

Summary of Session atomic clocks

Status on ground:

uncertainties of 10^{-18} are state of the art,
international validation in progress

strong commitment for clock development from metrology community

→ redefinition of SI-second in 2030

largest gap: intercontinental time and frequency dissemination

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Ongoing space activities:

Europe:

ACES, 10^{-16} frequency uncertainty, intercontinental time transfer

I-SOC pathfinder, improving TRL, improved link technology,
common view clock comparison

China:

planned mission for combined clock, quantum communication,
fundamental science mission

US:

white paper in preparation for mission:
combination of metrology (time transfer), fundamental
science (red shift, new physics), and geodesy

orientation towards neutral atom (lattice) clocks

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Research fields
and technologies:

Earth observation
physical height system
cm-resolution, stable
need: UN resolution, IAG...

Communication, Navigation
stable lasers, high data rate

T&F links

**clocks in
space**

Metrology
redefinition second 2030?
 10^{-18} frequency / ps time
distribution

Fundamental science
EEP or redshift test
highest possible performance

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Public outreach:
clocks attract
attention

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International synergies with other agencies: e.g. with NASA.

NASA: 1) Fundamental physics

BPS: Biological and physical sciences

Time-line: Roadmapping will be available around 2023.

Focos mission: 2029: lattice clock in space.

Technology readiness: transportable cavities, Freq combs

By the time of the mission, there is need to further mature the key tech areas for space...

Atomics physics packages, frequ. combs, cavities, electronics (e.g. high current and ultra precise electronics needed)

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Very strong synergy between clocks and many other fields.

Clocks and their components are an enabling technology with very high performance

Fundamental science with clocks is very appealing!

And can be combined with Earth observation and Metrology.

