

# Transit Timing Variations of Circumbinary Exoplanets

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## Abstract

Circumbinary exoplanets are planets orbiting around a close binary star. They are strange objects, with their formation and evolution subject to gravitational torques, variations in insolation and other effects not found in planets around single stars. These can lead to rapid orbital precession, with precessional periods on the timescale of only tens of planetary periods [1]. This along with the motion of the binary stars presents complications to their detection (and orbital stability). Here we focus on the transit detection method, where transit timing variations (TTVs) on the order of days in magnitude become evident. We describe newly derived and tested limits on the TTVs of such planets, revealing a variety of unusual effects in their orbits and allowing searches to be targeted much more efficiently. We describe the use of these limits in a new search algorithm which can be applied to existing large datasets, such as Kepler and WASP.

## References

- [1] Doolin S. and Blundell K. M.: The dynamics and stability of circumbinary orbits, *Monthly Notices of the Royal Astronomical Society*, Vol. 428, pp. 2656-2668, 2011.