Poster Session #B
Observational and space tests of gravitation

B01

ACES/PHARAO: high performance space-to-ground and ground-to-ground clock comparison for fundamental physics

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The Atomic Clock Ensemble in Space (ACES) is a fundamental physics mission of the European Space Agency (ESA) to be launched in August 2021. It relies on a high-performance clock onboard the International Space Station (ISS), a network of high-performance clocks on ground, a dedicated two-way microwave link (MWL) enabling space-to-ground and ground-to-ground clock comparisons, as well as an optical link (ELT). PHARAO/SHM (Projet d'Horloge Atomique par Refroidissement d'Atomes en Orbite/Space Hydrogen Maser), the clock onboard the ISS, has a relative frequency accuracy at the 10^{-16} level, a relative frequency stability (Allan deviation) equal to $10^{-13}/\sqrt{\tau}$ (τ being the integration time in seconds) and a time deviation of 12 picoseconds after one day of integration. The MWL is designed to reach a time deviation below 7 ps after one day of integration. While space-to-ground clock comparisons will enable precise tests of the gravitational redshift, tests of deviations from General Relativity at the 10^{-6} level, and tests of local Lorentz invariance at the 10^{-10} level, ground-to-ground clock comparisons will enable a search of the time variation of fundamental constants with uncertainty at the 10^{-17} level after one year. In this contribution, we review the mission set up with a particular emphasis on the MWL, discuss the simulation and data analysis software developed to investigate mission performance, focusing on its primary scientific objective: the test of the gravitational redshift.