CERN Colloquium

SPEAKER: Jason Hogan

TITLE: **Atom interferometry for fundamental physics and gravitational wave detection**

DATE: 12 Sep 2019, 16:30

PLACE: 503/1-001 - Council Chamber

ABSTRACT

In recent years, atom interferometry and atomic clocks have made impressive gains in sensitivity and time precision. The best atomic clocks have stability corresponding to a loss of less than one second in the lifetime of the universe. Matter wave interferometers have achieved record-breaking coherence times (seconds) and atomic wavepacket separations (over half a meter), resulting in a significant enhancement in accelerometer and gravity gradiometer sensitivity. Leveraging these advances, atomic sensors are now poised to become a powerful tool for discovery in fundamental physics. I will highlight ongoing efforts to test aspects of general relativity and quantum mechanics, and search for new fundamental interactions. A particularly exciting direction is gravitational wave detection. I will describe the Mid-band Atomic Gravitational wave Interferometric Sensor (MAGIS) proposal, which is targeted to detect gravitational waves in a frequency band complementary to existing detectors (0.03 Hz – 10 Hz), the optimal frequency range to support multi-messenger astronomy. Finally, I will discuss MAGIS-100, a 100-meter tall atomic sensor being constructed at Fermilab that will serve as a prototype of such a detector, and will also be sensitive to proposed ultra-light dark matter (scalar and vector couplings) at unprecedented levels.

Organised by: W. Lerche/TH-SP..... Tea and coffee will be served at 16h00