



Bachelor and Master theses or Project work within the ZEpHyR project



Courses: Industrial Engineering
Production Engineering
Space Engineering
Systems Engineering

The STERN programme (**Studentische Experimentale Raketen**) of the German space agency (DLR) offers German universities and their students the possibility to design, build and launch sounding rockets. The main goal of this programme is the education of students to prepare them for future employments in the space industry by giving students the opportunity to run through a complete project cycle by space industries standards.

Since 2012 the ZARM is also involved in the DLR STERN programme as a part of the University of Bremen. ZARM's contribution is the **ZARM Experimental Hybrid Rocket (ZEpHyR)**. Its rocket motor utilises paraffin wax (candle wax) as fuel and liquid oxygen as oxidiser. In April 2016 ZEpHyR 1 was successfully launched from ESRANGE in Sweden. The entire rocket was built by students of the University of Bremen.



Since October 2017 the development of ZEpHyR 2 is in progress. The new hybrid powered sounding rocket will have a diameter of 0.24 metres and a length of about 6 metres. Its motor is designed to generate a thrust of about 6500 newtons to reach an estimated altitude of 10 – 12 kilometres. The launch is scheduled for summer 2020. Students are invited to participate in the development as part of their Bachelor or Master theses or as part of a project work. Possible topics are:

- Aerodynamic design and trajectory simulation
- CAD design (e.g. structure, rocket motor, launch rail, infrastructure etc.)
- Concept studies at subsystem or overall system level
- Electronics and software (e.g. on-board computer, ground station, LabView etc.)
- Flow or combustion simulations
- Handling and management of fluids (helium, oxygen and nitrogen)
- Logistics
- Test stand operation (e.g. injector or fuel tests, engine tests etc.)

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