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Exoplanet Hosts and the PIC
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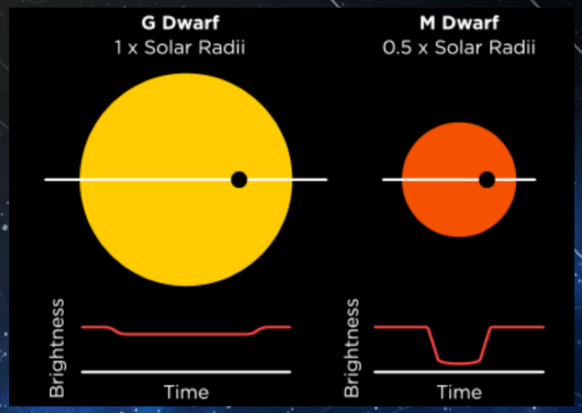
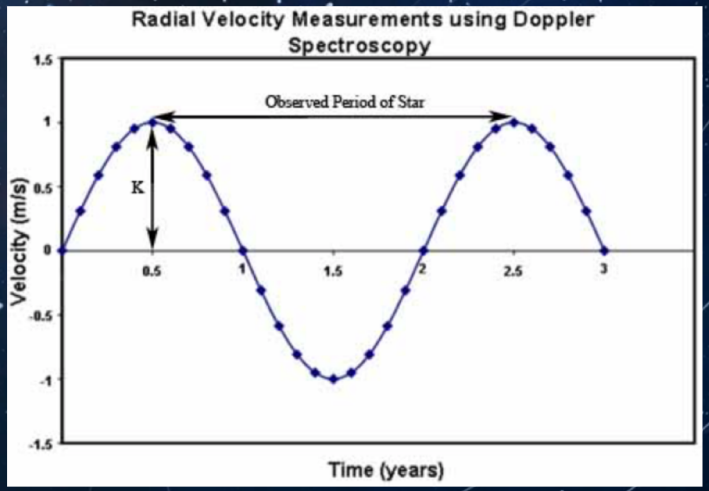
Why? A reminder:



Transit Depth = $(R_p/R_*)^2$

RV semi-amplitude = $(2\pi G/P_{orb})^{1/3}\ M_p \sin I / (M_*+M_p)^{2/3}\ \ 1/\sqrt{(1-e^2)}$



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Observable catalogue information

GAIA astrometry/position (=> astrometric light curves?)

Magnitudes (SED) observed and dereddened over as large a wavelength range as possible

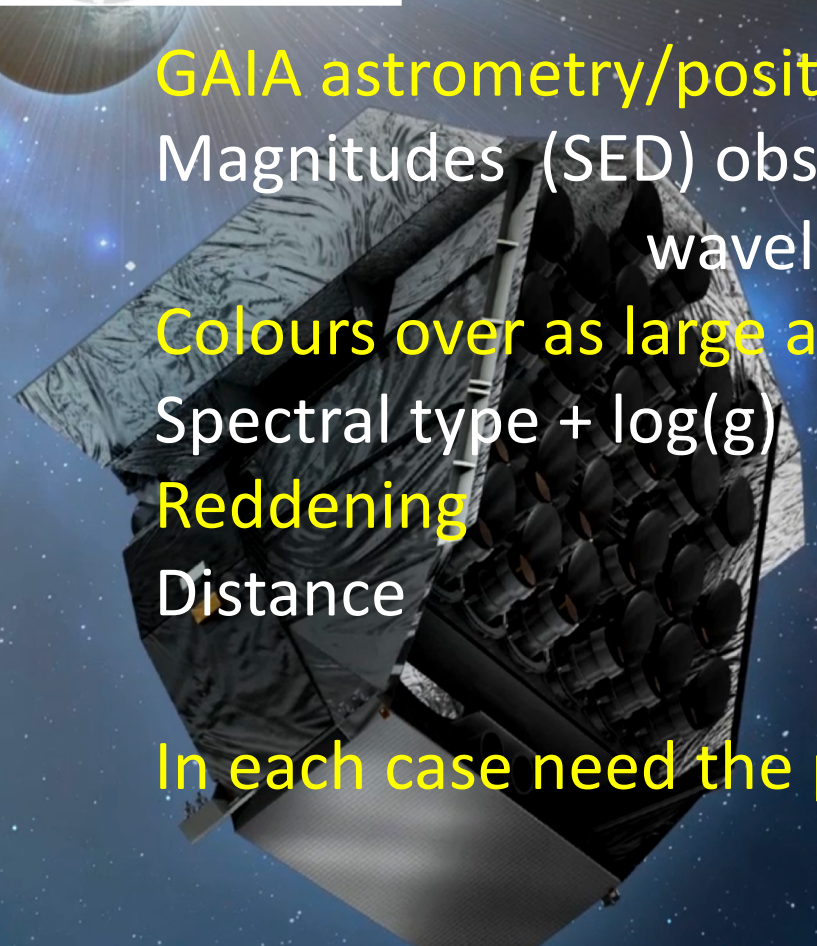
Colours over as large a wavelength as possible

