Seminar/Talk

Quantum entanglement for precision sensing with atoms and light

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Host:

In the last decades, advances in the level of precision in controlling atomic and optical systems opened up the low-energy precision frontier to fundamental physics tests in addition to yielding new applied sensing technologies. In this talk I will focus on our experiments with cold atoms highlighting some of the most recent developments in the prospect of using quantum entanglement to further improve the precision of atomic and optical sensors.
I will describe the generation of 20dB spin-squeezed states of half a million 87Rb atoms inside of an optical cavity. From a practical point of view, the generated states enable up to a 100-fold reduction in required averaging times or atom numbers to achieve a given precision. I will explain the implementation of an atomic clock operating 10 dB beyond the standard quantum limit as well as the investigations of entanglement and Bell correlations in this system. I will then describe the demonstration of a new concept we call quantum phase magnification which utilizes optical cavity-aided interactions between atoms to magnify signals to-be-measured. This technique eliminates the need for low noise detection to achieve phase sensitivities beyond the standard quantum limit.

Monday, March 20, 2017 09:45am - 10:45am
Mondi Seminar Room 2, Central Building

This invitation is valid as a ticket for the ISTA Shuttle from and to Heiligenstadt Station.
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https://ista.ac.at/en/campus/how-to-get-here/ The ISTA Shuttle bus is marked ISTA Shuttle (#142) and has the Institute Logo printed on the side.