Contribution ID: **127** Type: **not specified**

Production method for precision experiments with protonium

Thursday, 6 September 2018 15:20 (20 minutes)

Antimatter experiments conducted at CERN address the fundamental question of baryon asymmetry through comparison measurements of fundamental properties of matter and antimatter, such as tests of CPT symmetry and the weak equivalent principle (WEP).
The method of resonant-charge-exchange allows for the generation of H^- as well as for exotic antiprotonic systems such as p-p^- (Pn), μ-p^-, d-p^-, (and other novel systems) for subsequent comparison measurements sensitive to the strong force on threshold, the isospin or on the (anti)-proton charge radius.
We propose to generate cryogenic and long-lived pulses of Pn starting from a mixed H-/p^- ensemble in a Penning trap via photodetachment of H- and subsequent Rydberg excitation of H following the reaction: p^-+H->*Pn*+e-. Such a Pn source could be used for subsequent precision spectroscopy measurements or measurements of gravity in an atom interferometer, for e.g. testing charge neutrality.
In this presentation, the proposed production scheme of Pn is discussed using a semi-classical Monte Carlo approach and its implementation into an experiment at the antiproton decelerator (AD) at CERN.

Selected session

nuclear physics, antiprotons

Primary author: GERBER, Sebastian (Cern)

Presenter: GERBER, Sebastian (Cern)

Session Classification: Fundamental Symmetries