TOI-824b : A planet on the edge of the hot Neptune Desert

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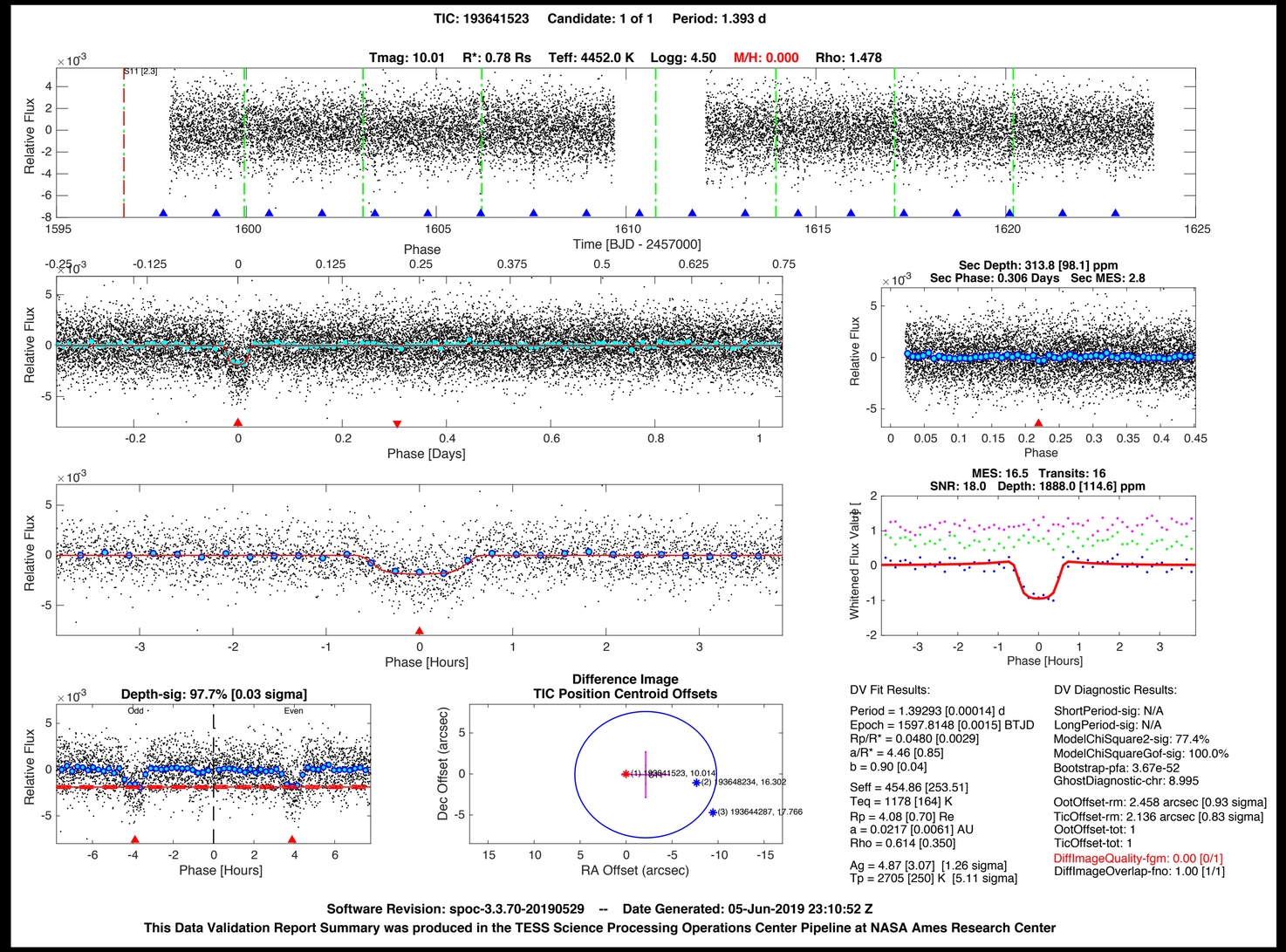
TOI-824

Table 1. Stellar parameters for TOI 824.

