

# Recent Advancement in Laser Spectroscopy of Antihydrogen and the Progress towards the Measurement of its Gravitational Acceleration

*Monday, November 7, 2022 4:00 PM (30 minutes)*

The ALPHA experiment at CERN is designed to perform precision measurements of the properties of antihydrogen - the antimatter counterpart of the hydrogen atom. The so-called ALPHA-2 apparatus is dedicated to antihydrogen spectroscopy. Its goal is to test the CPT invariance, a fundamental symmetry of the Standard Model, which requires that the spectra of hydrogen and antihydrogen be identical. The measurement of the long-lived 1S-2S transition is a milestone in this line of research. Recently, the ALPHA collaboration has also reported on the first successful attempt to laser cool a sample of antihydrogen atoms, an important step towards high precision spectroscopy. The so-called ALPHA-g apparatus is currently making progress towards a measurement of the antihydrogen gravitational acceleration. From the experimental point of view, the gravitational interaction of antimatter is a completely unexplored field. Therefore the goal of ALPHA-g is put to test the prediction of the Weak Equivalence Principle in General Relativity, which states that the gravitational acceleration of matter and antimatter be identical. The technical aspects of ALPHA, such as antihydrogen trapping and detection, as well as its physics results, such as laser spectroscopy, are the focus of this talk.

**Authors:** CAPRA, Andrea (TRIUMF); ALPHA COLLABORATION

**Presenter:** CAPRA, Andrea (TRIUMF)

**Session Classification:** Plenary

**Track Classification:** All