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Investigation of planetary systems of WASP, TrES, Qatar and Kepler projects by using transit photometry with O-C parameter tracking and TTV method application on Kyiv Comet Station

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We report the results of the investigation of five planetary systems TrES-3b, Kepler-17b, WASP-3b, Qatar-1b, and Qatar-2b. For the exoplanets TrES-3b, Kepler-17b, WASP-3b, and Qatar-1b, the obtained results of the center-transit time, depth and length of transit agree with the ephemeris data, while for two observations of the Qatar-2 system for the planet Qatar-2b there is a clear decreasing trend of the value of the O-C parameter. Observations were carried out from 2 April 2021 to 14 February 2022 by using a 70-cm reflecting telescope AZT-8 on the Astronomical Observatory of Taras Shevchenko National University of Kyiv / Kyiv comet station (Kyiv, Ukraine). Photometric processing of the observation results was performed by using the Muniwin program. The obtained exoplanet transit brightness curves were published in ETD. The accuracy and quality of our observations on the ETD database scale ranged from 1 to 3.
Additionally, applying the method of time transit variation (TTV) to our and Exoplanet Transit Database (ETD) data, we found a possible gravitational effect on the orbit of the exoplanet Qatar-2b of another massive body. This suggests that the assumption of the existence of the planet Qatar-2c conjectured in Bryan et al. (2011) is true.

Author: Mr SOLOMAKHA, Mykhailo (Taras Shevchenko National University of Kyiv, Kyiv, Ukraine)

Co-authors: BARANSKY, Alexander (Taras Shevchenko National University of Kyiv, Kyiv, Ukraine); NAHURNA, Anastasia (Taras Shevchenko National University of Kyiv, Kyiv, Ukraine); LOBODENKO, Mariia (Taras Shevchenko National University of Kyiv, Kyiv, Ukraine)

Presenter: Mr SOLOMAKHA, Mykhailo (Taras Shevchenko National University of Kyiv, Kyiv, Ukraine)

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