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SCIENTIFIC EXPERIMENTS ON BOARD THE GOLIAT CUBESAT

Abstract

Planned to be launched in 2011 on Vega's maiden flight, Goliat is intended to prove the possibility of investigating the near Earth environment using small satellites. The cubesat class satellite has a payload consisting of a narrow angle digital camera for imaging purposes, a micro-meteoroids detector and a radiation detector. This paper presents the two scientific experiments flying on board this first Romanian nano-satellite.

The first scientific objective defined for the Goliat mission was the characterization of space dust particles having their dimensions in the μm range. For this purpose a polyvinylidene fluoride film detector was mounted on the -Z side of the satellite for detecting high velocity impacts. The paper presents the in house measurements on the laboratory unit and the integration of the detector assembly on the satellite.

The second scientific objective is the measurement of the total radiation dose on orbit. The detector consists of a scintillating plastic converting the incident radiation in visible light and a pin diode measuring the light intensity. The signal from the diode is integrated and the value is read at the DAC channel of a micro-controller who stores it together with the time and the satellite position. We present the calibration and the measurements conducted in the laboratory prior to the launch. The Vega deployment will provide an opportunity for Goliat to enter a highly elliptical orbit with the the apogee and the perigee of 1450 and 340 km respectively. This orbit offers the possibility of investigating the radiation at different altitudes inside the Van Allen inner belt. The detector is considered for future development with the purpose of measuring the radiation spectrum and differentiating based on the incident particle. The small scale of the overall system must be maintained for easy integration on board nano-satellites for single or formation flying missions.