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Low-energy antiprotons at CERN and at FAIR

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The Antiproton Decelerator AD of CERN is currently the only facility providing beams for experiments with stopped or trapped antiprotons. An extension of the AD to lower the antiproton energy from 5 MeV to 100 keV called ELENA is under construction at CERN and should start operation in 2017, significantly increasing the number of stopped antiprotons. The physics program at CERN-AD/ELENA is focussed on precision spectroscopy and antimatter gravity experiments using cold antihydrogen. FLAIR (Facility for Low-energy Antiproton and Ion Research) was originally proposed in 2005 for FAIR but later on moved to phase 2. It consists of a magnetic storage ring called LSR which is similar to ELENA, an electrostatic Ultra-low energy Storage Ring USR decelerating until 20 keV energy, and the HITRAP facility for trapping highly charged ions and antiprotons. The lower antiproton energy and originally foreseen accumulation in a dedicated storage ring called RESR would result in a larger yield of stopped antiprotons in the full version of FLAIR. Furthermore, the storage rings of FLAIR are foreseen to provide both slow and fast extracted beam, the latter of which is not available at CERN-AD/ELENA. Thus nuclear and particle physics type experiments will only be available at FLAIR. Recently the situation has changed with the transfer of CRYRING, which was chosen by FLAIR for the LSR, from Manne Siegbahn Laboratory (Stockholm) to GSI and its installation at the current ESR storage ring of GSI. Together with the HITRAP facility already installed at ESR, a large fraction of the experiments of FLAIR with highly charged ions will be possible. If a way can be found to transport antiprotons from the production target of FAIR to the ESR, the low energy antiproton program of FLAIR could be also realized in an early stage. The potential of this facility will be reviewed in this talk.

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