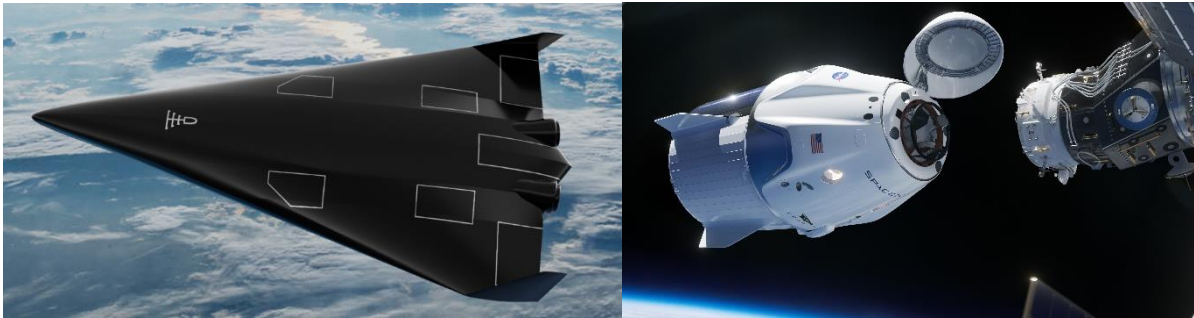


**REF 23/08/A-ST: MASTER THESIS**

**Vergleich der Umweltauswirkungen unterschiedlicher  
Raumtransportsystemkonzepte  
Comparison of the environmental impact of different space  
transportation system concepts**



**Motivation:**

In the coming years, a significant increase in space transportation system launch rates and spaceflight activities is expected. In addition, there will be an increased demand for bi-directional transportation across space. However, the associated environmental impacts of production, launch emissions, and re-entry have not been adequately researched. In particular, the focus is on the effects on the Earth's radiation budget, the ozone layer, and living organisms.

At the moment, different concepts for space transportation systems are under development. Within the scope of this study, they will be analyzed with respect to their environmental impact. Of particular interest is the comparison of conventional vertically launching launchers with horizontally launching spacecrafts. The entire life cycle (production, launch, reentry, reuse) will be considered and compared using common methodology. Different scenarios will be considered (Earth to Earth, Earth to Orbit, Earth to Moon).

After an introductory literature research into the topic, a characterization of the environmental impact will be carried out and existing methodologies will be evaluated and assessed. Subsequently, a model of the environmental impact will be established and estimated. Finally, a comparison between different space transportation systems will be performed.

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This master thesis is carried out in a **cooperation between POLARIS Raumflugzeuge GmbH and the University of Stuttgart, Institute for Space Systems at the Space Center Baden-Württemberg (RZBW)**. Workshops at POLARIS are planned for this purpose.

### Requirements

- Interest in space transportation systems, system studies as well as combustion technology
- Independent working style & self-initiative
- Experience in life cycle analysis is an advantage

**Application:** Please send your application with CV and transcript of grades by mail to:

Jan-Steffen Fischer (fischerj@irs.uni-stuttgart.de, 0711 685-69628)

**Start of processing:** possible from October 2023

**Image sources:** POLARIS Raumflugzeuge GmbH, NASA/SpaceX



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