# Abstract for general public

**Detached Eclipsing Binary Stars as Benchmarks for ESA's PLATO mission**

Detached Eclipsing Binary Stars (DEBs) are a type of binary star system where two stars orbit each other in a way that they periodically eclipse one another. These eclipses provide a model-independent method to measure the fundamental properties of stars, such as their masses and radii with very high precision and accuracy.

The PLAnetary Transits and Oscillations of stars (PLATO) mission which will launch in 2026 with 26 telescopes of 20 cm class, that altogether acts like a telescope of 1 m class, is dedicated to discovering habitable exoplanets around Sun-like stars and to studying the stellar pulsations. It also has the goal to determine the accurate age of Planetary systems. PLATO needs a set of well-studied targets with very minimal errors in their fundamental parameters. These targets in technical terms are also known as Benchmark targets. Since DEBs can have masses and radii with very high precision and accuracy ($< 1\%$), they are used as reliable benchmarks for testing and calibrating the algorithms.

The accurate measurements estimated from DEBs help us to refine models of stellar structure and evolution, which provide a strong foundation for predicting stellar properties. The characterisation of exoplanets highly depends on the characterisation of their host stars. The more precise and unbiased the characterisation of stars, the more accurate will be the planet's characterisation. The masses and radii derived from DEBs are highly accurate and can serve as calibration points for the empirical mass-radius relationship. This enables us to estimate the properties of individual stars based on their masses and radii and the exoplanets.

In the proposed project we will test the reliability of accuracy and precision in the measurements by studying particular types of DEBs that have been observed by Transiting Exoplanet Survey Satellite (TESS) in multiple sectors, which are also in the proposed Long-duration Observation phase South (LOPS2) field of PLATO using different modelling algorithms. It will not only test the consistency of the measurement but also identify the dependency of errors with the eccentricity of the orbit, period of eclipses, total eclipses, number of individual eclipses, number of observed sectors by the TESS, and stellar activities. We will also measure the effective surface temperature of the stars using spectra and multi-band photometry with high precision, and study their evolution.