Spectral type + log(g)

Reddening

Distance

In each case need the parameter error as well



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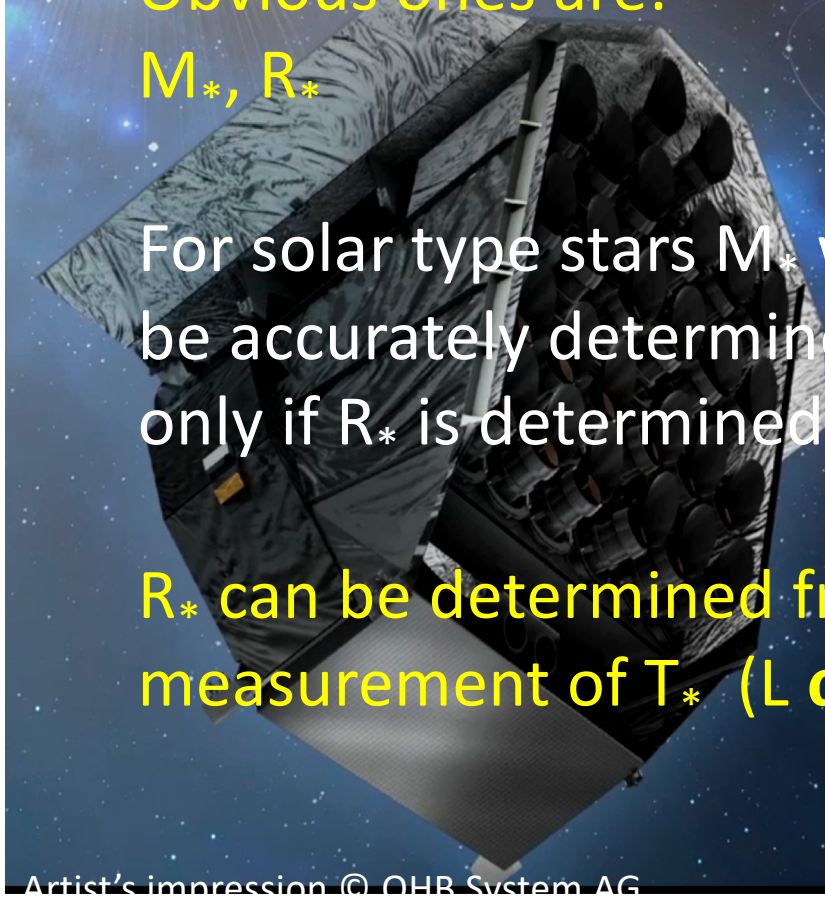
Stellar Parameters directly needed

Obvious ones are:
M_*, R_*

For solar type stars M_* will need to be initially estimated but can be accurately determined from asteroseismology techniques but only if R_* is determined through another means.

R_* can be determined from GAIA data but needs an accurate measurement of T_* ($L \alpha R^2 T^4$)



