Contribution ID: **115** Type: **Invited Oral**

High-Accuracy Yb+-Ion Clocks for Test of Fundamental Principles and Robust Long-Term Operation

Tuesday 17 October 2023 14:30 (30 minutes)

We report on results from long-term operation of the Yb1 ion optical clock of PTB, where we have obtained uptimes exceeding 80% over typical TAI reporting intervals of 30 days. Using these data and the special electronic structure of Yb+ allows us to improve searches for a coupling of ultra-light dark matter (UDM) to photons, temporal drifts of the fine structure constant and its potential dependence on the gravitational field. Interestingly, the same optical clock comparison data can also be used to probe UDM-nuclear couplings and provides competitive sensitivity.
We will also report on a composite system with Yb+ and Sr+ ions and on our efforts to employ a transportable optical clock based on the 171Yb+ E2 transition for contributions to TAI and frequency measurements at other institutes in Europe.

Author: HUNTEMANN, Nils (Physikalisch-Technische Bundesanstalt (PTB))

Co-authors: Dr PEIK, Ekkehard (PTB); Dr JIANG, Jian (Physikalisch-Technische Bundesanstalt (PTB)); STEINEL, Martin; Ms FILZINGER, Melina (Physikalisch-Technische Bundesanstalt (PTB)); Dr LINDVALL, Thomas (VTT Technical Research Centre of Finland Ltd, National Metrology Institute VTT MIKES)

Presenter: HUNTEMANN, Nils (Physikalisch-Technische Bundesanstalt (PTB))

Session Classification: Precision Measurements and Fundamental Physics II

Track Classification: Precision Tests on Fundamental Physics