Contribution ID: **54** Type: **Contributed**

Modelling the behavior of the positron plasma temperature in antihydrogen experiments

Tuesday, 11 June 2013 14:45 (25 minutes)

Antihydrogen is now routinely produced at CERN by overlapping clouds of positrons and antiprotons. The mechanisms responsible for antihydrogen formation (radiative capture and the three-body reaction) are both dependent on the temperature of the positrons (T_e), though with a different weight.
Here we present a simple model of the behaviour of the positron temperature based on the main processes involved during antihydrogen synthesis, namely: antiproton-positron collisions, positron heating due to plasma expansion and cooling via the emission of synchrotron radiation. Simulations of the time evolution of T_e have been performed for the relevant working conditions of the CERN-AD experiments (but in particular ATHENA and ASACUSA) by changing the positron densities and the initial antiproton kinetic energies. A preliminary analysis comparing the experimental antihydrogen formation rates to those calculated using the present model results is also presented.

Primary authors: Prof. LODI-RIZZINI, Evandro (Istituto Nazionale di Fisica Nucleare, Gruppo Collegato di Brescia, 25133 Brescia, Italy); Prof. VENTURELLI, Luca (Universita' di Brescia and INFN Brescia); Prof. CHARLTON, Michael (Department of Physics, College of Science, Swansea University, Singleton Park, Swansea SA2 8PP, UK); Dr ZURLO, Nicola (Dipartimento di Ingegneria dell'Informazione, Universita' di Brescia, 25133 Brescia, Italy & Istituto Nazionale di Fisica Nucleare, Gruppo Collegato di Brescia, 25133 Brescia, Italy); Dr MASCAGNA, Valerio (Dipartimento di Ingegneria dell'Informazione, Universita' di Brescia, 25133 Brescia, Italy & Istituto Nazionale di Fisica Nucleare, Gruppo Collegato di Brescia, 25133 Brescia, Italy)

Presenter: Prof. VENTURELLI, Luca (Universita' di Brescia and INFN Brescia)

Session Classification: Antihydrogen

Track Classification: Antihydrogen