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# Effect of stellar activity on the high precision transit light curve

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## Abstract

Stellar activity features such as spots and plages can create difficulties in determining planetary parameters through spectroscopic and photometric observations. The overlap of a transiting planet and a stellar spot, for instance, can produce anomalies in the transit light curve that may lead to inaccurate estimation of the transit duration, depth, and timing. Such inaccuracies can affect the precise derivation of the planet's radius. In this talk we will present the results of a quantitative study on the effects of stellar spots on high precision transit light curves. We show that spot anomalies can lead to the estimate of a planet radius that is 4% smaller than the real value. The effects on the transit duration can also be of the order of 4%, longer or shorter. Depending on the size and distribution of spots, anomalies can also produce transit timing variations with significant amplitudes. For instance, TTVs with signal amplitudes of 200 seconds can be produced by spots as large as the largest sunspot. Finally, we examine the impact of active regions on the transit depth measurements in different wavelengths, in order to probe the impact of this effect on transmission spectroscopy measurements. We show that significant (up to 10%) underestimation/overestimation of the planet-to-star radius ratio can be measured, especially in the short wavelength regime.

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