

# CHEOPS: CHaracterising ExOPlanet Satellite – The Guaranteed Time Observing Programme and the Science of CHEOPS

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## Abstract

CHEOPS (CHaracterising ExOPlanet Satellite) is the first exoplanet mission dedicated to the search for transits of exoplanets by means of ultrahigh precision photometry of bright stars already known to host planets.

The first S- or small-class mission in ESA's Cosmic Vision 2015-2025, the mission is a partnership between Switzerland and ESA, with important contributions from 10 other member states. It will provide the unique capability of determining accurate radii for a subset of those planets in the super- Earth to Neptune mass range, 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 of ground- and space-based transit surveys. By combining known masses with CHEOPS sizes, it will be possible to determine accurate densities of subsaturn size planets, providing key insight into their composition and internal structure. By identifying transiting exoplanets with high potential for in-depth characterisation – for example, those that are potentially rocky and have thin atmospheres - CHEOPS will also provide prime targets for future instruments suited to the spectroscopic characterisation of exoplanetary atmospheres.

The high photometric precision of CHEOPS will be achieved using a photometer covering the 0.35 - 1.1 $\mu$ m waveband, designed around a single frame-transfer CCD which is mounted in the focal plane of a 30 cm equivalent aperture diameter, f/5 on-axis Ritchey-Chretien telescope.

CHEOPS will reach a photometric precision of 20 parts per million in a 6 hour observation of a v-band magnitude 9, G-type ( $T_{\text{eff}}=5500\text{K}$ ) dwarf, commensurate with measuring the transit depth of an

Earth-size planet transiting the same star to a signal-to-noise of 5. In the case of fainter stars, CHEOPS will reach a photometric precision of 85 parts per million in a 3hour observation of a v-band magnitude 12, K-type ( $T_{\text{eff}}=4500\text{K}$ ) dwarf.

CHEOPS will launch in the timeframe of October-November 2019. 80% of the observing time in the 3.5 year nominal mission lifetime will be taken by the Guaranteed Time Programme, defined by the CHEOPS Science Team. The remaining 20% will be available to Guest Observers from the Community through a competitive proposal submission process, comprising annual Calls and a discretionary time component.

In this poster we give an overview of the science that will be address by the Guaranteed Time Observing Programme which is under the responsibility of the CHEOPS Science Team.

## Acknowledgements

The author acknowledges the key contributions of the CHEOPS Consortium led by Prof Willy Benz at the University of Bern (CH); the CHEOPS Project Team at ESTEC; ESA colleagues at ESTEC and ESOC; the prime spacecraft Contractor Airbus Defence and Space ECE (ES); GMV (ES), INTA (ES) and DEIMOS Engenhaira (PT), without which CHEOPS would not be possible.