Parameter	Value	Source
Designations	TIC 193641523	
	SCR J1448-5735	
RA (hh:mm:ss)	14:48:39.71	Gaia DR2
Dec (dd:mm:ss)	-57:35:19.92	Gaia DR2
μ RA (mas yr^{-1})	-51.6035 ± 0.068	Gaia DR2
μ Dec (mas yr^{-1})	-152.392 ± 0.079	Gaia DR2
Parallax (mas)	15.696 ± 0.049	Gaia DR2*
Distance (pc)	63.71 ± 0.20	Gaia DR2
SpT	K4V	This work
B	12.290 ± 0.157	Tycho-2
V	11.402 ± 0.095	Tycho-2
r	10.705 ± 0.15	UCAC4
i	10.329 ± 0.15	UCAC4
$TESS$	10.0732 ± 0.006	TIC8
$Gaia$	$10.762^{+0.02}_{-0.001}$	Gaia DR2
$GaiaBP$	$11.406^{+0.02}_{-0.001}$	Gaia DR2
$GaiaRP$	$10.021^{+0.02}_{-0.001}$	Gaia DR2
J	9.145 ± 0.018	2MASS
H	8.557 ± 0.046	2MASS
K_s	8.432 ± 0.038	2MASS
W_1	8.154 ± 0.083	WISE
W_2	8.326 ± 0.021	WISE
W_3	6.948 ± 0.017	WISE
W_4	3.372 ± 0.020	WISE
$v\ sin(i)$ (km s^{-1})	0.63 ± 0.50	This work
U (km s^{-1})	-0.220 ± 0.152	This work
V (km s^{-1})	-45.803 ± 0.181	This work
W (km s^{-1})	-33.886 ± 0.140	This work

*Correction of +82 μas applied to the Gaia parallax as per **?**



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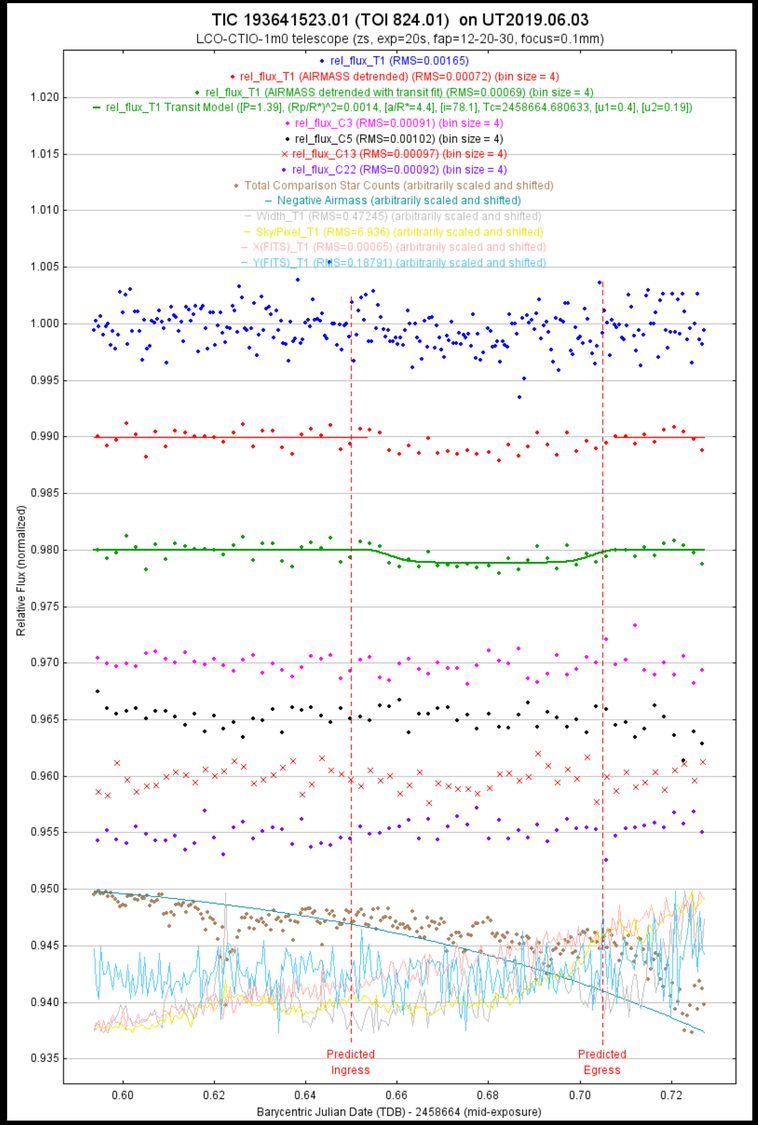
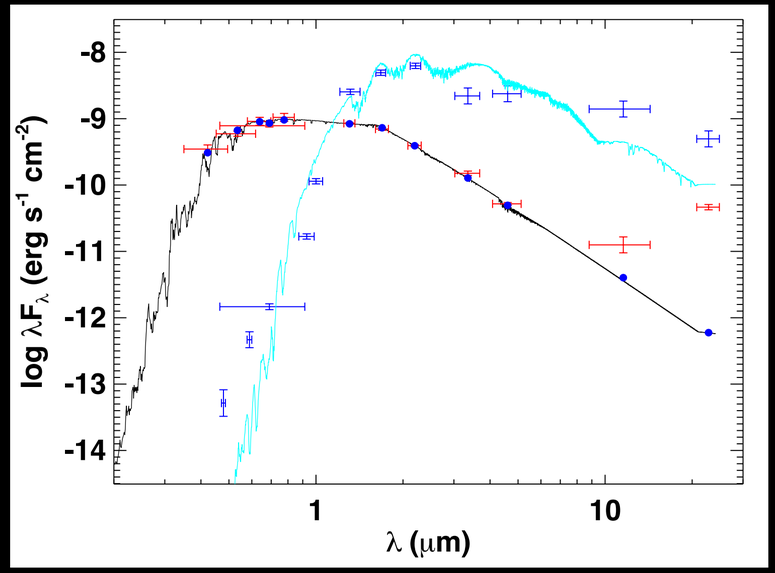
TOI-824 : Stellar Vetting





