Canadian Association of Physicists
Association canadienne des physiciens et physiciennes

Contribution ID: **110** Type: **Invited Speaker / Conférencier(ère) invité(e)**

Developing Canada's First Transportable Quantum Gravimeter

Monday 9 June 2025 10:15 (30 minutes)

Classical free-fall gravimeters based on optical interferometry have been a cornerstone of geophysical research and exploration for decades. However, they suffer from long-term instability, mechanical drift, and they cannot be operated on moving vehicles. The first commercial quantum gravimeters are now available on the market, largely due to advances in lasers and ultra-high vacuum technologies. These instruments use matter-wave interferometry with a laser-cooled gas of neutral atoms to measure gravity down to the micro-Gal (10^{-9} g) level. At the University of New Brunswick, we recently realized a table-top quantum gravimeter that will eventually act as a high-accuracy gravity reference for other instruments. We are also building a second quantum gravimeter that is designed to operate outside the lab for gravity mapping, positioning, and navigation applications. In this talk, I will give an overview of these instruments, their operating principles, and their key advantages over classical technologies. I will also discuss progress toward building Canada's first transportable quantum gravimeter.

Keyword-1

Quantum sensing

Keyword-2

Atom interferometry

Keyword-3

Gravimetry

Author: Prof. BARRETT, Brynle (University of New Brunswick)

Presenter: Prof. BARRETT, Brynle (University of New Brunswick)

Session Classification: (DAMOPC) M1-3 Cold atoms and Magnetometry | Atomes froids et magnétométrie (DPAMPC)

Track Classification: Technical Sessions / Sessions techniques: Atomic, Molecular and Optical Physics, Canada / Physique atomique, moléculaire et photonique, Canada (DAMOPC-DPAMPC)