Document: **Status report (11 June 2012)**

Proposition: **LABEX P2IO R&D (08-November-2011)**

Title: **A novel antiproton-decelerator concept**

Partners: **Service de Physique de Particules (SPP), IRFU/CEA (Saclay) and Centre de Spectrométrie Nucléaire et de Spectrométrie de Masse (CSNSM), IN2P3-CNRS (Orsay)**

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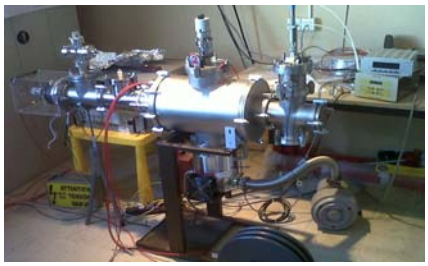
Amount: **96 k€**

Abstract: This project aims at the realization of a new decelerator development for the production of antimatter. Applying atomic physics techniques that have been used successfully for handing exotic radioactive species, we proposed a novel decelerator setup to furnish low-energy antiproton beam pulses of less than 1 keV. This development relies on the very fast switching of a drift tube from 100 keV almost to ground, plus additional accelerator beam optics for preparing the antiproton beam. The device is to be used at the CERN AD antiproton facility with the newly approved ELENA project. While specifically conceived for the recently proposed GBAR experiment, the new decelerator could benefit all experiments that plan to use the ELENA facility. We requested funds for building and testing a prototype decelerator.

Progress since December 2011

We have refurbished laboratory space at the CSNSM and have installed the first elements of a test bench for the decelerator project (see photograph inset). We have recovered a Penning-discharge ion source which presently provides 5-keV beams of N^+ and N_2^+ ions. The beam has been extracted through a series of deflectors and injected into a quadrupole triplet to verify the focusing properties. A pulsed drift tube has also been manufactured and is currently being used to measure the energy spread of the ion source. This work is being performed in the framework of a five-month M1 stage by M. Sebastien Delphine (from the University of Clermont-Ferrand), who will procede to fully characterize the source and upgrade the test bench to 10 keV for first use with pulsed beams.



Financial details

So far we have ordered material and the machining for several ion optical components (2 k€). We have also ordered extruded aluminium profiles to construct the full beam line support structure (2 k€). We have also ordered two 10-kV (100 ns) Behlke switches (5 k€ each) for pulsing the beam and for pulsing the drift tube. We also used the P2IO funds to pay the “gratification de stage” of S. Delphine (2.5 k€).