the HEBT system was released (7/14) or is currently under approval (4/14). The indian shareholder BOSE institute started the tendering process of the HEBT beam diagnostics vacuum chambers in Jan 2014.
Major efforts were taken to deliver further required information for the building planning. E.g. 3D models of the SIS100 machine setup dump in K0619A, of the draft of the support structure including service platforms in building H0705A, of the course of Halfen rails for mounting HEBT300 at the tunnel ceiling as well as of free installation space for cable trays in G0702A were prepared. The HEBT supply areas in L0516A had to be rearranged significantly to provide mandatory escape routes, space for ascending traces and a smoke extraction shaft. Furthermore the review of the building plans of the 2. Vorabzug Rohbau took place, followed by 3D collisions checks (building with Hüllkontur) and coordination processes for cable routing.
A first draft concept for a transportation unit for assembly and disassembly on the injection and extraction ramp was worked out in an advanced design project between ENMI and the department of computer integrated design of the TU Darmstadt.
Furthermore much work was invested in project planning at the beginning of 2013. Twenty project plans including ressources (personnel, budget) and three different timelines for HEBT A/B/C were established by the WPLs as well as three major milestone plans for HEBT A/B/C by the MPL.

References

[1] C. Omet, “SIS100: Emergency dumping of protons and ions”, presentation at 10th MAC, November 2013