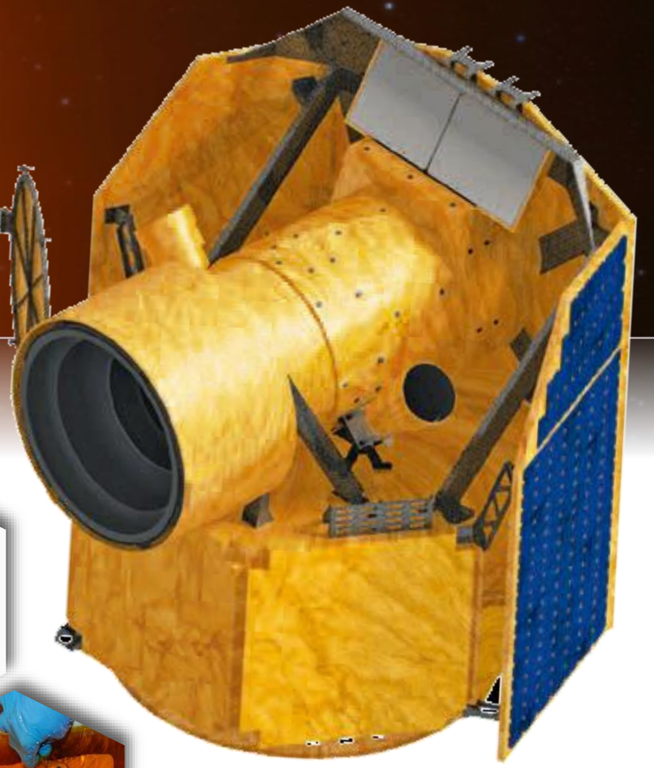
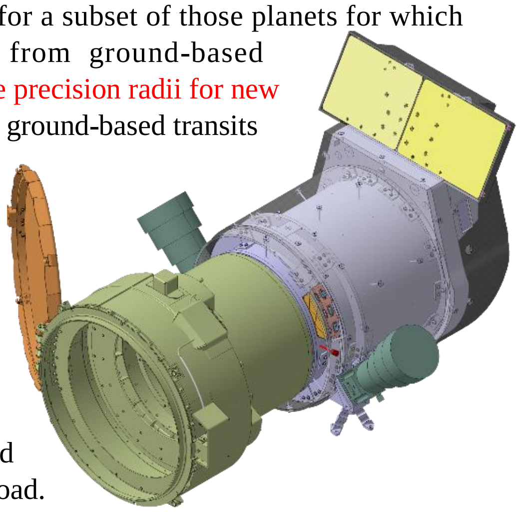
CHEOPS

CHARACTERIZING EXOPLANET SATELLITE



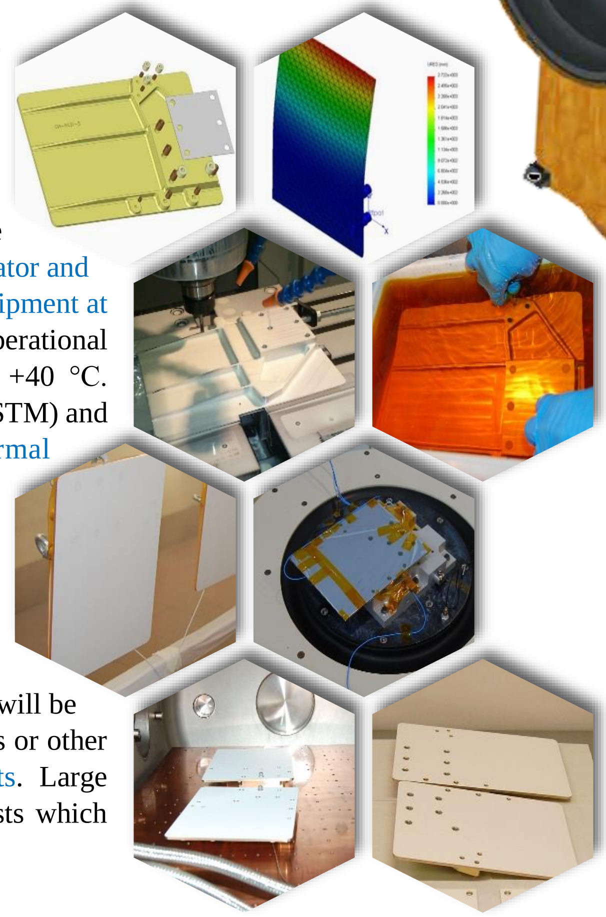
THE MISSION

CHEOPS – Characterising ExOPlanet Satellite is a small photometric observatory to be launched into low Earth orbit to measure transits of Exo-planets. CHEOPS is the first Small mission from ESA and was selected in October 2012 with a launch target for 2019. ESA is the Mission Architect and in charge of the spacecraft development and launcher procurement. The Member States contribution is led by University of Bern (UBE). The mission's main science goal is to search for transits by means of ultrahigh precision photometry on bright stars already known to host planets. By being able to point at nearly any location on the sky, it will provide the unique capability of determining accurate radii for a subset of those planets for which the mass has already been estimated from ground-based spectroscopic surveys. It will also provide precision radii for new planets discovered by the next generation ground-based transits surveys (Neptune-size and smaller). The mission is flying a single medium-size telescope (30 cm aperture, 1.2 length including baffle). All platform requirements are aimed at supporting the functionality of the telescope and its ultrahigh photometric precision. The main implications for the platform are related to pointing capabilities and thermal environment for the payload.



