

IAF SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)
On Track - Undergraduate Space Education (3)

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FROM STRATOSPHERIC EXPERIMENTS TO CUBESAT DEVELOPMENT: LESSONS LEARNED FROM THE S5LAB PARTICIPATION INTO ESA HANDS-ON EDUCATIONAL PROGRAMMES

Abstract

The Sapienza Space Systems and Space Surveillance Laboratory (S5Lab) at Sapienza University of Rome offers hands-on projects opportunities, focused on space systems development, to students in aerospace engineering. Particular effort has been dedicated in the recent years, to enhance the laboratory students participation within the European Space Agency (ESA) hands-on educational Programmes. At the moment, S5Lab is one of the only laboratories in Europe to be simultaneously involved into two of these ESA programmes. In late 2018, a group of ten students, predominantly third-year BSc, has been selected for the REXUS/BEXUS Programme, managed by SNSA (Swedish National Space Agency), DLR (German Aerospace Center) and ESA, for designing, manufacturing, testing and launching their experiment, named TARDIS, on-board a BEXUS stratospheric balloon. Another group of students from S5Lab is participating since 2017 in the ESA Fly Your Satellite! Programme, addressed at offering launch opportunities to University students team willing to manufacture, test and launch their CubeSat. The laboratory is participating with LEDSAT, a 1-U CubeSat equipping Light Emitting Diodes (LEDs) on all the satellite external surfaces, which will be launched in 2020. The participation into these Educational Programmes is a great opportunity to extend and complement the education of students at all academic levels, improving their soft skills, practical experience on real flight hardware and teamwork capabilities. Furthermore, these Programmes schedules can fit into the students academic curricula and comply with the gained knowledge at different stages of their University years. In particular, the manufacturing of a stratospheric experiment is usually applicable to third-year BSc or first-year MSc, even without any previous experience in small hands-on projects. A second-year MSc student, along with PhD students, is involved into nano-satellites development and testing. Last but not least, the students have the possibility to practically access Space Agencies' technical reviews procedures in their education years, as significant preparation step for their involvement in future space projects. The acquired knowledge during these hands-on projects represents the robust fundamentals for the prosecution of the students' career after graduation, both in the academic or industrial framework. This paper describes the lessons learned from the involvement of students at all levels in ESA hands-on educational programmes. By using the two on-going projects as study cases, the paper will focus on the obtainable education improvements offered when complementing academic theoretical education with the hands-on projects activities. Furthermore, examples of educational return during specific experiences or events will be discussed.