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Seminar über Quanten-, Atom- und Neutronenphysik (QUANTUM)

Dec. 17, 2020 at 2 p.m. c.t.
None

Univ.-Prof. Dr. Markus Arndt
Universität Wien

The long road towards interferometric tests of nonstandard physics

Physics is currently in a state where many would say, the essential laws of nature are well understood. And it is true that quantum physics has matured for more than a century and has become the basis of a stunning range of modern technologies. And yet, fundamental questions of quantum physics have remained unsolved until today such as its transition into classical phenomenology or its relation to gravity theory. More recently a growing evidence has also suggested that we may actually know only a few percent of the world, missing the entire dark sector in matter and energy.

Here I will focus on how to set up universal matter - wave interferometers that can demonstrate and utilize the quantum wave nature of matter. I will present experiments to explore the interface between quantum physics and classical phenomena and shine light on the question of objective wave function collapse. I will discuss how gravity influences all matter-wave interferometry, and many conceivable ways for it may to modify the dynamics of very massive superpositions. Finally, matter-wave interferometers built for that purpose will also mature into sensors for dark matter in a specific energy range. Ideas and prospects are briefly discussed.

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