

Transit timing variations in the WASP-4 planetary system

Southworth, J., Dominik, M., Jørgensen, U. G., Andersen, M. I., Bozza, V., Burgdorf, M. J., ... & Von Essen, C. (2019). Transit timing variations in the WASP-4 planetary system. *Monthly Notices of the Royal Astronomical Society*, 490(3), 4230-4236. Accessed 06 Mar 2021.

Abstract

Transits in the planetary system WASP-4 were recently found to occur 80?s earlier than expected in observations from the TESS satellite. We present 22 new times of mid-transit that confirm the existence of transit timing variations, and are well fitted by a quadratic ephemeris with period decay $dP/dt = -9.2 \pm 1.1 \text{ ms yr}^{-1}$. We rule out instrumental issues, stellar activity, and the Applegate mechanism as possible causes. The light-time effect is also not favoured due to the non-detection of changes in the systemic velocity. Orbital decay and apsidal precession are plausible but unproven. WASP-4b is only the third hot Jupiter known to show transit timing variations to high confidence. We discuss a variety of observations of this and other planetary systems that would be useful in improving our understanding of WASP-4 in particular and orbital decay in general..

Keywords

Stars, Activity, Stars: fundamental parameters, Stars, Individual, WASP-4.