Contribution ID: **745** Type: **Invited Plenary**

Technologies for manipulating and measuring antihydrogen for fundamental physics

Monday 24 May 2021 08:50 (25 minutes)

Precision comparisons of properties of well-studied hydrogen with its antimatter counterpart, antihydrogen, provide opportunities for testing foundational principles of modern physics –such as CPT invariance and Weak Equivalence Principle. Since the beginning of the Antiproton Declarator facility at CERN in 1999, significant progress has been made in developing techniques for synthesizing, trapping, manipulating, and measuring atoms made of antimatter. As a result, the precision of antihydrogen measurements [e.g. Nature 557, 71 (2018)] is now approaching that of hydrogen. Most recently, laser cooling of antihydrogen atoms has been demonstrated [Nature 592, 35 (2021)], a technique which has revolutionized the field of atomic physics in the past four decades, but has not been applied to antimatter atoms —until now . In this talk, I will discuss some of the key technologies which enabled the recent progress, with the emphasis on those developed by the ALPHA (Antihydrogen Laser PHysics Apparatus) collaboration. They range from superconducting magnetic traps, VUV lasers, and a radial-drift time projection chamber. I will also touch on a new project HAICU (Hydrogen-Antihydrogen Infrastructure at Canadian Universities) to develop future technologies in antimatter physics, including anti-atomic fountains, antimatter-wave interferometers, and the synthesis of anti-molecules.

TIPP2020 abstract resubmission?

Funding information

Primary author: FUJIWARA, Makoto (TRIUMF (CA))

Presenter: FUJIWARA, Makoto (TRIUMF (CA))

Session Classification: Plenary