

Objectives

Determination of angular diameter throughout HR diagram

2021

Start of the CHARA-SPICA survey

Application of previous determinations to PLATO targets

2024

PLATO fields are known

Focus on exoplanet host stars and detected binaries

2027

First PLATO data

Sample

- COROT, SONG and TESS observable targets
- Core sample focused on F, G, K IV-V stars
- Extension to giants and earlier types
- Explore various metallicities

- Extension of the CHARA-SPICA sample to PLATO targets
- Follow-up detected binaries

Methods

Precise and **accurate** T_{eff} and θ
SBCR

Calibration of seismic scale relation

Provide R and T_{eff} for preparation pipeline

Binary detection:

- FLAG (CHARA-SPICA and GAIA complementarity in separation)
- Radius of the component(s)

Binary : mass ratio
radii of components

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First PLATO data

- seismic modelling requires mass, radius and T_{eff}
- provide θ as « model independent » observable
- derive R from θ and π
- derive T_{eff} from bolometric luminosity and θ

Teff usually determined from spectrophotometry or spectroscopy, dependent on model atmospheres (precise but not accurate)

except for limb darkening

watch out for extinction

- improvement of SBCR calibration
- ... to be used on stars with no direct θ measurement
- use determinations of radius and T_{eff} in...

Scaling relations : $\Delta\nu \propto \sqrt{\langle \rho \rangle}$ $\nu_{\text{max}} \propto g/c_s$

$$\frac{M}{M_{\odot}} \simeq \left(\frac{\nu_{\text{max}}}{\nu_{\text{max},\odot}} \right)^3 \left(\frac{\langle \Delta\nu \rangle}{\langle \Delta\nu_{\odot} \rangle} \right)^{-4} \left(\frac{T_{\text{eff}}}{T_{\text{eff},\odot}} \right)^{3/2}$$

$$\frac{R}{R_{\odot}} \simeq \left(\frac{\nu_{\text{max}}}{\nu_{\text{max},\odot}} \right) \left(\frac{\langle \Delta\nu \rangle}{\langle \Delta\nu_{\odot} \rangle} \right)^{-2} \left(\frac{T_{\text{eff}}}{T_{\text{eff},\odot}} \right)^{1/2}$$

$$T_{\text{eff}} = \left(\frac{4 F_{\text{bol}}}{\sigma \theta^2} \right)^{1/4}$$

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- extend target sample with PLATO targets
- derive T_{eff} and θ for targets that are bright enough
- apply improved SBCR to fainter PLATO targets
- insert newly determined parameters into PLATO database
- use Gaia, spectro, CHARA/SPICA data to produce models
- identify new multiple stars (complementary to Gaia) → flag
- measure radii of components
- estimate mass ratios from orbital elements (need multiple visits)

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