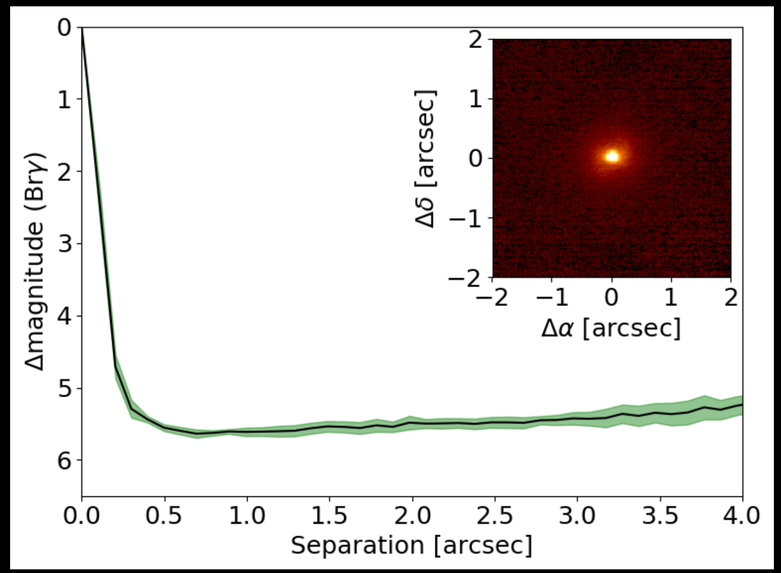


Table 2. SPECIES results for TOI 824

Parameter	Value	Uncertainty
[Fe/H]	-0.15	0.113
T_{eff}	4615.7	51
log g	4.613	0.116
vt	0.188	0.10
vsini	2.165	0.325
v_{mac}	-0.206	0.25
# FeI lines	131	
# FeII lines	8	
Element	**Abundance**	**# Lines**
[Na/H]	0.08±0	1
[Mg/H]	-0.1±0.18	3
[Al/H]	-0.18±0.029	3
[Si/H]	-0.18±0.002	3
[Ca/H]	-0.37±0.359	7
[TiI/H]	0±0.024	6
[TiII/H]	0.12±0.853	2
[Cr/H]	-0.13±0.088	12
[Mn/H]	0.02±0.111	5
[Ni/H]	-0.04±0.009	5
[Cu/H]	0.31±0.644	3
[FeI/H]	-0.142	
[FeII/H]	0.325	
Parameter	**Value**	**54% Confidence Level**
Mass	0.7	0.021
Age	7.82	3.853
log g_{iso}	4.617	0.015
Radius	0.68	0.007
log L	-0.72	0.011

