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TECHNOLOGY DEVELOPMENTS FOR RADIO ASTRONOMY ON THE LUNAR FAR SIDE -
CURRENT AND FUTURE EFFORTS OF THE ASTRONOMICAL LUNAR OBSERVATORY (ALO)
TOPICAL TEAM.

Abstract

The Moon provides an attractive location both from an exploration- and a scientific perspective and over the recent years the interest in the Moon has been revived. ESA's Astronomical Lunar Observatory (ALO) topical team, coordinated by the Radboud University Nijmegen (The Netherlands), has been tasked with investigating the unique scientific opportunities on the Lunar far side, as well as setting out roadmaps for technology developments. As the highest-impact science case the study of the cosmological Dark Ages and Cosmic Dawn has been identified, using the long wavelength radio emission of the redshifted 21-cm Hydrogen line. A baseline mission concept was defined during a ALO-led CDF (concurrent design facility) study, which identified a number of key enabling technologies that the ALO team is currently pushing for TRL improvements. These TRL activities include i.e. inflatable deployment systems, foil-based antenna design, low-power and low-mass electronics, and lunar night thermal control solutions, which are addressed in close collaboration with international industry and academic partners. The complete the science requirements definition, the ALO team is further considering additional radio science cases which uniquely can be done from a Lunar far side location. Here we will present the driving sciences, the current status of the technology developments and future plans for precursor/demonstration missions. In addition, we will highlight the potential technology synergies with other science missions and the human exploration agenda.