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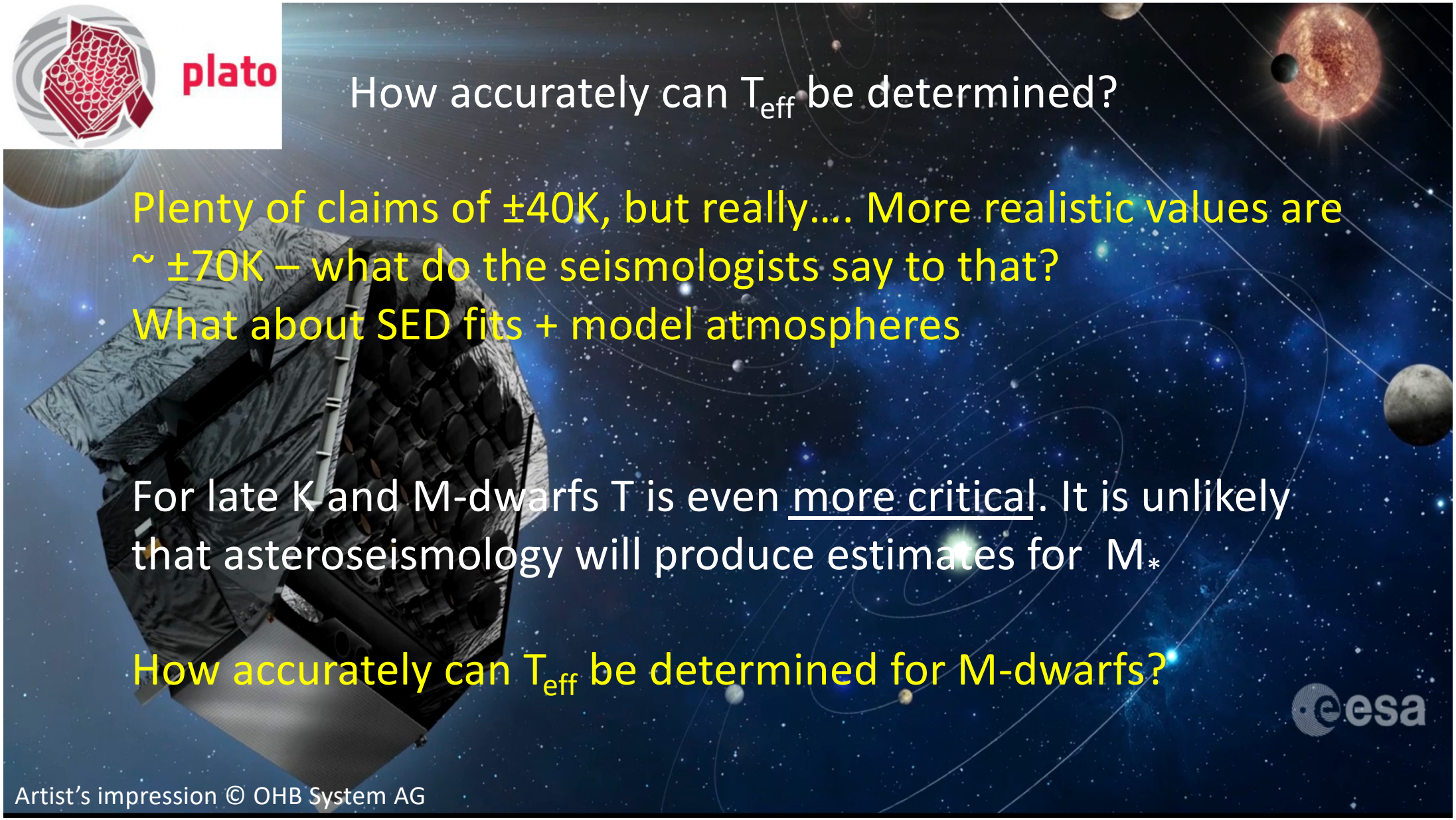
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How accurately can T_{eff} be determined?
Plenty of claims of ±40K, but really…. More realistic values are ~ ±70K – what do the seismologists say to that?
