# S-EBIT at HITRAP: Status report

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The Super-EBIT (S-EBIT) [1] plays an important role for accomplishing the mission of Helmholtz Institute Jena (HI-Jena) towards Facility for Antiproton and Ion Research (FAIR). It considerably expands the opportunities for developing new technologies and procedures for novel experiments with highly charged ions (HCI). In the S-EBIT program of HI-Jena the emphasis is put on X-ray spectroscopy and the interaction of intense laser radiation with HCI, including the respective diagnostics. The project will open up further points of contact, e.g. in the fields of X-ray wavelength standards, astrophysics, and material sciences. The S-EBIT will contribute substantially to the research program at GSI/FAIR as well as to the required R&D activities such as the development of x-ray spectrometers, calorimeter detectors, x-ray optics, and traps for the interaction of intense laser light with highly charged ions. Moreover, the S-EBIT program of Helmholtz Institute Jena is of substantial importance for bridging the gap of the transition time for heavy ion experiments between GSI and FAIR. In particular, as an operating source of highly charged ions during the shutdown period of the GSI accelerator, the S-EBIT will facilitate research and development works indispensable for SPARC experiments at FAIR. Within this decade the new laboratory building at the HI-Jena is expected to be available. This will allow moving the S-EBIT installation from GSI to the HI-Jena where it can be coupled to the available unique laser infrastructure where intense laser pulses with high repetition rate are provided (JETI200, POLARIS). Still, S-EBIT will serve also as an R&D facility for FAIR both in combinations with the intense laser pulses but also as a standalone device.

Currently, the S-EBIT is being installed at the experiment platform of the HITRAP facility [2] at GSI and it will be used not only as a standalone device but also as an ion source for highly charged heavy ions. At the experiment platform, various experimental setups have already been installed and are available for operation such as traps for QED experiments, surface experiments, gas target stations, and recoil ion spectrometers. The HITRAP decelerator is currently getting commissioned and is not yet operational [2] and in particular also first experiments with highly-charged ions in intense laser fields can be anticipated (PHELIX) at the HITRAP location [3].

A brand new transportable frame for the S-EBIT has been manufactured which will allow one to move the source towards experimental installations in order to be able to combine with the already available and planned experiments [2]. Preparations of the new superconducting magnet (4T) have been finalized and it is now being tested for the performance in the new S-EBIT environment. In a superconducting Helmholtz coils configuration of the S-EBIT a special attention has to be paid to efficient cooling of the magnet as it has to perform with the currents of higher than 60 A. In order optimize that the new shielding and cooling parts have being manufactured which are currently undergoing their first cryogenic tests. Also, brand new drift tubes to fit the new 4T-superconducting magnet have been manufactured, which along with the optimized S-EBIT chamber feedthru system will allow a reliable fast ramping of the drift tubes potentials at up to +40 kV. In combination with the -220kV on the e-gun/collector terminal the electron beam energy of 260 keV can potentially be reached. In addition, the work on integrating the S-EBIT control system into the GSI/HITRAP infrastructure is on going.

## References

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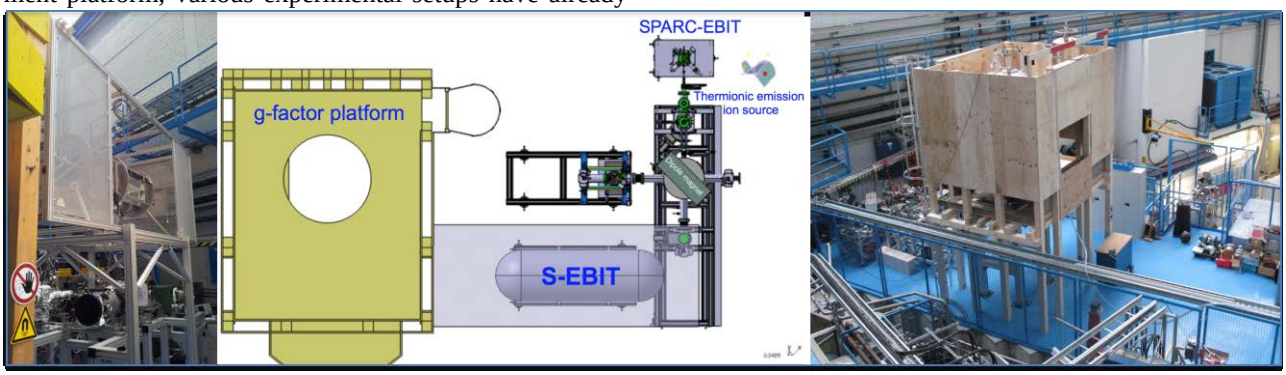


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