



CRC 1227  
Designed Quantum States of Matter



## GUEST LECTURE

# Ass. Prof. Baptiste Allard

**Laboratoire IRSAMC-LCAR,  
Université Paul Sabatier, Toulouse, France**

(Guest of Prof. K. Hammerer and Prof. E. Rasel)

Leibniz Universität Hannover  
DQ-mat Colloquium  
**26 January 2023, 4.00 pm**  
**(Room D326, Welfengarten 1)**

## "Large momentum transfer atom interferometer in the quasi-Bragg Regime"

Atom interferometers based on large momentum transfer (LMT) beam splitters are one of the main prospects for improvement of inertial sensors technologies and fundamental constant measurements.

I will present the development of a LMT atom interferometer dedicated to perform a test of atom neutrality based on the scalar Aharonov-Bohm effect [1, 2]. The interferometer uses the high order Bragg diffraction of a Bose-Einstein Condensate in the quasi-Bragg regime [3]. I will discuss how the multipoint nature of the diffraction process is linked to parasitic phase shifts and fringe distortion both leading to systematic error on the phase estimation.

More recently, we have performed a phase-sensitive interferometer with  $\sim 170$  recoil momenta separation using sequential Bragg acceleration. It is a first step towards the cm-scale separation required to introduce electrodes on each arm of the interferometer and realize neutrality tests.

[1] C. Champenois et al., The hydrogen atom, Springer, 554, (2001).

[2] A. Arvanitaki et al., Phys. Rev. Lett. 100, 120407 (2008).

[3] A. Béguin et al., Phys. Rev. A 105, 033302 (2022).

**All DQ-mat members and all interested are cordially invited to attend.**