What about SED fits + model atmospheres
For late K and M-dwarfs T is even more critical. It is unlikely that asteroseismology will produce estimates for M_*
How accurately can T_{eff} be determined for M-dwarfs?
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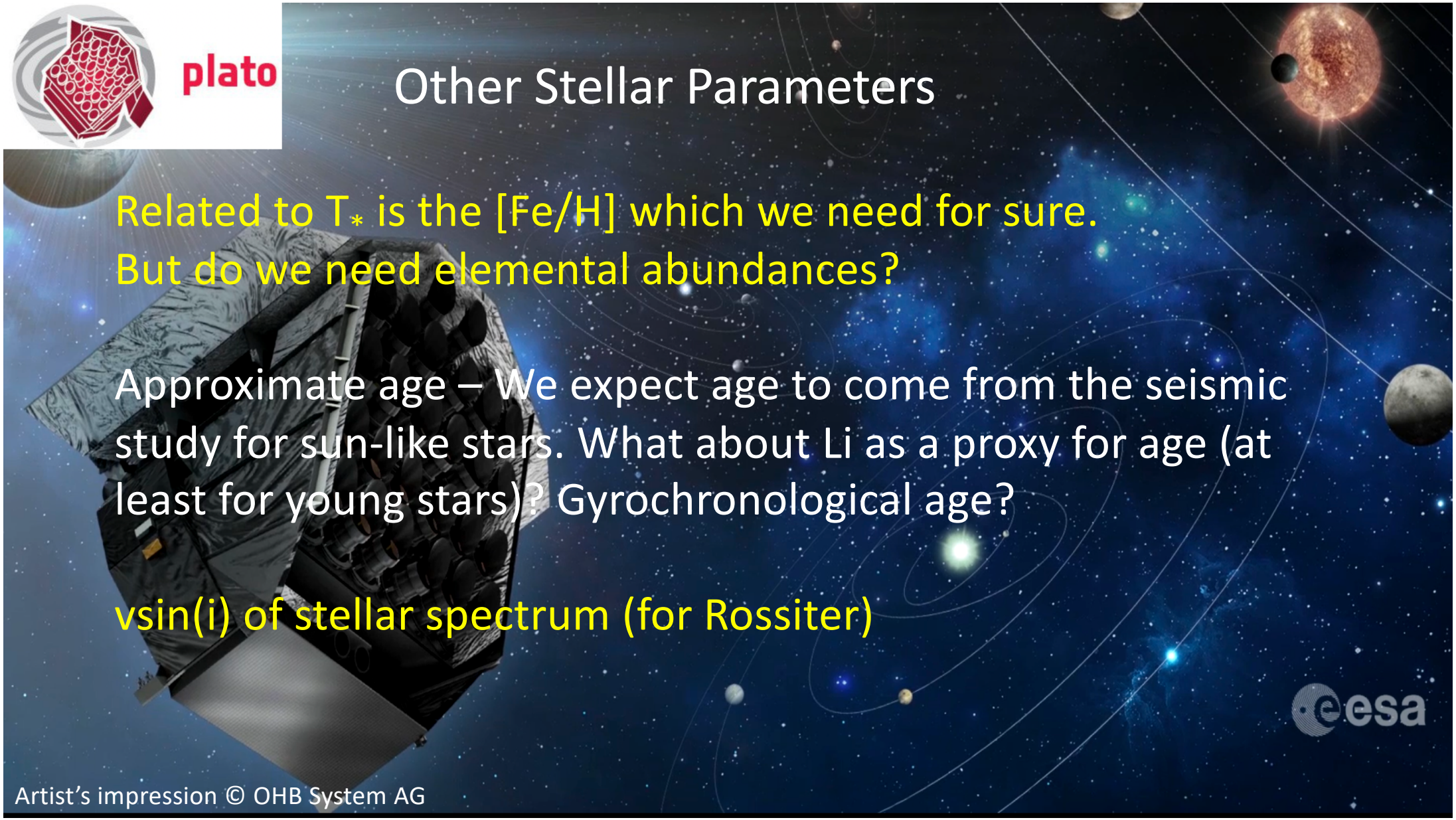
Other Stellar Parameters

