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The low energy storage ring CRYRING@ESR project

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The CRYRING@ESR project is the early installation of the low-energy storage ring LSR, the Swedish in kind contribution to FAIR, which was proposed as the central decelerator ring for antiprotons at the FLAIR facility. Since the modularized start version of FAIR does not include the erection of the FLAIR building, it was proposed to install the CRYRING storage ring behind the existing experimental storage ring ESR already now. This opens the opportunity to endeavor part of the low energy atomic physics with heavy, highly charged ions as proposed by the SPARC collaboration but also experiments of nuclear physics background in the NUSTAR collaboration much sooner than foreseen in the FAIR general schedule. Furthermore, since the installation of the ring will be handled mostly by FAIR standards, it will be used to test major parts of the FAIR control system for the first time and well ahead of time before it is needed to run SIS100.

Highly-charged ions up to bare uranium as produced by stripping at 400 MeV/nucleon will be stored, cooled and decelerated in the ESR. This will supply CRYRING@ESR with up to 100 millions of heavy, highly-charged ions stored at energies between several 100 keV/nucleon and about 10 MeV/nucleon for atomic physics experiments.

Rare ions for storage in CRYRING@ESR are produced and separated in the FRS and then also stored, cooled and decelerated in the ESR. This imposes a lower life time limit of several ten seconds for ions available for experiments in the storage ring. A future connection to the Super FRS at FAIR would increase the available yields of rare, heavy and highly charged ions considerably and hence also extend the physics opportunities. Furthermore, a possible connection of this kind would also allow to guide antiprotons from the FAIR antiproton production facility to CRYRING@ESR and hence bridge the present gap to the low energy physics program with antiprotons as proposed by the FLAIR collaboration.

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