



## Master Thesis Work

of Choose title Name, Surname

### Entwicklung eines atmosphärischen Wiedereintrittssystems für einen 6U CubeSat Developing an Atmospheric Entry System of a 6U CubeSat

#### Motivation:

Qosmosys is a new satellite venture, based in Singapore, and have been designing the first spacecraft-freighter system that virtually anybody can have access to, which is based on its versatile, innovative family of space platforms. Qosmosys spacecraft address various freight missions around the Earth, to the Moon and beyond, offering unprecedented service at competitive prices.

In this Master thesis work, the candidate will design an atmospheric re-entry system for a 6U CubeSat, with the purpose of returning a subscale payload safely and cost-efficiently to the Earth's surface for recovery. Initial design parameters for this return mission profile are being defined by Qosmosys in collaboration with various partners in industry and academia and shall be further assessed in the framework of the Planetary Probe Design Workshop (PPDW) at IRS, the findings of which shall serve as a starting point for this work.

The safe return and recovery of a small-scale payload poses a particularly ambitious engineering challenge. Following a review of existing concepts and candidate materials, the candidate will design and iterate a prototype for this Thermal Protection System (TPS), selecting viable candidate materials and evaluating its performance through suitable simulation approaches. This work shall conclude with a viable design for an Engineering Model (EM), as well as a test plan towards qualifying the EM and further prototypes through suitable ground testing methods.

#### Task description of the Master thesis work:

- Review of small-scale sample return missions and thermal protection systems.
- Optimization of mission and system design parameters for a CubeSat atmospheric re-entry from 220 km altitude.
- Iteration and finalization of TPS and payload insulation design, identification of suitable materials.
- Development of test plan for engineering model prototype.
- Documentation of the work in English.

The thesis will be accomplished at Qosmosys (from home for social distancing reasons).

Internal supervisor: Adam Pagan, Georg Herdrich

External supervisor: Francois Dubrulle

Starting date: 01.07.2021

Submission until: Six months after starting date

Apply to: [fd01@qosmosys.com](mailto:fd01@qosmosys.com);  
[pagan@irs.uni-stuttgart.de](mailto:pagan@irs.uni-stuttgart.de)

#### **Acknowledgement of receipt:**

I hereby confirm that I read and understood the task of the master thesis, the juridical regulations as well as the study- and exam regulations.

_____ Date PD Dr.-Ing. Georg Herdrich (Responsible Professor)	_____ Date External Supervisor	_____ Date Signature of the student
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## Declaration

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