Related to T_* is the [Fe/H] which we need for sure.
But do we need elemental abundances?

Approximate age – We expect age to come from the seismic study for sun-like stars. What about Li as a proxy for age (at least for young stars)? Gyrochronological age?

vsin(i) of stellar spectrum (for Rossiter)



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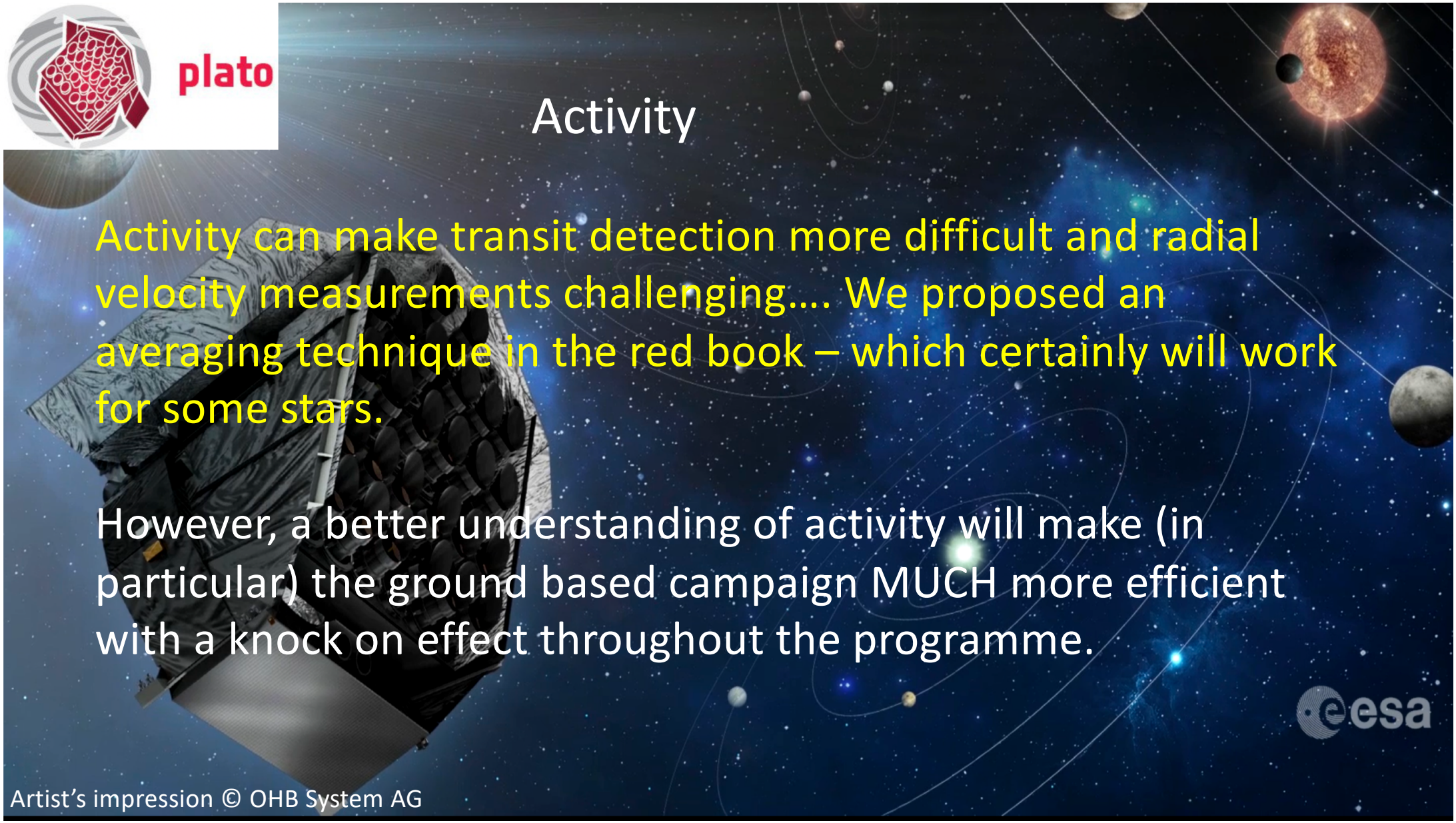
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Activity
Activity can make transit detection more difficult and radial velocity measurements challenging…. We proposed an averaging technique in the red book – which certainly will work for some stars.
However, a better understanding of activity will make (in particular) the ground based campaign MUCH more efficient with a knock on effect throughout the programme.
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Activity/Variability I

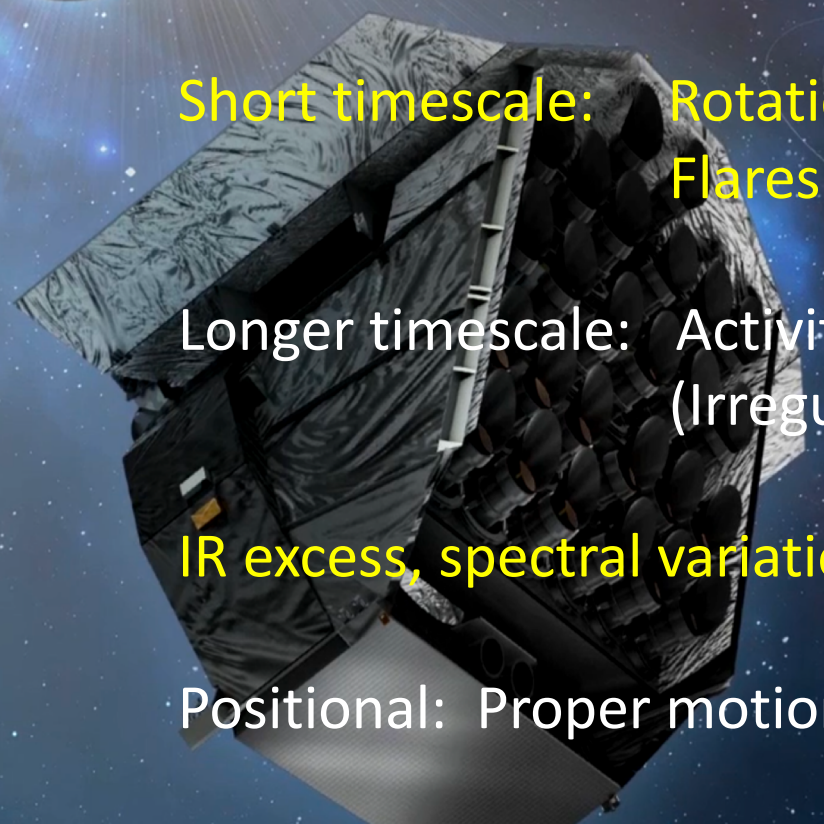
Here are some types of variability/activity:

Short timescale: Rotation cycle (from spots)
Flares and plages

Longer timescale: Activity cycle
(Irregular variability ?)

IR excess, spectral variations etc In general not really for mature stars

Positional: Proper motion (plus errors)



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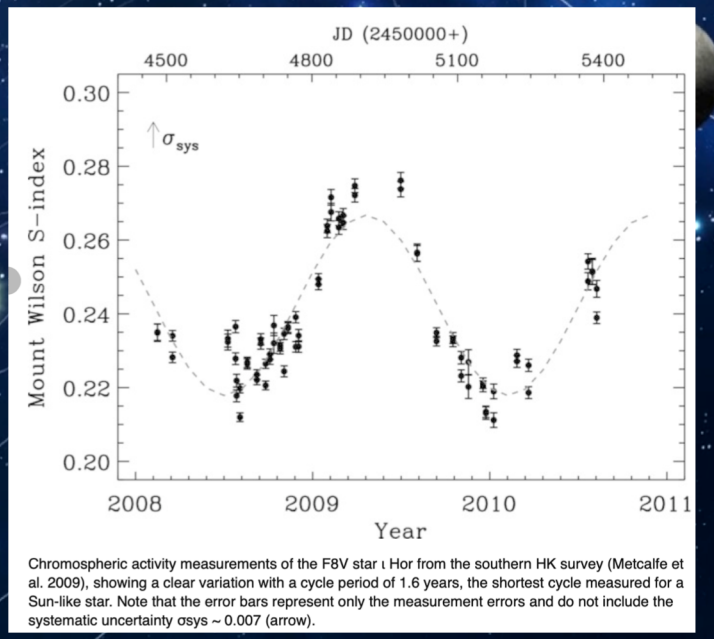
Activity/Variability II

Variability from TESS & ground based surveys. It is important that surveys are as near contemporaneous with PLATO observations – separations of more than a few years could mislead over expected activity at time of PLATO.

Chromospheric activity – H & K data? Is this an activity cycle? Activity cycles can be short.
Proxy for magnetic field (H&K, x-ray)

Huge amount of work



Chromospheric activity measurements of the F8V star ι Hor from the southern HK survey (Metcalfe et al. 2009), showing a clear variation with a cycle period of 1.6 years, the shortest cycle measured for a Sun-like star. Note that the error bars represent only the measurement errors and do not include the systematic uncertainty σsys ~ 0.007 (arrow).