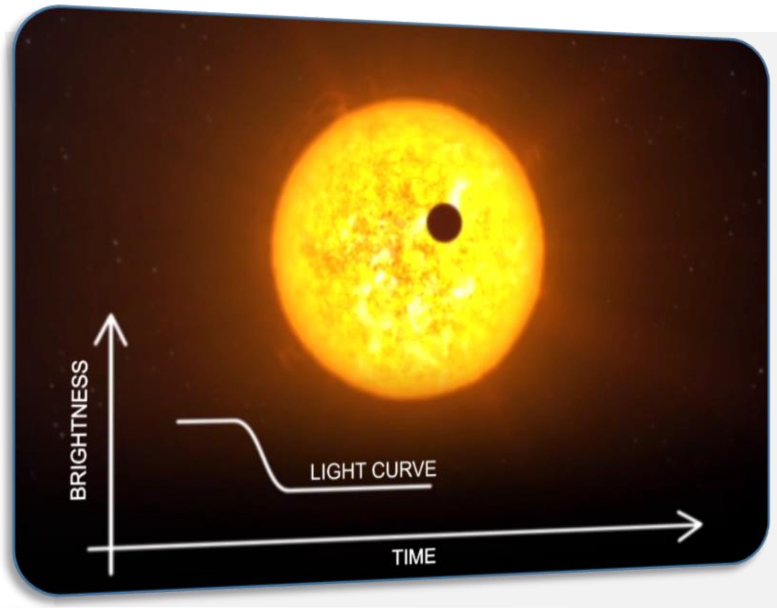
ROLE OF ADMATIS

Technical objective is to develop two radiator assemblies for the scientific instrument of the CHEOPS satellite. Proper thermal control at instrument and spacecraft level is one of the key components to mission success. The Focal Plane Array (FPA) requires 10mK and Front-end Electronics (FEE) 50 mK temperature stability with -55 °C and -10 °C operational temperatures. FPA radiator and the associated FEE radiator are responsible to keep these equipment at optimum working temperature in all mission phases while the operational operational temperature range of spacecraft is between -70 and +40 °C. ADMATIS is responsible for the Structural and Thermal Model (STM) and Proto Flight Model (FPM) delivery. Design activity included thermal and structural FE analysis to optimize mechanical and thermal properties. Raw material of radiators is aluminium alloy, baseline machining processes are NC milling and turning. Radiators will be chromate conversion coated to improve corrosion resistance and adhesion to paints and glues. Radiative areas will be coated with thermal control system (white paint or secondary surface mirror, SSM) to ensure the proper heat rejecting. Vacuum bake-out will be performed to remove organic contaminants and residues of solvents or other volatiles. Verification included the mechanical and thermal tests. Large number of MGSE tools has been developed for environmental tests which were also managed by ADMATIS.



MISSION SUMMARY

INSTRUMENT	32 cm reflective an-axis telescope
PHOTOMETRIC PRECISION	20 ppm
WAVELENGTH	Visible range: 400 to 1100 nm
ORBIT	Sun-synchronous Low Earth Orbit, altitude 650-800 km
MASS	250 kg
DIMENSIONS	1.5 x 1.4 x 1.5 m
LIFETIME	3.5 years
TYPE	S-class mission
LAUNCH	2019
COSTUMER	UNIVERSITÄT BERN
MISSION ARCHITECT	esa
ADMATIS CONTACTS	Tamás BÁRCZY *general manager* tamas.barczy@admatis.com Zsolt KOVÁCS *project manager* kovacs.zsolt@admatis.hu



THE SCIENCE BEHIND CHEOPS

An exoplanet or extrasolar planet is a planet that orbits a star other than the Sun, a stellar remnant, or a brown dwarf. CHEOPS satellite will be investigate exoplanets with Transit photometry method. This method can determine the radius of a planet. If a planet crosses (transits) in front of the disk of its parent star, then the observed visual brightness of the star drops a small amount (shown on the left picture). The amount the star dims depends on the relative sizes of the star and the planet. When combine this method with the radial-velocity method (wich determines the planet's mass) one can determine the density of the planet and learns something about the planet's physical structure. The transit method also makes it possible to study the atmosphere of a planet.

Photo: Succesful Delivery Review Board meeting of CHEOPS Radiators STM model (Structural and Thermal Model) on 27 November 2014 in Miskolc with the participation of the Swiss consortium leaders.

Admatis Advanced Materials In Space

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