



Negative Ion Beamline: Deceleration of ions for VLEO velocities

The Collaborative Research Centre 1667 “Advancing Technologies of Very Low-Altitude Satellites (ATLAS)”, funded by the German Research Foundation DFG, addresses the fundamental scientific and engineering challenges of rendering Very Low Earth Orbit (VLEO, about 200 km to 450 km altitude) accessible. These orbits are particularly beneficial for indispensable satellite services of our modern knowledge, information and communication society. Additionally, access to VLEO offers the opportunity to operate satellites without exposure or contribution to the increasing contamination of traditional orbits with space debris.

Simulation of VLEO conditions in a lab environment requires the generation of an atomic oxygen flow at a velocity of 7-8 km/s. A new concept for realizing such high speeds is based on a beam of fast negative oxygen ions, which are controlled by ion optical elements. This negative ion beamline shall be studied numerically. A critical step is the deceleration of the particles to the final target velocity. The goal of this thesis is to design, model and simulate a deceleration module for the ion beamline using the particle-based code PICLas.

Your tasks:

- Literature review on ion beam deceleration concepts
- Familiarization with the particle-in-cell code PICLas
- Design of a deceleration module for the ion beamline in exchange with the experimentalists
- Realization and simulation studies in PICLas
- Evaluation of the results and documentation in a thesis

Requirements:

- Bachelor or Master students in STEM
- interested in code development
- able to work independently and autonomously
- and optional: experience with Fortran

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Bachelor Thesis
or
Master Thesis
Opportunity

