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Towards (anti)hydrogen fountains and interferometers with the HAICU project

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Precision comparisons of atomic hydrogen and its antimatter counterpart, antihydrogen, provide stringent tests of fundamental symmetries between matter and antimatter such as CPT invariance and the Weak Equivalence Principle. The most precise measurements of atomic hydrogen properties have traditionally been performed in atomic beams. In contrast, precision measurements of antihydrogen to date have been conducted within a magnetic trap environment, where experimental challenges arise due to the presence of an inhomogeneous field.

To significantly enhance the discovery potential with antihydrogen measurements, we have initiated an ambitious R&D project known as HAICU (Hydrogen-Antihydrogen Infrastructure at Canadian Universities). Located at TRIUMF—Canada's Particle Accelerator Centre in Vancouver—HAICU is utilizing atomic hydrogen to develop the techniques necessary for realizing atomic fountains and interferometers for antimatter. This, in turn, may provide opportunities for novel measurements on hydrogen itself, as no atomic fountains have ever been built for hydrogen.

This talk will provide an overview of the HAICU project, detailing our current progress and discussing the future potential for fountains and interferometers for both hydrogen and antihydrogen.

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