Speaker: **Dominik Lentrodt**

Title: **From Peres to Mössbauer - Testing the axioms of quantum mechanics with x-rays and nuclei**

Date: **Thursday, November 28th, 12:00 pm (s.t.).**

Place: **Seminar room 915**

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Abstract:

Precision experiments provide one of the cornerstones of the systematic testing of physics, and measurement techniques offering new levels of precision have historically enabled new research directions. For example, the resolution of a tiny energy shift in atoms - now known as the Lamb shift - marked the starting point of modern quantum electrodynamics theory. In this talk, we will discuss a precision experiment which aims at testing the fundamental assumptions underlying quantum mechanics itself. We develop a measurement concept which utilizes x-rays and atomic nuclei to build a highly stable and precise interferometer. Unlike the well-known double slit experiment, the interference happens in the time domain instead of in space. We further present preliminary data from a recent implementation of this experiment at the PETRA III synchrotron facility at DESY in Hamburg. In particular, we tested the validity of Born's probability rule and the assumption of complex numbers in quantum mechanics.