

Post-Doctoral Researcher in Quantum Sensing with Ultracold Atoms

Quantum Sensing and Ultracold Matter Group at UNB

We invite exceptional candidates to apply for a **post-doctoral researcher** in the field of experimental quantum sensing with ultracold atoms in the research group of **Prof. Brynle Barrett** at the **University of New Brunswick**. Our research group focusses on harnessing the wave-like properties of cold atoms to realize new types of quantum sensors for fundamental physics, geoscience, and real-world applications such as positioning and navigation. We have extensive experience developing state-of-the-art matter-wave interferometers for sensing accelerations, rotations, magnetic fields, and testing fundamental theories of gravity and electrodynamics. For further insight, please visit: www.quantumsensing.ca

We are looking for an experienced researcher to aid the development of an **absolute quantum gravimeter** with ultracold atoms. This project is a collaboration between UNB, the Quantum Gas group at University of Amsterdam, and quantum-tech companies Q-CTRL and Quantum Valley Ideas Lab. This offers candidates a unique opportunity to interface directly with leading experts in academia and industry. The candidate will play a crucial role in the development of this quantum technology during an exciting time, as it is poised to revolutionize several critical fields, including Earth observation, natural resource exploration, and climate change.

Role and Responsibilities

The position will involve upgrading an existing experiment to employ new all-optical evaporative cooling schemes to achieve sub-recoil temperatures on short timescales. This work will also involve developing real-time quantum control hardware to optimize atom loading, cooling, and noise suppression. The candidate will also work closely with our industry partners to implement optimal quantum control schemes. These efforts will enhance the sensitivity of the instrument at large interrogation times while also improving sensor accuracy by reducing several systematic effects. Our state-of-the-art quantum gravimeter will serve as an absolute gravity reference to characterize several geophysical effects important to the region, including the world's largest ocean tides. The position also involves leading and mentoring graduate students in a laboratory setting, writing research papers and funding applications, presenting results at scientific conferences, and the possibility of developing IP in the form of patents.

Requirements

- **Experience:** A strong background in experimental atomic or optical physics; a demonstrated ability to conduct independent research; strong written English and verbal communication skills; some background in cold atom physics is desired.
- **Education:** A PhD in physics is required, preferably obtained within the last three (3) years. Candidates must have completed all PhD requirements by the start date of the appointment.

Appointment details

- **Start date:** April 1, 2024 (negotiable)
- **Duration:** 3 years
- **Salary:** \$50,000 + 15% benefits

Application process

- Please send general inquiries about the position to Prof. Barrett: brynle.barrett@unb.ca
- Candidates are requested to submit a Curriculum Vitae (including a complete publication list and at least two academic references) and a Cover Letter to the email address above.
- The review of applicants will begin immediately and continue until the position is filled.

About the University of New Brunswick and the City of Fredericton

As Canada's oldest English-language university, UNB has a long history of excellence in teaching and research, with campuses in both St. John and Fredericton, New Brunswick. The Dept. of Physics conducts world-leading research in quantum sensing and ultracold matter, atomic and molecular spectroscopy, space and atmospheric physics, and materials MRI.

Fredericton provides all the amenities of a large city with the added charm of a small town. Situated along the banks of the beautiful Wolastoq River, a region recognized worldwide for its natural beauty, Fredericton offers a rare opportunity for academics to undertake world-class research in a supportive, family-friendly, and low-stress environment. Downtown is only a short walk from campus, surrounded by forested rural communities that enjoy only a 15-minute commute, making it easy to engage in work, social events, and outdoor activities. Fredericton's affordability, extensive network of multi-use trails, and vibrant multicultural community provide the opportunity for a balanced and affordable work-life environment.