

# *Colloquium*

**Department of Physics, Temple University**

**Interferometry with ultracold atomic gasses**

Eite Tiesinga

Joint Quantum Institute and the National Institute of Standards and Technology, Gaithersburg, Maryland, USA.

I have long-term interests in the physics of laser-cooled, ultra-cold atoms. So far the most important application of atoms at micro- and nano-kelvin temperatures is in time and frequency standards, that is atomic clocks. Here, the goal is to isolate just one atom, typically an alkali-metal or alkaline-earth atom, not affected by its environment. On the other hand their collisions or interactions are crucial in collective or many-body systems in which, for example, we can simulate (quantum) phase transitions, such as Bose-Einstein condensation and superfluidity.

In this presentation I will describe our latest research on Bose-Einstein condensates with magnetic atoms, i.e. atoms with spin. Their mutual interactions allow for this spin to precess and oscillate. I will discuss how these oscillations can be used to build atomic interferometers that are analogous to laser- or light-based Mach-Zehnder interferometers, where the usual beam splitters are replaced by nonlinear crystals that exhibit four-wave mixing.

**Monday, November 13, 2017 at 3:00pm**

**SERC, Room 116**

**Refreshments served at 2:45pm**