Spectroscopic follow-up of TESS candidates with KESPRINT 1.5-3-m telescopes network

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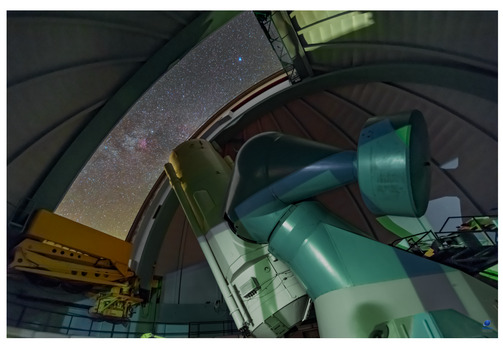
Motivation:

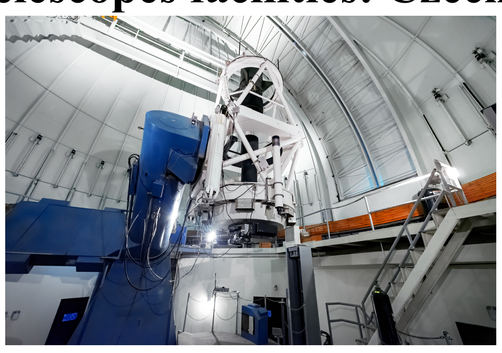
We report on the spectroscopic follow-up of TESS planetary candidates with a network of 2-3 meter telescopes located in Ondrejov, CZ, Tautenburg, DE, McDonald observatory, US and SMARTS telescope, CL, which use spectrographs with high resolving power. We coordinate our observing campaigns within the KESPRINT consortium and we significantly contribute to validation and characterization of mostly gas giant planets but not only. We briefly present involved observatories and their current observing campaigns.

Our KESPRINT 2-3-m telescopes facilities: Czechia, Chile, Germany, Texas USA

Operational from 2023

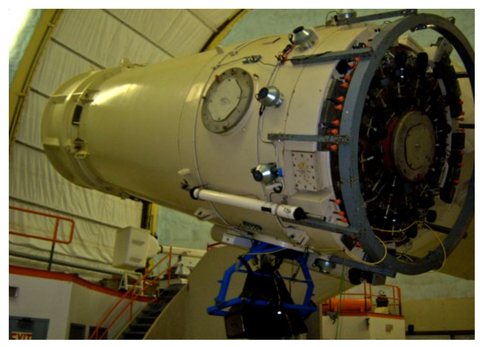


2-m Perek Telescope
OES spectrograph
R=40000
Coverage: 380-900 nm
Accuracy: 50 m/s (bright)
Vmag range: down to 13

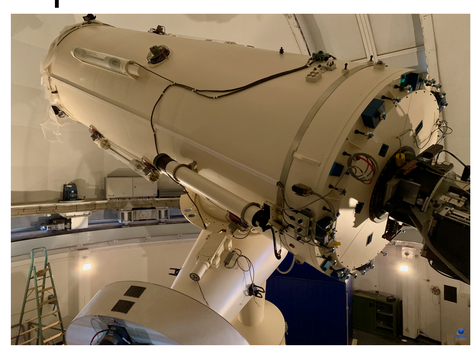


1.5-m CTIO SMARTS
CHIRON spectrograph
R= 80000
Coverage: 410-870 nm
Accuracy: 1 m/s
Vmag range: down to 13

Alfred-Jensch Telescope,
TLS spectrograph
R=50000
Coverage: 380-900 nm
Accuracy: 3 m/s (bright)
Vmag range: down to 13



Harlan J. Smith 2.7-m
Tull échelle spectrograp
R=60000
Coverage: 375-1020 nm
Accuracy: 3 m/s (bright)
Vmag range: down to 13



PlatoSpec ESO 1.5-m

Echlle spectograph	Parametere value
Wavelength coverage	360-680 nm
Spectral resolution	70k
Thermal stability	0.1deg
RV accuracy	3m/s
Calibration	ThAr+Iodine cell

Target selection:

Planetary candidates are selected based on their detectability with 2-m class telescopes. Most frequent targets are Hot and Warm Jupiter candidates. Furthermore, an important goal is also an initial screening of properties of exoplanet stellar hosts.

Warm Jupiters:

To date TESS has found nearly 70 candidate WJs, although many of these are unconfirmed. With our KESPRINT CHIRON radial velocity (RV) survey, we are performing a long-term monitoring of some confirmed WJs to search for additional companions, as well as Doppler follow-up observations of new candidates to determine their mass, radius, and orbital parameters. Figure 1 shows the radius versus period diagram for TESS WJs.

