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CUSP CUBESAT FOR SPACE WEATHER AND SOLAR FLARES X-RAY POLARIMETRY: AN OVERVIEW OF THE DEVELOPMENT STATUS

Abstract

The CUbesat Solar Polarimeter (CUSP) project, funded by the Italian Space Agency (ASI) under the national CubeSat program ALCOR, aims at measuring the linear polarization of solar flares in hard X-rays (25-100 keV energy band) thanks to a space system composed by two 6U CubeSats. This mission will allow to improve the knowledge of violent eruptions that occur on the Sun, involving magnetic reconnection and particle acceleration toward the interplanetary space. CUSP will assess the correlation between the polarization of solar flares, the occurrence of Coronal Mass Emissions (CME) and Solar Energetic Particles (SEP) events at the Earth location. So, this project has a double aim: 1) contribute to improve heliophysics knowledge by means polarimetry in X-rays; 2) contribute to space weather monitoring of the Sun. To enable these two objectives, there is a particular demanding technological goal that foresees the realization of a polarimeter, based on double-phase Compton scattering, that shall be able of a low detection threshold (20-25 keV) and the maintenance of this performance over the whole duration of the mission (3 years), in a particularly challenging radiative environment such as the polar orbit. CUSP has completed the phase A and is going to start the phase B in the first months of 2024. In the present paper, the CUSP project development status is described by sharing the main outcomes achieved at the Preliminary Requirements Review (PRR) for both space and ground segments, including the initial

activities carried out for the preliminary design phase and the description of breadboard testing activities to be performed. The perspectives of future development are also presented looking towards the design and verification phases.