

Laser Spectroscopy of the ^{229}Th Nuclear Transition – Current Status and Applications

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After a first round of successful laser spectroscopy experiments of the ^{229}Th nuclear-clock transition based on broad-band laser systems as well as one direct frequency-comb experiment, we are now entering a phase of precision spectroscopy using CW laser sources at 148.4 nm. These successes are the result of several decades of effort to precisely determine the transition energy and a first step towards nuclear precision spectroscopy and the development of a nuclear frequency standard of extremely high accuracy. Applications for dark matter detection as well as the search for time variations of fundamental constants appear to be in reach, with first improvements already published.

In this talk I will provide an overview over the history of ^{229}Th that has culminated in this success. Further, I will discuss the remaining efforts and challenges. Finally, I will introduce the investigations underway within the framework of the BMFTR-funded project "NuQuant".