



DLR – DAAD Fellowships

Fellowship No. 563

Research Area : Space

Research Topic: **Thermoelectric Generator for Lunar Applications**

DLR Institute: Institute for Materials Research, DLR Cologne

Position: Postdoctoral Fellow

Openings: 2

Job Specification: **Thermoelectric generators (TEG)** can convert heat directly into usable electrical energy. As they work without moving parts or fluids TEG require virtually no maintenance. They are therefore suited as energy sources for space applications and herein well-established as radioisotope thermoelectric generators (RTG). The ESA/DLR initiative “LUNA” aims for developing a lunar analogue facility in Cologne, Germany, which is scheduled to be built and outfitted in 2022/2023. The LUNA facility will support the development, testing and simulation of new tools and equipment as well as new operational concepts for future human missions to the Moon and later to Mars.

The fellow shall develop two different RTG-related systems: one RTG dummy involving a programable DC power source and one functional demonstrator, which is based on an electric heater and adapted TEG-modules. The work addresses scientific and engineering challenges involving the development of a mechanical, thermal and electrical 1D model of an RTG, an RTG dummy and an RTG system demonstrator. The task is divided into three topics:

- Development of an 1D network model to serve as a digital twin of an RTG for virtual testing and designing. This RTG-model shall include sub-models of a radioactive heat source, TEG modules and a radiator for heat rejection.
- Development of an RTG dummy for experimental testing in the artificial lunar research environment

- Development of a functional RTG demonstrator for testing and functional demonstration, based on non-radioactive heat sources

Required Qualification: **PhD in physics, mechanical or electrical engineering**
Experienced with analytic descriptions of heat transfer and ideally thermoelectric effects
3D - Finite Element Modelling and Multiphysics Simulation (preferably ANSYS)
Significant experience in programming of a common language
CAD tools
Ability to work in an international and diverse team

Advantageous Skills: Specialist in thermoelectrics and heat transfer
Hands-on experiences with thermoelectric energy harvesters
1D network modelling with SciLab or OpenModelica
Programming with Python
Interest in scientific and technological challenges

English competence: **Fluent** - See requirements on www.daad.de/dlr

Earliest Start Date: 01.11.2022

Application Deadline: **until position filled**

Further Information: <http://www.dlr.de>
http://www.dlr.de/wf/en/desktopdefault.aspx/tabid-1696/3089_read-3739/
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