Abstract Submitted for the HAW05 Meeting of The American Physical Society

High precision spectroscopy of antiprotonic helium atoms N. ONO, D. BARNA, A.J. DAX, J. EADES, K. GOMIKAWA, R.S. HAYANO, M. HORI, T. ISHIKAWA, W. PIRKL, H.A. TORII, T. YAMAZAKI, Univ. of Tokyo, B. JUHASZ, ATOMKI, E. WIDMANN, SMI, D. HORVATH, KFKI, ASACUSA COLLABORA-TION — Antiprotonic helium is an exotic three body metastable system consisting of an antiproton, an electron and an alpha particle. We have measured the transition energies of the states of this atom with a laser spectroscopy method at the AD (Antiproton Decelerator) of CERN. By comparing the results of 2002 experiment with theoretical calculations, we set a limit of the possible differences between the antiproton and the proton charges and masses at 1×10^{-8} . These are the best CPT limits for baryonic masses and charges. In 2004, we developed the laser to improve the experimental precision. We used a narrow-bandwidth ($\delta f/f < 10^{-9}$) singlefrequency CW laser. The frequencies of the laser were measured and stabilized by an optical frequency synthesizer with a relative accuracy of 10^{-10} . The CW laser was amplified with dye, and we generated the laser pulses which had high energy and narrow bandwidth thorough enough to measure the transition energies more precise than the experiment in 2002. Using this laser system, we measured the transition frequencies of antiprotonic helium atoms to about a factor 10 better than the experiment in 2002.

> Naoya Ono Department of Physics, University of Tokyo

Date submitted: 26 May 2005

Electronic form version 1.4