

ATel #13122. <http://www.astronomerstelegam.org/?read=13122>

## The disappearance and reappearance of optical emission lines and the drop in a Swift/XRT count rate during the recent rebrightening of TCP J21040470+4631129

ATel #13122; V. Neustroev (University of Oulu), D. Boyd, F. Sims (ARAS), K. L. Page (University of Leicester), T. Tordai (MCSE), S. M. Brincat, C. Galdies, G. Sjoberg (AAVSO), S. Zharikov (UNAM), J. P. Osborne (University of Leicester), N. P. M. Kuin (University College London-MSSL), T. R. Marsh, B. T. Gaensicke (University of Warwick), C. Knigge (University of Southampton)

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Credential Certification: Vitaly Neustroev ([vitaly@neustroev.net](mailto:vitaly@neustroev.net))

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We report the results of our continuing optical and X-ray monitoring of the bright WZ Sge-type dwarf nova TCP J21040470+4631129 (hereafter TCP2104) discovered on July 12, 2019 (for previous reports, see ATel #12947, #13009). Our optical photometric observations are mostly performed using 30-cm class telescopes, while spectroscopic data are obtained with the 2.1-m telescope at the OAN-SPM, the 2.5-m Isaac Newton Telescope on La Palma, and other smaller telescopes.

The observations show that the object is exhibiting remarkable, very unusual behaviour. After the end of the plateau stage on August 3, TCP2104 experienced 2 short rebrightenings on August 8-10 and 14-16, after which the object underwent the second superoutburst with a relatively short plateau stage of about 9 days (from August 25 to September 3). After the second plateau ended, TCP2104 showed another short rebrightening on September 15-17. We note that the fading after this rebrightening has again decelerated suggesting that another rebrightening is possible. We also point out that superhump modulations which were observed from the very beginning of the superoutburst have never completely disappeared (see also ATel #12947 and #13009), and they are still present in a light curve after the end of the most recent rebrightening (their amplitude is about 0.1 mag). Using the observations obtained between September 18-21, we measured a period of modulations to be  $P=77.15\pm 0.3$  min, which is consistent with the orbital period  $P_{orb}=77.07\pm 0.02$  min (ATel #13009).

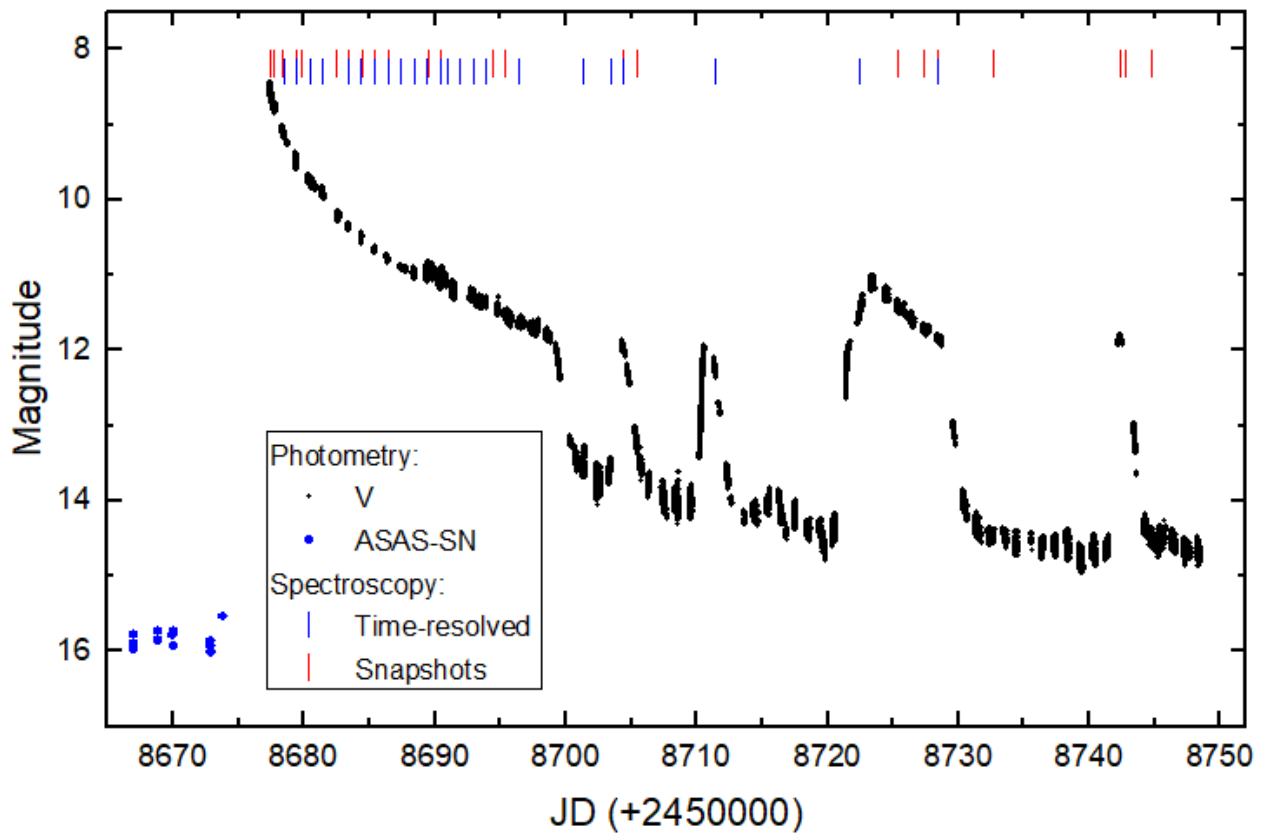
TCP2104 is currently at the level of  $V\sim 14.7$  mag, that is still about 1.3 mag brighter than just before the discovery (according to ASAS-SN). However, the Pan-STARRS1 (PS1) catalog lists much lower fluxes; at a mean epoch of 2014 August 23 the mean  $V$  magnitude was measured to be  $\sim 18.1$  mag (converted from PS1 magnitudes). We note, however, the PS1 detection tables indicate that between 2010 and 2014 TCP2104 has gradually brightened by  $\sim 0.5$  mag.

