



Contribution ID: 1075

Type: **Contributed Oral Presentation**

## **C4Or1C-07: Cryogenic Design and Test Considerations in Support of Drilling on the Lunar Surface**

*Thursday 25 July 2019 11:00 (15 minutes)*

Earth's Moon harbors valuable water ice deposits within the permanently shadowed regions (PSR) of craters and possibly other geological features. Of primary value in the water are the molecular hydrogen and oxygen constituents useful as spacecraft propellants, fuels to generate power, and life support to enable mankind's further exploration of the solar system and beyond. Acquiring the water resources is extremely challenging due to the extreme low-temperature and vacuum environment on the Moon. Without full knowledge of the geological makeup and physical properties of the water-bearing regolith resources, an intelligent drilling system is being developed to characterize and adapt to the range of material properties that may be present. Cryogenic engineering is playing a significant role in this specialized technology development, not only with material design considerations, but also in design of experiments and test methods to explore and capture the practical limits of both the drilling systems and the potential Lunar resources.

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**Session Classification:** C4Or1C - Aerospace Applications - Exploring the Universe