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Science Goals and Drivers for Future Exoplanet, Space Astronomy, Physics, and Outer Solar System
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PLATO: REVEALING HABITABLE WORLDS AROUND SOLAR-LIKE STARS

Abstract

The question - “Are we unique or is there (similar) life out there?” - dates back several millennia. Since 1995 we know that (exo-)planets orbit other stars in the Milky Way. Meanwhile further ground-based and spaceborne instruments yielded a large amount of exoplanet systems around many stars.

PLATO (PLANetary Transits and Oscillations of stars) will be an exceptional future space mission to detect terrestrial exoplanets in the habitable zone of solar-type stars and the related characterisation of their bulk properties. It is a medium sized mission (M class) in course of the ESA Cosmic Vision 2015-2025 programme and will fundamentally enhance our understanding of the formation and the evolution of planetary systems.

The payload encompasses a cluster of 26 cameras including their focal plane assemblies and related electronics plus the on-board data processing system. It is a joint development and provision of the PLATO Mission Consortium (PMC), led by DLR as the principal investigator. OHB in Munich is part of the PMC and supports the payload development.

The optical system (Vis to NIR) features 6 lenses per telescope, thereof 1 aspheric, and 4 CCDs each focal plane with 4510 x 4510 pixels per CCD (pitch: 18µm). The total field of view is approx. 2250 deg. Once being launched to a large amplitude libration orbit around the Sun-Earth Lagrangian point L2 and after successful commissioning, the satellite will commence the first of two long observation phases in which a single field is monitored – yielding uninterrupted high precision photometric data in the visible band of very large samples of bright (mV 11) stars. Besides the long pointing periods an optional ”step-and-stare” phase is contemplated with several successive fields monitored for a few months each.

This paper will address the recent state of the payload development from system level point of view and will outline the related future scientific prospect.

Note: The members of the PLATO Mission Consortium shall be also recognised as authors of this paper. This includes scientists and engineers from 23 countries form and contribute to the PMC: Austria, Australia, Belgium, Brazil, Canada, Chile, Czech Republic, Denmark, France, Germany, Hungary, Italy, the Netherlands, Norway, Poland, Portugal, Romania, Slovenia, Spain, Sweden, Switzerland, United Kingdom, and USA.