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# Physikalisches Kolloquium

Jan. 23, 2024 at 4:15 p.m.  
HS KPH

CANCELED: Prof. Jonathan Wurtele  
University of Berkeley, California

## **CANCELED: Observation of the Influence of the Earth's Gravity on Antihydrogen**

This talk has been canceled due to illness!

The ALPHA Collaboration at CERN synthesizes, traps, and investigates the properties of antihydrogen, the antimatter equivalent of hydrogen. ALPHA's research has the goal of testing the standard model which holds that antihydrogen and hydrogen have the same spectrum, and the prediction of general relativity that antihydrogen atoms experience the same gravitational force as hydrogen atoms do. ALPHA's experiments conducted over the last decade produced measurements of the 1S-2S line, hyperfine structure, Lyman-alpha transition, and charge neutrality of antihydrogen. This presentation will predominantly delve into our latest breakthrough. Utilizing an innovative magnet system, we have successfully observed, for the first time, the interaction of neutral antimatter with the Earth's gravitational field. The best fit to our measurements yields a value of  $(0.75 \pm 0.13 \text{ (stat. + syst.)} \pm 0.16 \text{ (simulation)}) \text{ g}$  for the local acceleration of antimatter towards the Earth, consistent with the predictions of general relativity. We rule out the possibility of antihydrogen experiencing an upwards acceleration  $g$  in the Earth's gravity. Finally, potential paths to higher-precision gravity experiments will be discussed.

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