HOMOGENEOUS STUDIES OF TRANSITING PLANETS: an online catalogue

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The derived physical properties of the known transiting extrasolar planetary systems come from a variety of sources, and are calculated using a range of different methods which are not always easily comparable.

I present a catalogue of the physical properties of 58 transiting extrasolar planet and brown dwarf systems which have been measured using homogeneous methods, resulting in quantities which are internally consistent and well-suited to detailed statistical study. The objects included are shown in the list on the left.

For further details please see:
Southworth (2008, MNRAS, 386, 1644): description of light curve modelling and application to 14 systems
Southworth (2009, MNRAS, 394, 272): derivation of the physical properties of these 14 systems
Southworth (2010, MNRAS, 408, 1689): improved stellar model constraints and extension to 30 systems
Southworth (2011, MNRAS, in press, arXiv:1107.1235): inclusion of 30 systems observed from space

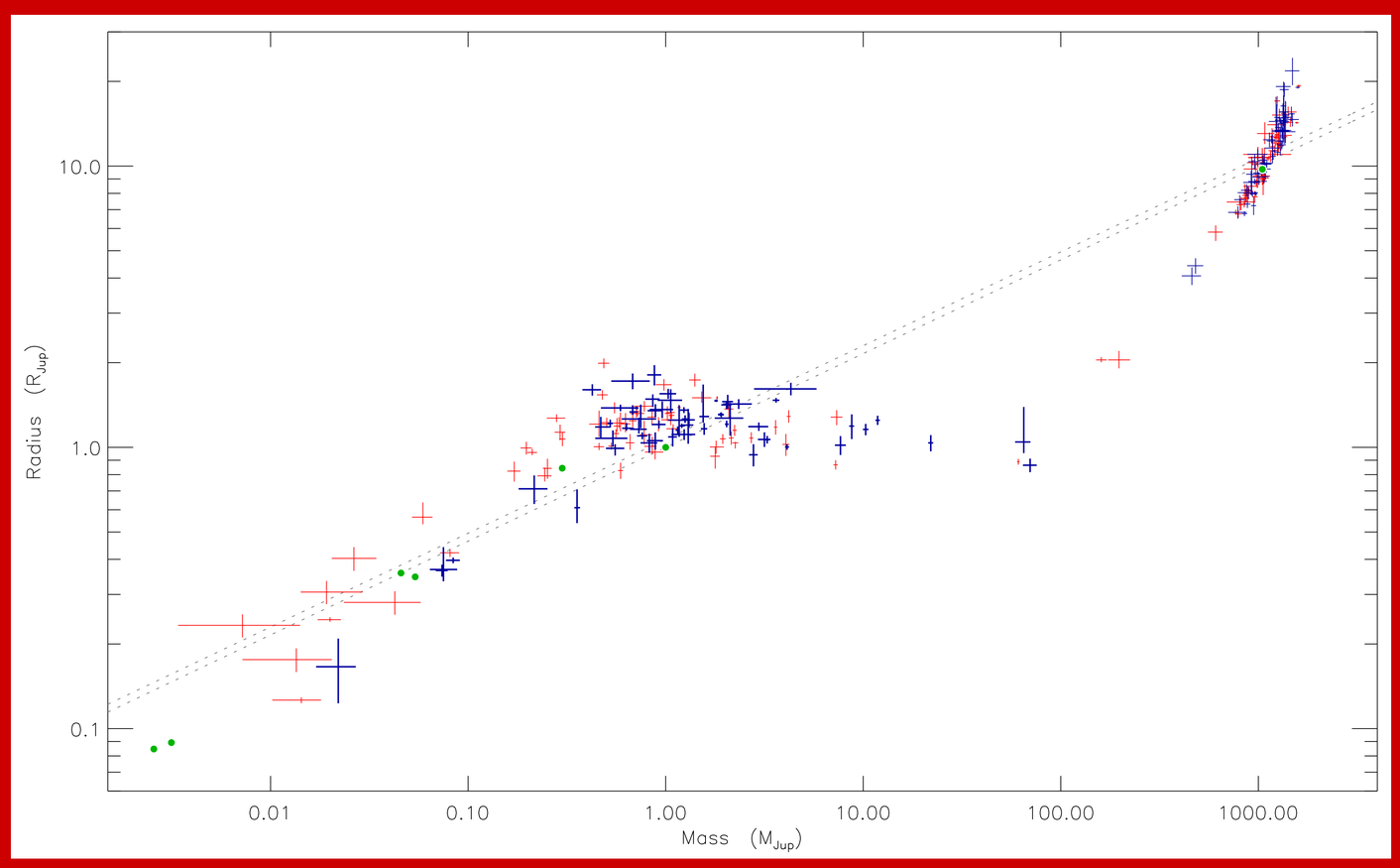
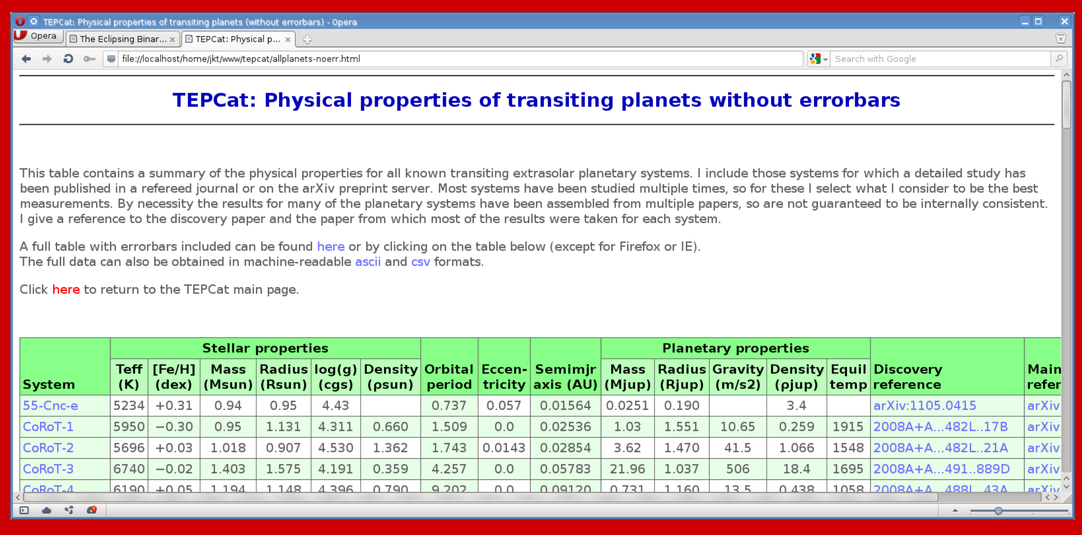


