

# Conclusions based on the analysis of data obtained from exoplanet transit observations at RFO

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24 April 2024

1 – During April 2024 we have reliably detected and observed transits for three exoplanets. These exoplanets are all Hot Jupiters, with sizes and masses comparable to the planet Jupiter. These three all have orbital periods of only a few days, and must thus be orbiting extremely close to their star.

2 -- At RFO we can regularly achieve milli-mag photometry on the RC20 telescope. This is achievable for differential photometry using BVRI filters and the new science camera (ZWO ASI2600). Such observations can obtain statistical measurement errors of a few thousandths of a magnitude. Of course, high clouds or other atmospheric phenomena can degrade this capability.

3 -- Transit observations with a V filter can achieve high quality model fits and precision determinations of time of mid-transit, transit durations, and transit depths. Transit depths lead to the determination of relative sizes for the transiting planets, and transit timing and duration can lead to the discovery and monitoring of additional planets present in the planetary system. Irregular features in the transit curves can be used to evaluate non-uniformities on the stellar surface (spots, active regions) and the presence of material in the planetary orbit and in the orbital plane.

4 – Two of the three objects we have observed appear to have anomalous transit curves. XO-1 appears to have a bump in the transit curve which could indicate the presence of features on the surface of the star or material in the orbital plane of the planet. XO-7 did not return to pre-transit brightness levels after what should have been the end of the transit. This could indicate the presence of material in the orbital plane or could be related to the second massive planet in the system on a wide orbit.

5 -- The large number of known systems with transiting planets, and the availability of convenient software, makes it feasible to expect that on any clear night it should be possible to identify a planet which will be experiencing an observable transit. Really! If it is clear, and the RC20 is available, it should be possible to record the transit of an exoplanet.

6 – A large number of Hot Jupiters are present in our galaxy. Such star-huggers are not present in our planetary system, but they are easy for us to detect and observe. What might we learn by observing this newly discovered class of objects?