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EIRSAT-1: THE EDUCATIONAL IRISH RESEARCH SATELLITE

Abstract

The Educational Irish Research Satellite, 'EIRSAT-1', is a collaborative space project, developed by students and staff of University College Dublin (UCD), that aims to build, launch and operate the first ever Irish satellite. EIRSAT-1 is one of six CubeSats which was selected by ESA Education for the 2017 edition of the Fly Your Satellite programme. The project will provide hands-on training and education for undergraduate and graduate students at UCD in all major aspects of satellite development, under expert guidance from academic and industry mentors. The project is supported by a number of industrial partners including ENBIO, SensL, IDEAS, Parameter Space and Nammo Ireland.

The primary payload, GMOD, the Gamma-ray Module, is a novel gamma-ray detector incorporating Silicon Photomultipliers (SiPMs) produced by Sensl, a Cerium Bromide (CeBr3) scintillator, and an Application Specific Integrated Circuit (ASIC) known as SIPHRA which was developed by Integrated Detector Electronics AS. GMOD is the latest in a series of detectors which have been developed at UCD with support from ESA in order to address the technical challenges of building sufficiently advanced next-generation high-energy astrophysics missions to meet the scientific requirements while being of manageable mass and complexity.

EMOD, the ENBIO Module, is an experimental payload which is designed to demonstrate and test the performance of the SolarBlack and SolarWhite spacecraft surface treatments, which have been developed by ENBIO for use on ESA's Solar Orbiter mission. EIRSAT-1 will provide the first measurements of SolarWhite and SolarBlack performance in Low Earth Orbit.

WBC, Wave Based Control, is a novel control algorithm which has been developed at UCD. The WBC approach excels at controlling flexible or under-actuated systems and will be evaluated by controlling EIRSAT-1's attitude.

All payloads contain technology that will be flown in space for the first time, marking an important step in their space heritage. The project will have a significant impact on educational programs and future skills by placing space flight know-how into students' hands for the first time. There will be a wider societal impact, through an exciting outreach STEM program. The launch of an Irish CubeSat is a stated aim of the Irish Space Industry Group who have recognised the importance of developing heritage to enable growth in the space sector in Ireland, with a plan to double the workforce in that sector by 2020.