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Antimatter Meets Gravity —A Frontier in Quantum Sensing

Wednesday 11 June 2025 15:15 (30 minutes)

Quantum sensing is an emerging approach for probing fundamental physics. In this talk, geared towards non-experts, I will explore the prospects of applying quantum sensing techniques to the study of antimatter.

The ALPHA experiment at CERN in Geneva recently observed the gravitational free-fall of antihydrogen—an atom composed of antimatter. To significantly improve the precision of such measurements, we have launched a new R&D initiative: HAICU (Hydrogen-Antihydrogen Infrastructure at Canadian Universities). HAICU uses hydrogen atoms as proxies for antihydrogen to develop atomic fountains as a stepping stone toward antimatter-based experiments. Our ultimate goal is to realize an anti-atomic interferometer for precision measurements of antimatter gravity.

Atomic interferometers are among the most sensitive quantum sensors available. I will highlight both the promise and the unique challenges of applying these techniques to antimatter atoms.

Keyword-1

Keyword-2

Keyword-3

Presenter: FUJIWARA, Makoto (TRIUMF)

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