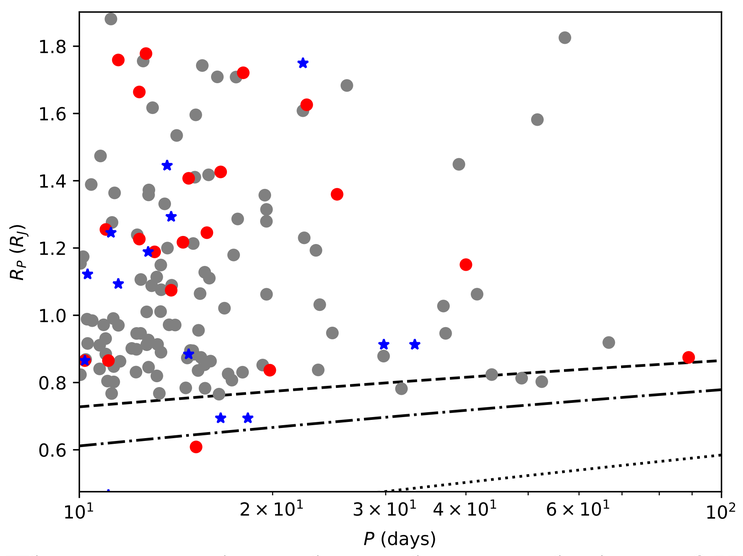


Figure 1: The gray points show the population of WJs predicted to be discovered by TESS around stars with V < 11.5 (bright enough to observe with CHIRON) by Barclay et al. 2018. The blue stars show the actual TESS confirmed and candidate WJs on our current target list, and the red points less secure TESS candidates that are not currently on our target list, but may be added if theyare confirmed. The dashed, dot-dashed, and dotted lines correspond to planets with RV semi-amplitudes of 20 m s−1, 12 m s−1, and 5 m s−1, respectively.

Hot Jupiters (HJs):

Hot Jupiters are gas planets which are characterized with orbital periods P < 10 days. These short orbits rise numerous questions about their formation process. Furthermore, HJs are very favorable targets for the further ground-based follow-up and characterization of their atmospheres.

Our telescope network is capable of observing and validating of candidates with radial velocity semi-amplitudes down to few tens of m/s. We are following-up about a dozen targets from TESS. An example is in Fig. 2.

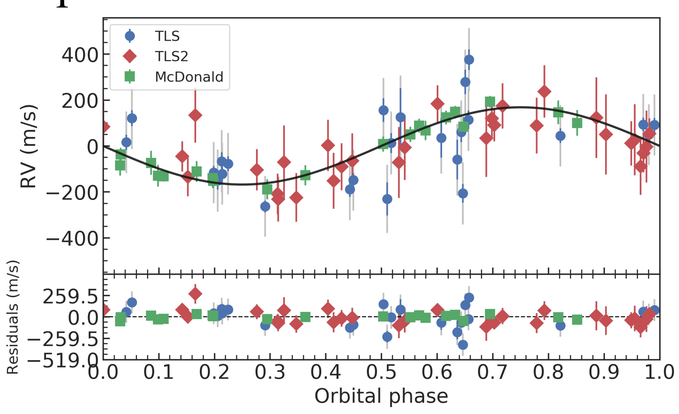


Figure 2: HJ planetary candidate Kabath et al in prep. 2021

Brown dwarfs (BDs):

We were able to confirm the first TESS transiting brown dwarf orbiting star TOI-503. This particular BD is interesting because it populates the high mass end of the BDs dessert. Figure 3 presents the RV curve obtained with our network and other collaborating facilities (Subjak et al. 2020, AJ, 159,151S).

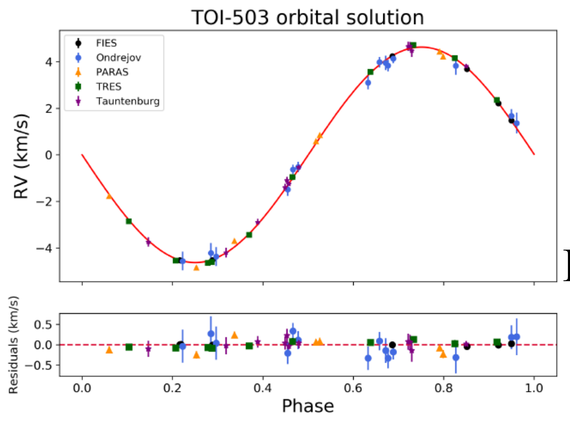


Figure 3: RV curve of the TOI-503 system hosting a BD. Figure from Subjak et al. 2020, AJ, 159,151S.

Our websites:

http://kesprint.science
http://stelweb.asu.cas.cz/plato
http://stelweb.asu.cas.cz/exogroup/

Any questions?
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