

Lundi 7 décembre 11h00

CEA-Saclay Bât 141, salle André Berthelot

Slow positronium with high intensity for the antihydrogen project : new results using a pulsed positron source and laser excitation

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A dense cloud of ortho-positronium as a target for antiprotons is a key part of the experimental scheme to produce ultracold antihydrogen atoms for the direct measurement of the gravitational acceleration of antimatter. We identified mesoporous silica films as the suitable system for the positron-positronium converter. Positronium time-of-flight measurements were performed at the slow positron spectrometer that we constructed in cooperation with the group of A. Rubbia (ETH Zurich) at CERN. We found that positronium is emitted with an energy less than 50 meV from the films.

Recently, the films were measured by D.B. Cassidy (Univ. of California, Riverside, USA) using a pulsed positron source. The kinetic energy of the o-Ps was measured via the Doppler spread of the line width of the 13S-23P transition of the positronium, using a laser. It is the first kinetic energy measurement on positronium using this method. The pulsed source provided a positron intensity in the film that is 10^{11} times higher than the intensity in the case of the source used at CERN. The measurement confirmed the efficiency of the positron-positronium conversion even at this high positron intensity. The kinetic energy of the emitted o-Ps was found to be 42 ± 3 meV, confirming the TOF results. The possibility will be discussed that the kinetic energy is limited by the quantum confinement energy of the positronium in the pores.

Le café sera servi 10 minutes avant.

NB : La présentation d'une pièce d'identité est exigée à l'entrée du centre. Tous les auditeurs extérieurs sont priés de prévenir à l'avance Emilie Chancrin, tél. 01 69 08 23 50, e-mail : emilie.chancrin@cea.fr. (U.E. : délai de 24 h, hors U.E. : délai de 4 jours).