

# Massive Search for Spot- And Facula-Crossing Events in 1598 Exoplanetary Transit Light Curves

Baluev R.V., Sokov E.N., Sokova I.A., Shaidulin V.S., Veselova A.V., Aitov V.N., Mitiani G.S., Valeev A.F., Gadelshin D.R., Gutaev A.G., Beskin G.M., Valyavin G.G., Antonyuk K., Barkaoui K., Gillon M., Jehin E., Delrez L., Gumundsson S., Dale H.A., Fernández-Lajú E.S., Disisto R.P., Bretton M., Wunsche A., Hentunen V.P., Shadick S., Jongen Y., Kang W., Kim T., Pakščiene E., Qvam J.K.T., Knight C.R., Guerra P., Marchini A., Salvaggio F., Papini R., Evans P., Salisbury M., Garlitz J., Esseiva N., Ogmen Y., Bosch-Cabot P., Selezneva A., Hinse T.C.

*Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia*

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## Abstract

We developed a dedicated statistical test for a massive detection of spot- And facula-crossing anomalies in multiple exoplanetary transit light curves, based on the frequentist p-value thresholding. This test was used to augment our algorithmic pipeline for transit light curves analysis. It was applied to 1598 amateur and professional transit observations of 26 targets being monitored in the EXPANSION project. We detected 109 statistically significant candidate events revealing a roughly 2 : 1 asymmetry in favor of spots-crossings over faculae-crossings. Although some candidate anomalies likely appear non-physical and originate from systematic errors, such asymmetry between negative and positive events should indicate a physical difference between the frequency of star spots and faculae. Detected spot-crossing events also reveal positive correlation between their amplitude and width, possibly due to spot size correlation. However, the frequency of all detectable crossing events appears just about a few per cent, so they cannot explain excessive transit timing noise observed for several targets.

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## Keywords

Planetary systems-techniques: Photometric-starspots

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