



QuanTalks

IISc Quantum Technologies Initiative (IQTI) Seminar Series



Title: Ultracold atoms: From quantum simulations to precision measurements

Date & Time : Monday, 26th September 2022, 3 30 PM (IST)

Venue: Physics Department Auditorium

Abstract: The invention of techniques to cool atoms down to temperatures below micro Kelvin has opened up enormous possibilities to manipulate and use these laser cooled atoms for a variety of scientific studies and for technological applications. In this talk, I will present our ongoing work in using ultracold Rb atoms in 1-D optical lattices for simulating physics of classically chaotic quantum systems and as a test bed to understand the physics of Anderson localisation. By further cooling, the collection of these atoms goes through a Bose-Einstein condensation (BEC) phase transition. Atoms in the BEC state act like a giant coherent matter wave. Using the BEC, we demonstrate a gravimeter to measure local acceleration due to gravity with a very high degree of precision. These sensors have huge practical applications ranging from underground resource mapping to detection of tunnels. I will present our implementation of the atomic gravimeter.

Meeting Link: [Click here to join the Webinar](#)

Speaker

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Biography: Prof. Umakant Rapol received his Ph. D. from Indian Institute of Science, Bangalore-India in 2003. He was a post-Doctoral research fellow at École normale supérieure, Paris - France and at Universität Innsbruck, Innsbruck - Austria. After his post-doctoral work, he spent about four years in Industrial Research and Development in General Electric Global Research – Bangalore, working on the development of optical devices and sensors for biotechnology and for power generation. He joined Indian Institute of Science Education and Research Pune in 2009. He is currently a Professor of Physics at IISER, Pune, Physics Department, Pune - India. Prof. Rapol's research interests are in the area of Atomic Physics and Quantum optics. He has an active research group at IISER, Pune: working in the areas of Ultra-cold atoms and ions for precision Optical Metrology, Quantum Information processing and Quantum optics and in areas of quantum technologies ranging from Quantum computing to quantum sensors.