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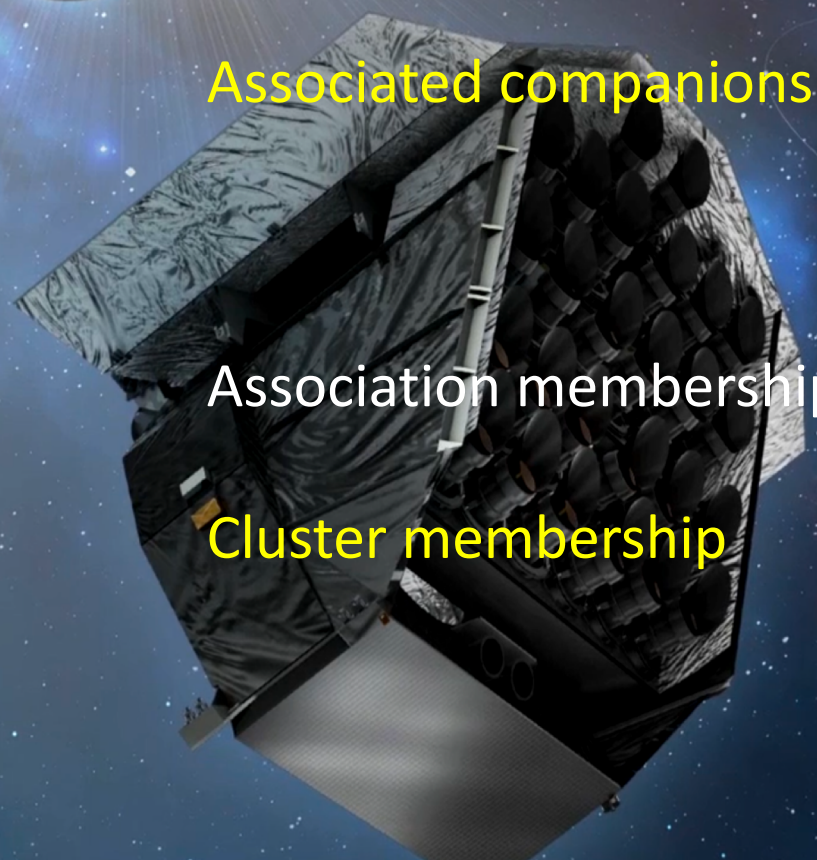
Stellar Multiplicity

Associated companions – Spectroscopic
Eclipsing
Visual (shared parallax)

Association membership (space motion)

Cluster membership



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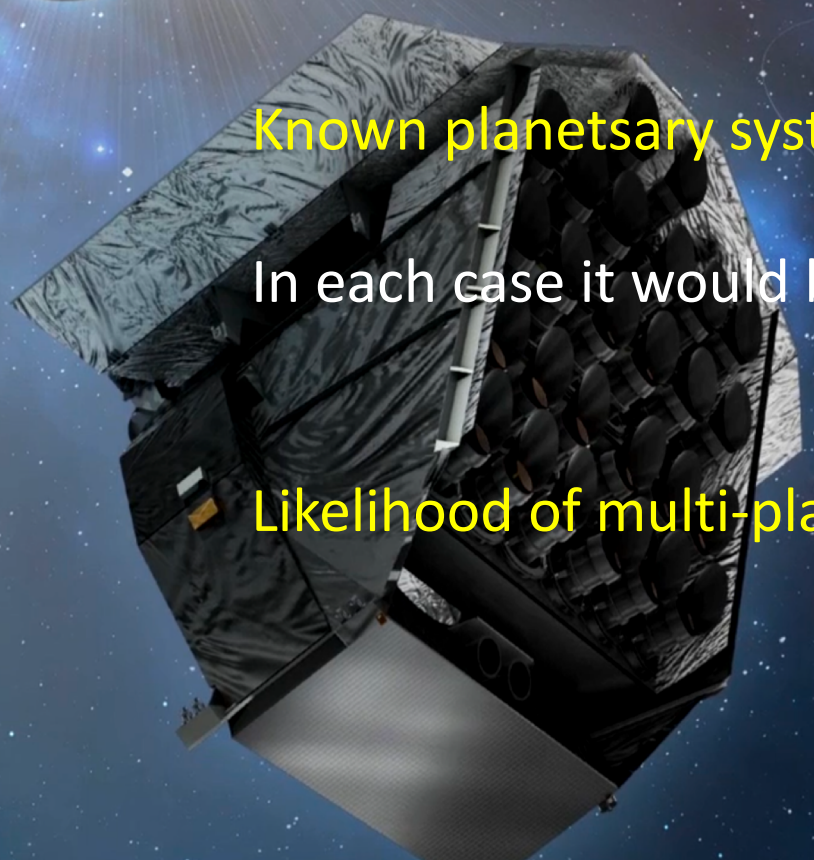
Known planetary systems

Known planetsary systems – transits: Kepler, K2, TESS, ground-based RV surveys

In each case it would be useful to have detection limits

Likelihood of multi-planet system – residuals in RV's?



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Environmental considerations

All in/outside the PSF

Distortions of the PLATO PSF

Companions (field)

Variability in background sources

Blending / Companion dilution

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A last point:

Given the growing importance of P5 (>245K stars) for statistical studies it is important to define the criteria (Alessandro's talk) or metric/matrixes early and stick to it throughout the target selection

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