Fig. 1. Plot of the masses and radii of the known transiting planets and their host stars. Blue errorbars show the 58 systems included in my *Homgeneous Studies* project. Red errorbars show the other 60 transiting systems known as of 2011/04/19. Solar System objects are shown as green circles and the loci of the density of Jupiter and the Sun are traced with grey dotted lines.

Each system is analysed in two steps. First, the available transit light curves are modelled using the JKTEBOP code. Then the physical properties are calculated from the measured photometric and spectroscopic results. The solution also requires an additional constraint on the properties of the star from stellar theory. Careful attention is paid to the following aspects:

- limb darkening — which is included in the transit model using five different laws
- random errors — which are assessed via a Monte Carlo algorithm
- correlated noise — which is gauged using a residual-permutation algorithm
- systematic errors due to stellar theory — which are measured by comparing results from five stellar models
- contaminating light — which is included in JKTEBOP in a statistically correct way
- orbital eccentricity — which is applied as a constraint in the JKTEBOP analysis
- numerical integration — to deal with the long integration times of the *Kepler* and CoRoT satellites
- empirical mass–radius relations — which can replace the theoretical stellar models


TEPCat: Physical properties of transiting planets (without errorbars) - Opera

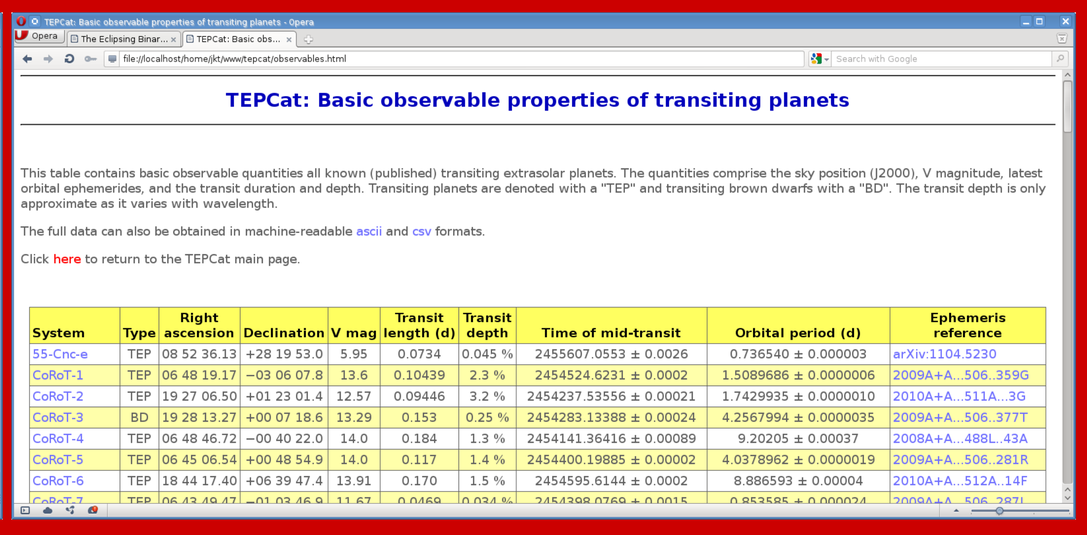
TEPCat: Physical properties of transiting planets without errorbars

This table contains a summary of the physical properties for all known transiting extrasolar planetary systems. I include those systems for which a detailed study has been published in a refereed journal or on the arXiv preprint server. Most systems have been studied multiple times, so for these I select what I consider to be the best measurements. By necessity the results for many of the planetary systems have been assembled from multiple papers, so are not guaranteed to be internally consistent. I give a reference to the discovery paper and the paper from which most of the results were taken for each system.

