

EXOPLANET ANALYSIS MODEL

A. French Jan 2021

Star	TOI 700	Red dwarf
Planet	TOI 700d	Liquid water?

Planet mass /earth masses	1.72
Planet radius /earth radii	1.19
Orbital period /days	37.43
Orbital radius /AU	0.163

Star mass /solar masses	0.416
Star radius /solar radii	0.42
Luminosity /solar luminosity	0.0233
Star surface temperature /K	3480
Distance from Earth /ly	101.61
Parallax /milli arc seconds	32.098

1AU /m	1.50E+11
Solar mass /kg	1.99E+30
Earth mass /kg	5.97E+24
Solar radius /km	696340
Earth radius /km	6371
Solar luminosity /Wm ⁻²	3.85E+26
Speed of light /ms ⁻¹	3.00E+08
1 year /s	31536000
1 light year (ly) /m	9.45E+15
Gravitational constant G / Nm ² kg ⁻²	6.67E-11
Stefan-Boltzmann constant /Wm ⁻² K ⁻⁴	5.67E-08
Sun surface temperature /K	5780
Sun peak spectral intensity wavelength /nm	502

Peak star spectral intensity wavelength /nm	834
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Star calculation based upon main sequence correlations, and quoted star surface temperature

Calculated star mass / solar masses	0.372
Calculated star radius /solar radii	0.490
Calculated star luminosity /solar luminosity	0.032

Published value

0.416
0.42
0.0233

Star calculation based upon main sequence correlations, and quoted star mass

Calculated star surface temperature / Sun surface temperature	0.638
Calculated star surface temperature /K	3686
Calculated star radius /solar radii	0.532
Calculated star luminosity /solar luminosity	0.047

0.602
3480
0.42
0.0233

Calculated orbital radius /AU from star mass and period	0.164
Orbital speed of star /ms ⁻¹ about barycentre	0.593
Calculated planet mass /earth mass	1.73
Maximum Doppler wavelength shift of star due to orbit about barycentre /nm	1.65E-06
Orbital speed of planet /kms ⁻¹ about barycentre (effectively the star centre of mass)	47.54

0.163
1.72
47.38

Time for centre of mass of planet to transit star /hours	3.42
Luminosity dip (%) during transit of planet in front of star	0.0672

<https://en.wikipedia.org/wiki/Exoplanet>
https://en.wikipedia.org/wiki/Doppler_spectroscopy
https://en.wikipedia.org/wiki/TOI_700_d
https://en.wikipedia.org/wiki/TOI_700