

What time is it on the Moon?

Pascale Defraigne

Royal Observatory of Belgium, Brussels, Belgium

Email: p.defraigne@oma.be

Abstract:

Given the renewed interest in lunar exploration, with applications requiring clock synchronization at the nanosecond level, adopting a relativistic lunar reference frame with an associated coordinate time becomes essential. The relativistic effects between an Earth-based clock and a Moon-based clock cannot be represented as a simple frequency offset, meaning that UTC cannot be directly used as a reference for high-precision applications.

In this context, the international scientific community—including the organizations responsible for defining and regulating time standards—is working to define a lunar reference time scale and its relationship with UTC. Several options are currently being examined, each with its own advantages and drawbacks, informed by our experience on Earth. Ultimately, the scientific community will state—before the conference—on a unique definition of the lunar reference time, along with its practical realization, its calendar, and its traceability to UTC.

Bio:

Pascale Defraigne is head of the Time and Frequency Division at the Royal Observatory of Belgium. She received her Ph.D. in physics in 1995 at the Université Catholique de Louvain (UCL), Belgium, and then moved to the Royal Observatory of Belgium where she started research projects on the use of geodetic GPS measurements for Time and Frequency transfer, first using the dual-frequency combinations of code measurements, and then on developments of PPP and IPPP. In the Consultative Committee of Time and Frequency, she chairs the working group on GNSS Time Transfer since 2012. She received the EFTF Award, "for seminal contribution in the use of geodetic GNSS techniques for time and frequency transfer" in 2012. In parallel, Pascale Defraigne is involved in the Galileo Program as consultant for time and synchronization since 2013, she is Member of the International Astronomical Union since 2000, and in that frame, she was President of commission Time 2006 to 2009. She is now involved in the coordination of establishing a lunar reference Time, as chair of the CCTF task Group on Lunar Time.