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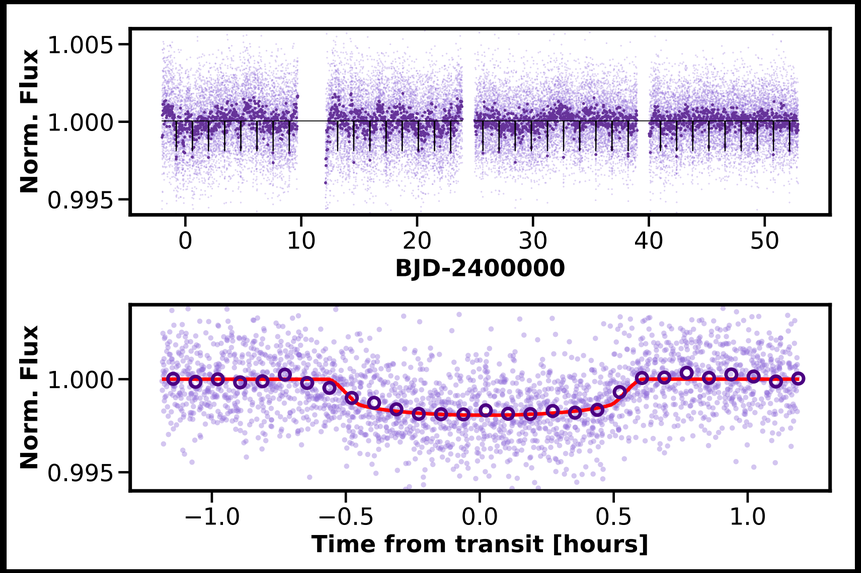
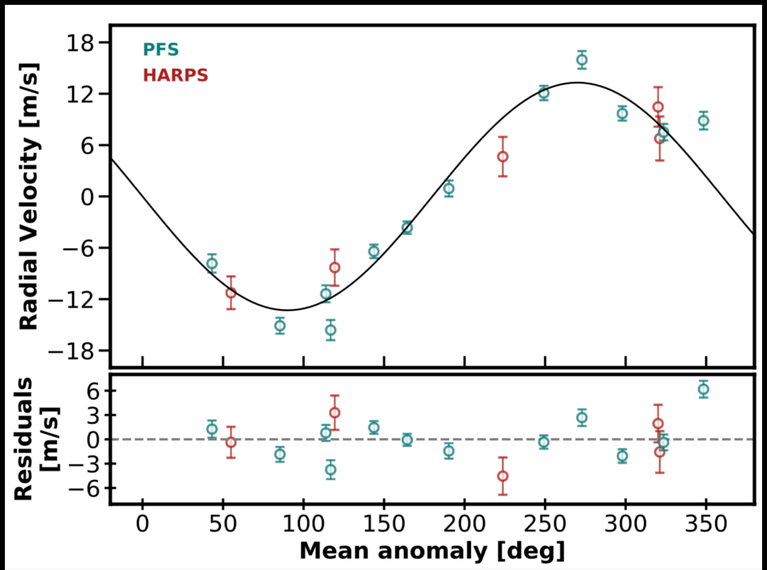
TOI-824 b : Planet Characteristics





