Professorship of Lunar and Planetary Exploration Technologies
TUM School of Engineering and Design
Technical University of Munich

**Research Internship/Semester Thesis/Master Thesis**

# Water extraction technologies on the Moon and Mars

*theoretical/numerical/experimental thesis*
Start date: As soon as possible

## Topic:

Water is one of the most essential resources for space exploration. Recent missions have discovered that stable water-ice exists in permanently shaded craters on the Moon. This water-ice could be extracted from the lunar regolith and used for rocket fuel, drinking water, or breathable oxygen.

Currently, the **Synergetic Material Utilization** resource group at the **German Aerospace Center (DLR) in Bremen** is looking into multiple methods to extract and capture this water. In order to determine the most efficient, durable, and reliable method, simulations are needed. Specifically, the extraction and water capturing devices are investigated. The results aim to provide more information about their optimal design. This can be used to inform future technology demonstrators or missions to the Moon. Additionally, the **LUWEX project** (`https://luwex.space/`) is planning a large-scale water extraction experiment. For this project, the optimal design needs to be determined and help with assembling the hardware is required.

This announcement is an **open call for students** to reach out for a potential research internship or thesis project together with the DLR Institute of Space Systems in Bremen and the Professorship of Lunar and Planetary Exploration Technologies at TUM. Should the above-mentioned topics interest you, please reach out to find out whether a project can be realized.

## Tasks:

- simulation of water extraction from icy lunar regolith
- simulation of water vapour capturing technologies
- optimization of design for these devices
- water, hydrogen, and oxygen storage vessels
- optimization of concept of operations and mission scenarios for future ISRU missions
- assembly, integration and test of hardware for water extraction and capture experiments

## Requirements:

- basic knowledge and interest in space resource utilization
- knowledge in thermodynamics and fluid dynamics
- simulation experience (preferably COMSOL)
- good command of the English language

## Supervisors:

**Luca Kiewiet**

Robert-Hooke-Strasse 7, 28359 Bremen
Phone: +49 421 24420 1315
*luca.kiewiet@dlr.de*

**Francisco J. Guerrero-Gonzalez**

Lise-Meitner-Str. 9-11, 85521 Ottobrunn
Phone: +49 89 289 16016
*f.guerrero@tum.de*