IST AUSTRIA
Institute of Science and Technology

Institute colloquium

Universal matter-wave interferometry

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Host: Onur Hosten

Throughout the last century, quantum physics has become one of the most important pillars of modern physics, proven correct in all experiments so far. And yet, the concepts of quantum theory are contradict classical intuition, when it comes to the notion of quantum superposition of states which are regarded as mutually exclusive in the classical world. An example of that is the quantum superposition principle, which can be visualized in diffraction and interferometry of massive matter on the single-particle level. The discovery of matter-waves goes back to Louis de Broglie who believed this concept to be universally valid. Matter-waves have been demonstrated and used with electrons, neutrons, atoms and diatomic molecules, but is there any limit in particle mass and complexity? Why do we see wave-like delocalization with atoms but not with students? If quantum physics is a universally valid theory, how can we construct experiments that demonstrate and utilize it for the most universal class of particles and materials?

I will present a series of quantum interference experiments that we have conducted at the University of Vienna to demonstrate the wave nature of atoms, fullerenes, dye molecules, vitamins, peptides and large organic molecules composed of up to 2000 atoms. I will discuss the technological challenges and philosophical implications in these experiments which we are pushing to probe the interface between quantum physics and chemistry and metrology, biomolecular science, gravity and the classical world.

Monday, June 8, 2020 04:00pm - 05:00pm

IST Austria Campus Raiffeisen Lecture Hall, Central Building

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