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 [3]. 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.

In 2014 the design and installation of infrastructure into the newly constructed Cave B included media supplies like cooling water or compressed air, power cabling, magnet cabling, water cooled cabling, signal cabling. The cable routing and cable tray planning and installation has almost been completed. For electrical supply a new low voltage distribution has been conceived and purchased. The integration into the GSI safety systems is ongoing and well advanced. For this the lock and gate system has been reinstalled to ensure controlled access to the cave.

One prerequisite for the physics part of the CRYRING@ESR project, the transport and injection of heavy, highly charged ions from the ESR, has been advanced. The beam line has been modified and setup in large parts. Furthermore, part of the beam time was used to test the extraction and transport of ESR beam. It has been shown successfully that even close to the lower limit of ESR operation, at 4 MeV/u beam energy, it was possible to extract ions towards CRYRING in Cave B and to transport it beyond the first three dipoles.

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Figure 1: Photograph of the situation in the CRYRING cave end of 2014. In the foreground the local injector has been setup and is being aligned. In the background visible is the ring structure with its dipoles and the magnetic sections with quadrupole and sextupole magnets.

The local injector has been mechanically put in place. First pumping down tests of the RFQ were conducted successfully. The required pressure has been reached, showing that the RFQ is ready to be operated after all the refurbishing to update for instance it's cooling circuit.

Setting up of the first components of the ring has begun, i.e. all ring dipoles were installed and the GSI technical divisions are completing inspection and preparation of the subsystems installed in the straight sections.

The Electron cooler has been worked at to repair transport damages and to check primarily the vacuum conditions. A testing stand for cryogenic tests is under preparation.

References

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