CRC 1227
Designed Quantum States of Matter

GUEST LECTURE

Prof. Gilad Perez

Weizmann Institute of Science, Israel

DQ-mat Colloquium

Physikalisch Technische Bundesanstalt
Vieweg Building, Room 133
Bundesallee 100, 38116 Braunschweig

Thursday, 09 January 2025, 4.00 pm

"Preparing for the Thorium-229 revolution"

After a brief introduction related to ultralight (pseudo) scalar dark matter, we shall describe the current status of searches for ultralight dark matter (UDM). We explain why modern clocks can be used to search for both scalar and axion dark matter fields. We review existing and new types of well-motivated models of UDM and argue that they all share one key ingredient - their dominant coupling is to the QCD/nuclear sector.

This is very exciting as we are amidst a revolution in the field of dark matter searches as laser excitation of Th-229 with effective precision of 1:10^13 has been recently achieved, which as we show, is already probing uncharted territory of models. Furthermore, Th-229-based nuclear clock can potentially improve the sensitivity to physics of dark matter and beyond by factor of 10^10. To what extent we trust this enhancement factor and what are the potential implications will be also briefly discussed.

All DQ-mat members and all interested are cordially invited to attend.