The status of the CRYRING@ESR project*

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The low energy storage ring LSR [1] shall provide highly charged ions and antiprotons at low energy for two collaborations at FAIR, SPARC and FLAIR. Those collaborations intend to perform precision experiments pursuing atomic and nuclear physics questions. The LSR is a Swedish in-kind contribution to the FAIR facility in Darmstadt.

The LSR is the swedisch low energy storage ring CRYRING modernized and adapted to the additional needs for injection and ejection of antiprotons and highly charged ions at about 10 MeV/nucleon. CRYRING has been operated at the Manne Siegbahn Laboratory in Stockholm until 2010, was dismantled in 2012 and transported to GSI in the first months of 2013. At GSI it will be installed behind the ESR, as proposed and described in detail in 2012 by a swedish-german working group [2]. This proposal has been accepted end of 2012 by the relevant committees.

CRYRING can decelerate, cool and store heavy, highly charged ions and anti protons injected at about 10 MeV/nucleon down to a few 100 keV/nucleon. It provides a high performance electron cooler and a straight section for flexible experiment installations as for instance a gas jet target. It is equipped with it's own injector and ion source, to allow for standalone commissioning. The magnets are conceived for fast ramping, such that the whole deceleration (acceleration) can be as short as 150 ms.

After dismantling the ring in Stockholm under the supervision and with the help of the Transport and Installations department of GSI the components where transported to Darmstadt in spring 2013.

The concerned specialist departments of GSI for power converters, radio frequency supplies, magnets, survey and alignment, control system as well as beam diagnostics and electron cooling, scheduled the required work for getting the ring back into operation. This includes extended tests as well as modifications to meet the GSI and FAIR standards.

A detailed survey has been completed to prepare for the precise alignment of all components in the refurbished cave. The positions of the components have been marked on the floor to prepare for installation. Dipoles, quadrupoles and sextupoles, have been equipped with measurement points for the foreseen laser tracking alignment and the position of those references have been transferred to the beam axis for each devices.

Beam diagnostic devices like the in-ring transformer and the ionization profile monitors have been tested. The ionization profile monitor was installed under vacuum at the HITRAP experiment setup and tested with alpha particles from a local source.

Engineering models in 3D of the ring and the two injection lines, from the ESR and the local ion source, are basically completed. The cable planning is ongoing as well as the installation of the required infrastructure like lighting, cooling water and miscellaneous supplies.

Much time, effort and resources went into the preparation of the cave that should house CRYRING@ESR. The former experimental installation, FOPI, has been removed with the help of the FOPI collaboration and the cave has been reconstructed. Fig. 1 shows the recently completed cave. On the roof of the cave an area for power converters has been prepared and four containers for more fragile electronic equipment were installed.

Figure 1: The completed cave for the installation of CRYRING@ESR. The light spots on the floor indicate the position of the bending dipoles and straight sections. The future beam path is marked with the blue line.

For the upcoming year it is foreseen to install the still missing infrastructure, to assemble and commission all devices required to operate the ring, to install the ring and local injector hardware and to start commissioning with the local ion source.

References

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