



SAPIENZA
UNIVERSITÀ DI ROMA



VIPER

Vibro-mechanical and Inertial
Positioning Experiment on Rocket

The VIPER mission, selected for launch on board the Improved Orion suborbital rocket, is scheduled to fly in March 2026 within the context of the European Space Agency's REXUS/BEXUS programme. The mission, entirely developed by master's and PhD students at Sapienza University of Rome, will feature two different experiments which aim to better characterize our understanding of flight vehicle structural dynamics and the effect of the launch vehicle environment on small payloads.

The first experiment, dedicated to dynamic system characterization, focuses on the analysis of the variation of modal frequencies and mode shapes of the REXUS launch vehicle throughout its flight envelope. Accordingly, the launcher dynamics during re-entry will also be observed to further improve our understanding of the modal behavior of the system during this phase.

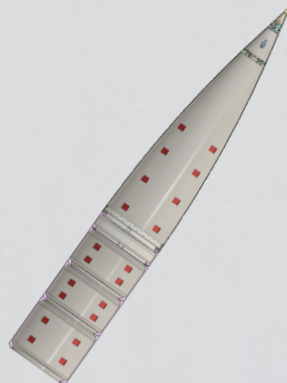
The second experiment is focused on developing vibration mitigation strategies for payload systems. The objective of the experiment is to identify and validate effective solutions for minimizing vibrational loads transmitted to payloads by testing innovative materials and optimized structural junctions.



LAUNCH VEHICLE STRUCTURAL DYNAMICS

OBJECTIVES

- Collect dynamic response data
- Characterize time variations in the dynamic responses and modal parameters of the launch vehicle
- Characterize the dynamic behavior during the re-entry phase



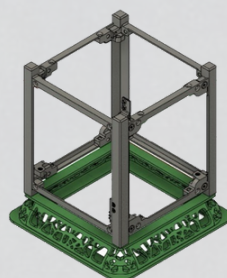
EXPECTED RESULTS

- To advance and validate launcher designs and predictive models
- Support the development of sustainable and reusable launch systems

PAYLOAD DESIGN & COMFORT

OBJECTIVES

- Asses the impact of different materials and junctions on CubeSat's structural response and mitigate the vibration environment
- Study optimized joint configurations to have better control over the payload's dynamical response to vibrations



EXPECTED RESULTS

- Support the research into new materials and junctions for enhanced payload design
- Reduce the probability of mechanical failure for small payloads during flight and deployment



@vipер.s5lab



linkedin.com/company/viper-s5lab



viper.rexus2025@gmail.com