

Twinkle – a Low-Earth Orbit Visible and Infrared Exoplanet Spectroscopy Observatory

Twinkle is a small, dedicated satellite that has been conceived to measure the composition of exoplanet atmospheres and solar system objects. This cost-effective spacecraft is being constructed on a short timescale in the UK and is planned for launch in 2022. The satellite uses a high-heritage satellite platform and instrumentation built by a consortium of UK institutes. Twinkle will carry a 45cm telescope with two instruments (visible and near-IR spectrographs providing simultaneous wavelength coverage from 0.4 to 4.5 μ m with resolving power up to $R \sim 250$) and will follow a Sun-synchronous low-Earth polar orbit. With the model taken to develop the Twinkle satellite, scientists worldwide will be able to directly use Twinkle to carry out their research.

Twinkle is being built to carry out cutting-edge science: Twinkle will use visible and infrared spectroscopy to analyse the chemical composition and weather of exoplanets in the Milky Way, including super-Earths (rocky planets 1-10 times the mass of Earth), Neptunes, sub-Neptunes and gas giants like Jupiter. It will also be capable of follow-up photometric observations of 1000+ exoplanets. Photometric measurements, taken simultaneously in the visible and the infrared bands, will allow orbital parameters of systems to be well-constrained and enable precise measurements of transit timing variations present in multiple planetary systems. The exoplanet targets observed by Twinkle will be composed of known exoplanets discovered by existing and upcoming ground- and space-based surveys (e.g. K2, GAIA, Cheops, TESS). Solar system objects ideally suited for spectroscopic and photometric observations with Twinkle include asteroids and comet comae, for which the broad wavelength range allows the observation of key hydration, organic and volatile features in their spectrum.

This presentation will provide a summary of the mission and the approach taken. For more information, visit www.twinkle-spacemission.co.uk.

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