IAF SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)
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THE IMPORTANCE OF HANDS-ON STUDENT ACTIVITIES : CHALLENGES AND LESSONS LEARNED FROM THE ROMULUS STRATOSPHERIC EXPERIMENT.

Abstract

Hands-on activities are highly beneficial to post-graduate students education for integrating their theoretical knowledge and in preparation of their involvement in industry and Space Agency programmes at the start of their career. Working on a stratospheric experiment allows them to learn about all the project phases, the implementation times and the difficulties of integration up to the test and launch phase. It is an important opportunity to strengthen technical skills and put into practice all the lessons learned during the university training cycle. The S5Lab (Sapienza Space Systems and Space Surveillance Laboratory) research group Sapienza University of Rome supports these activities by allowing students to participate in different projects as in the REXUS/BEXUS (Rocket and Ballon Experiments for University Students) program which allows European students to compose a team up and perform science and technology experiments on rockets or balloons. After the flight of two BEXUS experiments in 2016 and 2019, S5Lab has supported the ROMULUS Team (Radio Occultation Miniaturized Unit for Leo and Upper Stratosphere), composed of twelve Italian post graduate students which has been selected to fly

their experiment in the 14th cycle of the REXUS/BEXUS Programme. Its main objective is to perform GNSS Radio Occultation measurements with SDR (Software Defined Radio) technology providing a low-cost solution to current climate monitoring techniques as a function of the increase of anomalous and severe atmospheric phenomena due to climate change; it was designed, developed and tested since December 2021 and will be launched aboard the BEXUS 32 stratospheric balloon in September 2023, from the Esrange Space Center in Kiruna (Sweden), with the support of SNSA, DLR and ESA that are coordinating the REXUS/BEXUS Programme. The main lessons learned that the team gained from the project are related to team management, stakeholders research and sponsorships obtainment, first-experiences with space systems development including dealing with non-conformances and component failures. The 2-year duration of the Programme and the involvement of students in ROMULUS within their University curricula is also part of these lessons learned. The following paper presents the implementation, integration and test phases of the experiments and the main lessons learned by the students during the two years of work . Particular attention is paid to the main challenges and difficulties faced. The future plans and preliminary report on the launch campaign conducted work (to be held in September 2023) will be described.