



Announcement for  
**Bachelor and Master Theses**  
With the balloon astronomy project **ESBO DS**

Under the European project **ESBO DS** (European Stratospheric Balloon Observatory *Design Study*) the IRS develops a balloon-based astronomical observatory. The goal of the project is to establish an observatory with telescopes up to the 5 m aperture class flying on a regular basis. Therefore, within the scope of **ESBO DS**, feasibility and design studies are conducted and a development plan is prepared. Another integral part of the project is the development of a flightworthy prototype (**STUDIO**). This prototype will



carry a telescope with 50 cm aperture and instruments for the ultraviolet and visible spectral ranges. Thus, it will allow testing of critical technologies and first scientific observations. The prototype is scheduled to fly in 2021.

**ESBO DS** is conducted by a European consortium from science and industry. The IRS is, amongst other things, responsible for the project coordination.

Within the project **ESBO DS**, several Bachelor (BT) and Master (MT) theses are available regarding different engineering topics concerning both the feasibility and design studies as well as the prototype design. Currently, the following **Theses topics** are available:

Division Prototype:

- Design and test of a **pressure-tight cable feedthrough** for the **STUDIO** flights electronics pressure housing (BT)
- Development of a **thermal controller software** for a balloon-borne telescope active thermal control system, based on the existing component-based Flying Laptop software framework (MT)
- Development of a **software interface for the image stabilization camera** for the **STUDIO** mission as a component of the Flying Laptop Software framework (BT)
- Development and test of a **motor controller** interface to actuate the **STUDIO** telescope secondary mirror as a component of the Flying Laptop Software framework (MT)
- Development of ground station software to **process and archive scientific images** in FITS format (BT)
- Development of a **ground station component** to illustrate the pointing performance of **STUDIO** and the compliance with its requirements (current pointing, distance to the sun / moon,...) (MT)
- **Passive thermal management** of the **STUDIO** balloon telescope using an orbital model in ESATAN TMS (BT)
- Development and execution of a **shock test** of the **STUDIO** balloon optics (BT)
- Development and execution of an **alignment test under thermal vacuum conditions** of the **STUDIO** optical payload (MA)
- Conduction of a **Failure Analysis (FMECA)** for the **STUDIO** balloon telescope (MT)

Division Design and feasibility study:

- Feasibility study concerning **tethered balloons** (e.g. captive balloons) for astronomical missions, e.g. in Antarctica (MT)
- Feasibility study regarding “soft landing” of balloon telescopes of the 5 m aperture class

*The indication BA/MA is to be understood as a guideline. The scale of the topics can be adapted to the intended final thesis. In addition to the abovementioned topics, other similar topics are possible. Execution of the theses in English, at least to some part, is preferable, since English is the common project language.*

In case you are interested contact Philipp Maier at ([esbo-ds@irs.uni-stuttgart.de](mailto:esbo-ds@irs.uni-stuttgart.de) / +49 (0)711 685 60813). More information concerning **ESBO DS** can be found at [esbo-ds.irs.uni-stuttgart.de](http://esbo-ds.irs.uni-stuttgart.de).

Begin of the theses: As soon as possible

Supervising Professors: Prof. Dr. rer. nat. Alfred Krabbe  
Prof. Dr.-Ing. Sabine Klinkner

