

# Production of ultraslow antiproton beam and its application to atomic collisions

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The Antiproton Decelerator (AD) devoted primarily to atomic physics experiments was constructed at CERN and has been stably operated since year 2000. Until now, three proposals have been approved, two of which are on the production and spectroscopy of antihydrogen (ATHENA and ATRAP collaborations). The third one is our ASACUSA collaboration (AtomSpectroscopy And Collisions Using Slow Antiprotons), which was organized to study atomic collisions and precision spectroscopy of antiprotonic atoms. In making atomic collisions, it is essential to prepare a strong ultra slow antiproton beam, which is realized by combining AD (down to 5.3MeV), an RFQD (Radio Frequency Quadrupole Decelerator) (down to several tens keV), and an antiproton cooling device, which is called MUSASHI (Monoenergetic Ultra Slow Antiproton Source for High-precision Investigations) (down to several eV). Last year (2001), monoenergetic antiproton beams of 10eV-250eV were successfully transported into a collision region about 3m downstream of the trap through three differential pumping stages which are separated with apertures of 4mm in diameter. At the Workshop, the results of the antiproton extraction will be presented together with some examples of the future experiments under preparation, which include antiprotonic atom formation under single collision conditions, ionization, interaction with solid surfaces, and others.