A full table with errorbars included can be found here or by clicking on the table below (except for Firefox or IE).
The full data can also be obtained in machine-readable ascii and csv formats.

Click here to return to the TEPCat main page.

System	Stellar properties						Orbital period	Eccentricity	Semimjr axis (AU)	Planetary properties					Discovery reference	Main refer
	Teff (K)	[Fe/H] (dex)	Mass (Msun)	Radius (Rsun)	log(g) (cgs)	Density (ρsun)				Mass (Mjup)	Radius (Rjup)	Gravity (m/s2)	Density (ρjup)	Equil temp		
55-Cnc-e	5234	+0.31	0.94	0.95	4.43		0.737	0.057	0.01564	0.0251	0.190		3.4		arXiv:1105.0415	arXiv
CoRoT-1	5950	−0.30	0.95	1.131	4.311	0.660	1.509	0.0	0.02536	1.03	1.551	10.65	0.259	1915	2008A+A...482L..17B	arXiv
CoRoT-2	5696	+0.03	1.018	0.907	4.530	1.362	1.743	0.0143	0.02854	3.62	1.470	41.5	1.066	1548	2008A+A...482L..21A	arXiv
CoRoT-3	6740	−0.02	1.403	1.575	4.191	0.359	4.257	0.0	0.05783	21.96	1.037	506	18.4	1695	2008A+A...491..889D	arXiv
CoRoT-4	6190	+0.05	1.194	1.148	4.396	0.790	9.202	0.0	0.09120	0.731	1.160	13.5	0.438	1058	2008A+A...488L..43A	arXiv


TEPCat: Basic observable properties of transiting planets - Opera

TEPCat: Basic observable properties of transiting planets

This table contains basic observable quantities all known (published) transiting extrasolar planets. The quantities comprise the sky position (J2000), V magnitude, latest orbital ephemerides, and the transit duration and depth. Transiting planets are denoted with a "TEP" and transiting brown dwarfs with a "BD". The transit depth is only approximate as it varies with wavelength.

The full data can also be obtained in machine-readable ascii and csv formats.

Click here to return to the TEPCat main page.

System	Type	Right ascension	Declination	V mag	Transit length (d)	Transit depth	Time of mid-transit	Orbital period (d)	Ephemeris reference
55-Cnc-e	TEP	08 52 36.13	+28 19 53.0	5.95	0.0734	0.045 %	2455607.0553 ± 0.0026	0.736540 ± 0.000003	arXiv:1104.5230
CoRoT-1	TEP	06 48 19.17	−03 06 07.8	13.6	0.10439	2.3 %	2454524.6231 ± 0.0002	1.5089686 ± 0.0000006	2009A+A...506..359G
CoRoT-2	TEP	19 27 06.50	+01 23 01.4	12.57	0.09446	3.2 %	2454237.53556 ± 0.00021	1.7429935 ± 0.0000010	2010A+A...511A...3G
CoRoT-3	BD	19 28 13.27	+00 07 18.6	13.29	0.153	0.25 %	2454283.13388 ± 0.00024	4.2567994 ± 0.0000035	2009A+A...506..377T
CoRoT-4	TEP	06 48 46.72	−00 40 22.0	14.0	0.184	1.3 %	2454141.36416 ± 0.00089	9.20205 ± 0.00037	2008A+A...488L..43A
CoRoT-5	TEP	06 45 06.54	+00 48 54.9	14.0	0.117	1.4 %	2454400.19885 ± 0.00002	4.0378962 ± 0.0000019	2009A+A...506..281R
CoRoT-6	TEP	18 44 17.40	+06 39 47.4	13.91	0.170	1.5 %	2454595.6144 ± 0.0002	8.886593 ± 0.00004	2010A+A...512A..14F
CoRoT-7	TEP	06 43 49.47	−01 03 46.9	11.67	0.0469	0.034 %	2454398.0769 ± 0.0015	0.853585 ± 0.000024	2009A+A...506..287L

The results from the *Homogeneous Studies of Transiting Extrasolar Planets* project are now spread over four papers. I have therefore collected the main results for all of the systems studies into an online catalogue: **TEPCat**. The catalogue is split into three parts: (1) a critical compilation of the physical properties of all known/published transiting planetary systems; (2) the physical properties of the 58 systems covered by the *Homogeneous Studies* project; (3) basic observable properties of all known systems. Each table is available in HTML, ASCII and CSV formats for convenience.

http://www.astro.keele.ac.uk/∼jkt/tepcat/