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PLATO (PLANETARY TRANSITS AND OSCILLATION OF STARS) FOCAL PLANE ASSEMBLY: MODELS PHILOSOPHY AND PROTOTYPE TESTS RESULTS.

Abstract

PLATO (PLAnetary Transits and Oscillations of stars) is a medium-class astronomical science mission belonging to ESA Cosmic Vision Programme, dedicated to the detection and characterization of terrestrial exo-planets. In order to fulfill this overall mission goal, the PLATO mission has two main mission objectives: the detection and characterization of the transit signature of exo-planets in front of the parent star and the measurement of seismic oscillations of the central stars of exo-planetary systems and other selected stars. According to the baseline design, it is planned to mount 26 cameras on the same instrument bench for covering a large field of view with the highest possible photon statistics. Each PLATO camera consists of a telescope (TOU, Telescope Optical Unit), a focal plane assembly (FPA), and a detector electronics. Four CCDs are lodged in each FPA, they form the sensitivity area of the camera and provide extremely accurate photometry. The amount of cameras that have to be manufactured integrated and tested at the same time makes this mission the first space assembly-line production. This paper describes the models philosophy used in the PLATO mission and the results of a prototype designed in a grade of maturity of a flight-like model. The prototype of the thermo-mechanical structure of the Focal Plane Assembly has undergone several tests, from the thermo-balance tests to mechanical test as well as physical measurements to prove that the CCDs accurate position required by the scientists has been achieved. These tests prove that the FPA design has the level of maturity to perform an industrialization process.