

SOPHIE and HARPS-N spectroscopy of *Kepler* transit candidates

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Abstract

In this presentation, we present our results based on SOPHIE and HARPS-N follow-up observation of *Kepler* transiting candidates. Our large programme led us to characterise 24 planets and brown dwarfs up-to-now, for which some of them will be announced during this meeting. The presentation will specially focus on new long-period giant transiting exoplanets recently characterised.

1. Introduction

We started in July 2010, one month after the first *Kepler* transiting candidate release [6], a large programme of radial velocity follow-up observations with the SOPHIE spectrograph, mounted at the 1.93-m telescope of Haute-Provence Observatory (France). This programme is now followed by observations with the new HARPS-N spectrograph, commissioned in mid-2012 and mounted at the 3.6-m TNG telescope in La Palma. We present our radial velocity follow-up programme and highlight our latest discoveries and results with newly established planets.

2. Characterisation of *Kepler* transiting planet and brown dwarfs

Thanks to SOPHIE and HARPS-N observations, we characterised up to 24 transiting planets and brown dwarfs among the list of *Kepler* candidates [3]. These sub-stellar objects are listed in Table 1. We display in Fig. 1 the mass-radius diagram of the *Kepler* planets. The planet characterised by our programmes are

highlighted in red (SOPHIE data only) and blue (both SOPHIE and HARPS-N data).

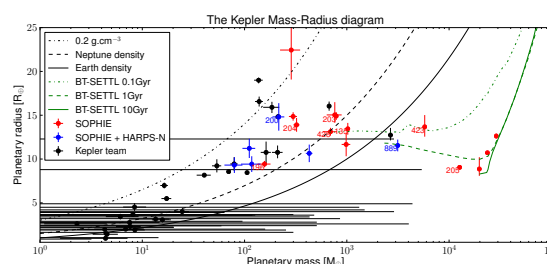


Figure 1: Mass – Radius diagram of the *Kepler* transiting planet and brown dwarfs characterised so far.

3 New long-period giant transiting exoplanets

Among the planets that we characterised so far, two of them have an orbital period longer than one month (see Fig. 2). Those planets are very important to further constrain the theories of planet formation, migration and evolutions. They will be presented in details during this presentation.

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Table 1: List of *Kepler* planets and brown dwarfs characterised by SOPHIE or/and HARPS-N.

KOI ID	Kepler ID	Period [d]	Mass [M_{jup}]	Radius [R_{jup}]	Ref.
KOI-13	Kepler-13	1.76	<14.8	2.2	[16]
KOI-135	Kepler-43	3.02	3.23	1.20	[4]
KOI-142	Kepler-88	22.34	0.62	—	[2]
KOI-196	Kepler-41	1.85	0.55	0.89	[15]
KOI-200	Kepler-74	7.34	0.68	1.32	[11]
KOI-202	Kepler-412	1.7	0.94	1.33	[8]
KOI-203	Kepler-17	1.49	2.47	1.33	[4]
KOI-204	Kepler-44	3.25	1.02	1.24	[4]
KOI-205	—	11.72	39.9	0.81	[10]
KOI-415	—	167	62.1	0.79	[13]
KOI-423	Kepler-39	21.09	18.0	1.22	[5]
KOI-428	Kepler-40	6.87	2.2	1.17	[14]
KOI-889	Kepler-75	8.88	9.9	1.03	[11]
KOI-XXX	—	5.3	2.82	1.45	[1]
KOI-XXX	—	12.9	2.86	1.13	[1]
KOI-XXX	—	8.6	0.84	1.99	[1]
KOI-XXX	—	30	78.0	0.99	[9]
KOI-XXX	—	52	95.8	1.17	[9]
KOI-XXX	—	87	1.45	0.94	[17]
KOI-XXX	—	51	0.65	0.97	[7]
KOI-XXX	—	3.8	0.23	0.99	[12]
KOI-XXX	—	3.2	0.32	1.09	[12]
KOI-XXX	—	10.3	0.28	0.86	[12]
KOI-XXX	—	3.5	1.33	1.09	[12]

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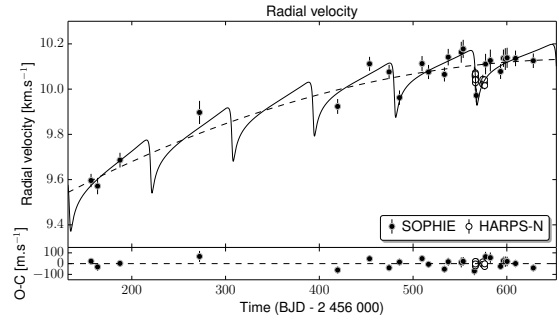


Figure 2: SOPHIE and HARPS-N time series of a new long-period giant transiting exoplanet, superimposed with the best-fit model. This exoplanet has a high eccentricity and resides in a binary star system (Santerne et al., in prep.).

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