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Experiments on Laser-Induced Radiative Formation of Antihydrogen Atoms. LAWRENCE GENE C. POSADA<sup>1</sup>, RYO FUNAKOSHI, RYUGO S. HAYANO, The University of Tokyo, MAKOTO C. FUJIWARA, TRIUMF, YA-SUNORI YAMAZAKI, RIKEN, ATHENA COLLABORATION<sup>2</sup> — Spectroscopy of antihydrogen and hydrogen atoms can provide a direct test for CPT invariance and the Weak Equivalence Principle, and perhaps also offer insights to searches for new physics. As a step towards that goal, we report on the ATHENA Collaboration's experiments on laser-induced radiative formation of antihydrogen. In this process, i.e.  $e^+ + \bar{p} + \gamma \rightarrow \bar{H} + \gamma$  a positron and an antiproton are induced to form a bound state of antihydrogen by using a photon of a specific wavelength. Our main objective is to use a CW <sup>13</sup>C<sup>18</sup>O<sub>2</sub> laser to induce the formation of antihydrogen atoms with the principal quantum number n = 11. Control of the quantum states of antihydrogen will be necessary for future experiments. This experiment has been performed at the CERN Antiproton Decelerator facility.

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