

## Master Thesis in Measuring Earth's Atmosphere

The CubeSatTOF mass spectrometer was selected to analyse the chemical composition of Earth's upper atmosphere on board the student-driven Constellation of High-performance Exosphere Science Satellites (CHESS, <https://doi.org/10.1109/AERO53065.2022.9843791>) mission. The CHESS mission is part of our initiative to engage students in applied space projects. We designed it to solve a 40-year old puzzle in atmospheric science using a mass spectrometer and a GNSS instrument.

CubeSatTOF is a miniaturised mass spectrometer currently in a prototype stage. To prove its capabilities as a scientific instrument, first measurements will be conducted on Earth using a mobile vacuum system on board an uncrewed aerial vehicle (UAV, i.e., a drone). The aim of this thesis is to enable, perform, and evaluate such measurements. This achievement represents a major milestone within this multi-organization, ESA-supported project (<https://activities.esa.int/ultra-compact-mass-spectrometer-enables-reliable-analysis-complex-molecules-real-time-monitoring>).

The selected candidate will:

- Select targets for its application (e.g., volcanos, forests, dumpsites, etc.)
- Determine requirements for the measurements including specifications for the UAV, etc.
- Adapt the system to enable the measurements
- Perform the measurements
- Evaluate the resulting data

Enthusiasm in handling hardware and related laboratory work is required. The candidate has good programming skills, preferably in python, or the strong willingness to acquire this knowhow. Experience in atmospheric science, biology, geology, vacuum technology, or related fields are considered as a bonus. There is some flexibility to tailor the project goals to the vision of the candidate. The work includes about 60% laboratory work and about 40% planning and evaluation of the data.

You will be part of a dynamic, cross-functional team whose mindset enables the realisation of state-of-the-art space instrumentation on major ESA and NASA missions. We provide insights into the complex world of developing space instrumentation and introduce you to strategies to master such challenges.

We welcome interested candidates to contact us for more information or directly submit an application:

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