Planetary Parameters:		TOI 824 b
P	Period (days)	$1.392993^{+0.000035}_{-0.000034}$
R_p	Radius ($R_\oplus$)	$3.4064^{+0.0874}_{-0.0897}$
M_P	Mass ($M_\oplus$)	$18.5612^{+1.7798}_{-1.8116}$
T_C	Time of conjunction ($\mathrm{BJD_{TDB}}$)	$2458597.81373^{+0.00087}_{-0.00090}$
T_0	Optimal conjunction Time ($\mathrm{BJD_{TDB}}$)	$2458629.85257^{+0.00040}_{-0.00041}$
a	Semi-major axis (AU)	$0.02175^{+0.00025}_{-0.00023}$
i	Inclination (Degrees)	$83.35^{+0.25}_{-0.23}$
T_{eq}	Equilibrium temperature (K)	1252 ± 11
$\tau_{\rm circ}$	Tidal circularization timescale (Gyr)	$0.270^{+0.050}_{-0.042}$
K	RV semi-amplitude (m/s)	$13.3^{+1.2}_{-1.3}$
$\log K$	Log of RV semi-amplitude	$1.124^{+0.038}_{-0.043}$
$R_p/R_\star$	Radius of planet in stellar radii	$0.04363^{+0.00079}_{-0.00080}$
$a/R_\star$	Semi-major axis in stellar radii	$6.53^{+0.12}_{-0.11}$
δ	Transit depth (fraction)	$0.001904^{+0.000070}_{-0.000069}$
$Depth$	Flux decrement at mid transit	$0.001904^{+0.000070}_{-0.000069}$
τ	Ingress/egress transit duration (days)	0.00460 ± 0.00025
T_{14}	Total transit duration (days)	$0.04915^{+0.00089}_{-0.00085}$

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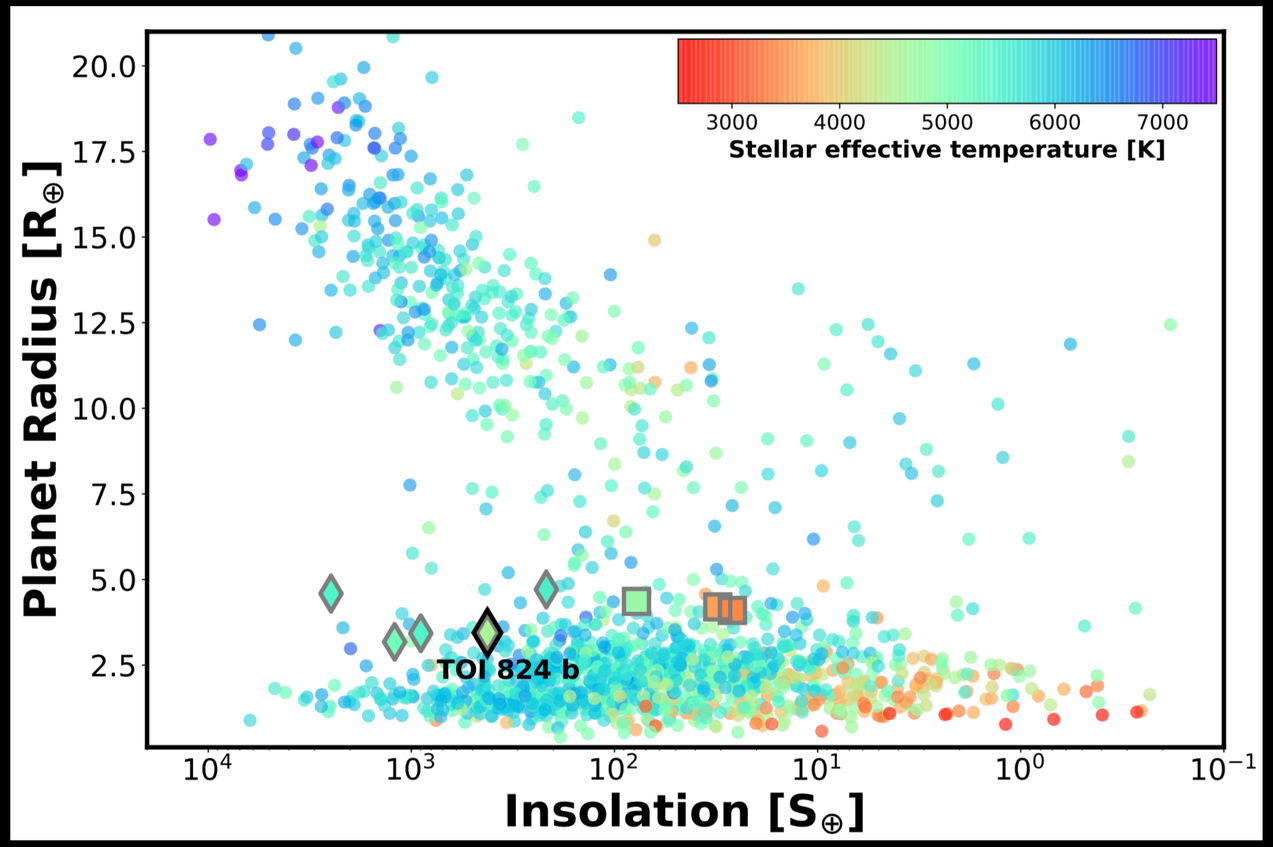

