

Simultaneous comparisons of optical clocks and atomic fountain clocks using broadband TWSTFT

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Two-way satellite time and frequency transfer (TWSTFT) is a technique used on a regular base to compare atomic clocks and local time scales of laboratories all over the world. However, its instability is limited mainly due to the modulation bandwidth of the signal. In the framework of the EMRP project “ITOC” (International Time scales with Optical Clocks), a unique measurement campaign was carried out, exceeding these limits by using the maximum bandwidth available for this technique so far for the first time. Within this campaign, five optical clocks and six atomic fountain clocks located in INRIM, LNE-SYRTE, NPL and PTB had been compared simultaneously over a duration of 26 days. GPS Precise Point Positioning had been used in parallel as a second, independent satellite-based technique for comparison. By applying an analysis procedure taking into account gaps and correlations on the data, results in the low 10^{-16} uncertainty range could be obtained.

The presentation will review the basic concept of broadband TWSTFT, show the challenges of such a campaign and give details on the data analysis.

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