CERN sets course for extra-low-energy antiprotons

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The kick-off meeting for ELENA, the Extra Low Energy Antiproton Ring, starts today at CERN. Approved by CERN Council in June this year, ELENA is scheduled to deliver its first antiprotons in 2016. This week's kick-off meeting brings together scientists from Canada, Denmark, France, Germany, Japan, Sweden, the UK and the USA. The project is led by CERN.

"ELENA is a new facility aimed to deliver antiprotons at the lowest energies ever reached in order to improve the study of antimatter," said CERN's Stéphan Maury, Head of the ELENA project.

ELENA will consist of a small new decelerator ring that will be installed in same building that houses CERN's existing Antiproton Decelerator (AD). It will slow antiprotons down to under a fiftieth of the current AD energy, bringing an improvement of a factor of 10-100 in antiproton trapping efficiency. At the AD, antiprotons have to be slowed down by passing them through a series of foils, a process that results in the loss of some 99.9% of the antiprotons extracted from the AD before they reach the experiments.

"This is a big step forward for antimatter physics. Going to extra low energy increases the trapping efficiency for antiprotons, which will not only improve the research potential of existing experiments, but will also allow CERN to support a wider range of antimatter experiments," said Walter Oelert, an antimatter pioneer at CERN, who has actively supported the ELENA project.

Ever since the Nobel Prize winning discovery of antiprotons in 1955, these particles have proved to be an important research tool. In the 1980s, they played a pivotal role in the discovery of the W and Z particles at CERN, which also led to a Nobel Prize.

CERN's achievements with low-energy antiprotons include the trapping and accumulation of large numbers of antiprotons in the early 1990s, which led to very precise comparisons of protons and antiprotons. In 1995, the first antiatoms - antihydrogen - were created at CERN, opening the way to new experiments on antimatter and, more recently, the trapping of antihydrogen atoms. One experiment at the AD has also made preliminary studies of the potential for using antiprotons in cancer therapy. In the future, experiments will make detailed comparisons of hydrogen and antihydrogen atoms, and measure the influence of gravity on antiprotons.

Construction of ELENA is scheduled to begin in 2013, in parallel with AD running. When complete in 2016, ELENA will be able to support more experiments than the AD can today, giving CERN - a laboratory best known for the high-energy frontier of particle physics - a grandstand seat at the low-energy frontier.

Provided by CERN