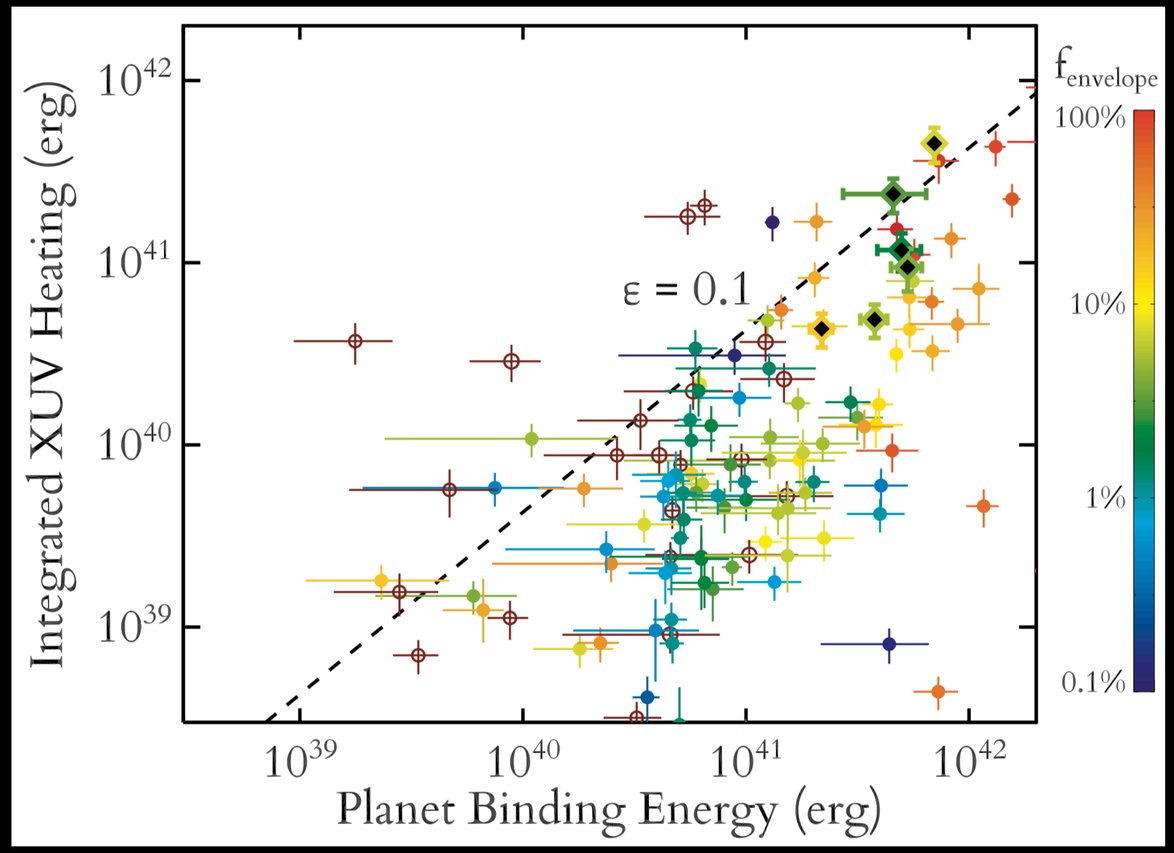

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