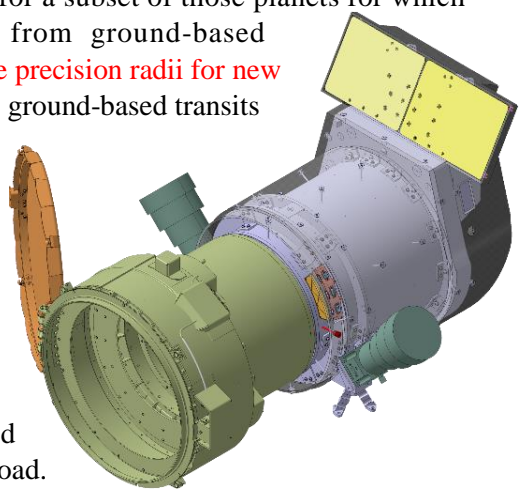


CHEOPS

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 2017. 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 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	2017
COSTUMER	UNIVERSITÄT BERN
MISSION ARCHITECT	esa
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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.

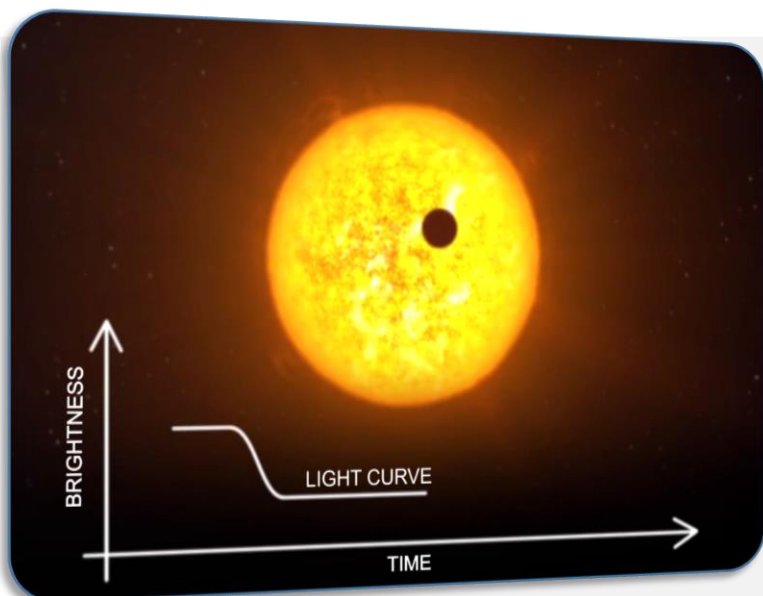


Photo: **Successful Delivery Review Board meeting** of CHEOPS Radiators **STM model** (Structural and Thermal Model) on **27 November 2014** in Miskolc with the participation of the Swiss consortium leaders.