Our extensive optical spectroscopic monitoring showed a notable difference between the spectra obtained during the first and the second plateau stages. During the second plateau, the flux in the emission lines was much reduced, and especially higher-order Balmer lines were significantly weakened. But the most dramatic spectral changes were observed during the recent rebrightening. The spectrum obtained on September 15.84, just before the rebrightening maximum, shows only Balmer absorption lines, while all the emission lines completely disappeared. However, another spectrum obtained 9 hours later (September 16.23) shows very strong emission lines again.

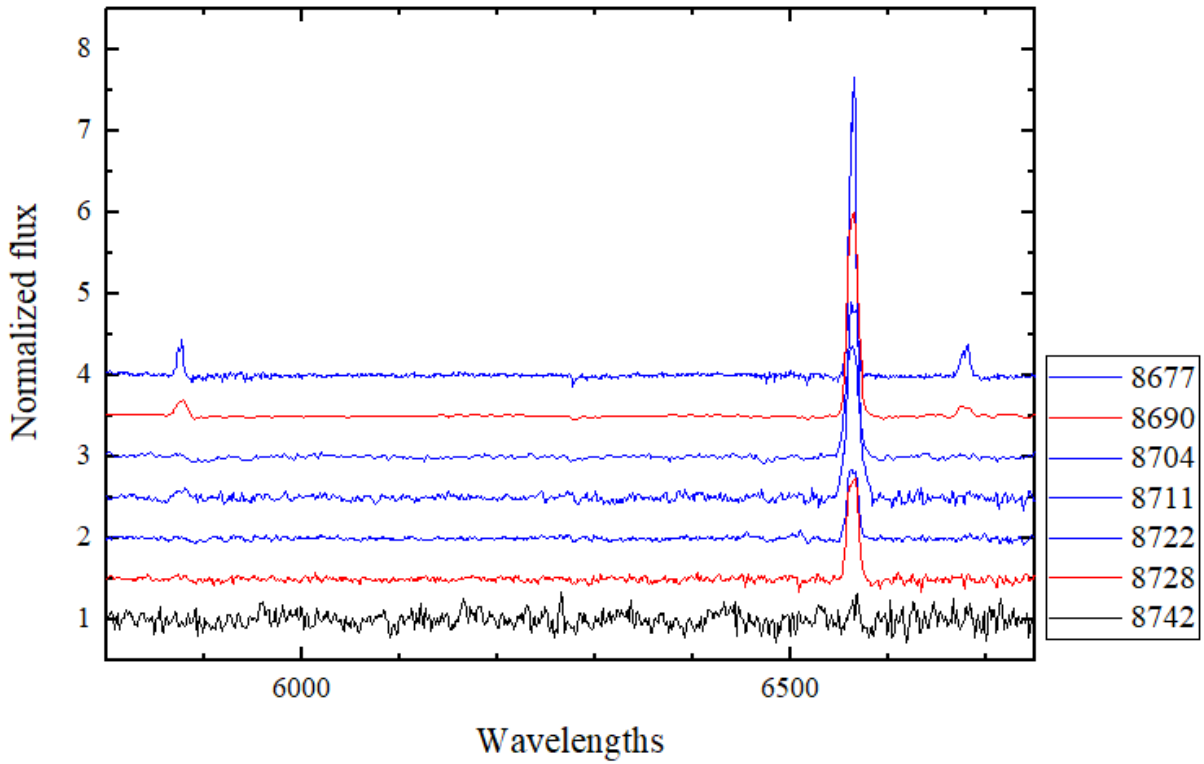
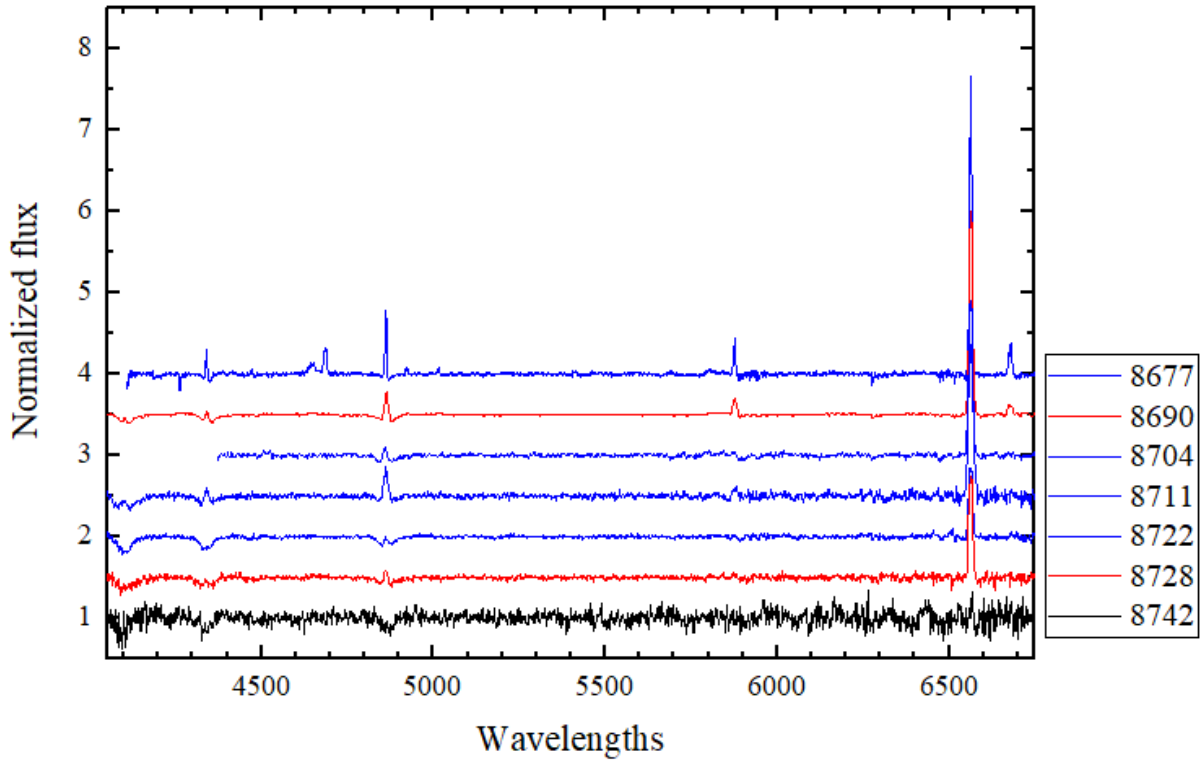
We also continued monitoring TCP2104 with Swift. The observations obtained between rebrightenings showed a very stable XRT count rate at the level of  $0.11\pm 0.02$  cts/s. However, during rebrightenings it has dropped by about 10 times.

We thank the Swift PI, Brad Cenko, for approving the observations, and the Swift planning and operations teams for their ongoing support.

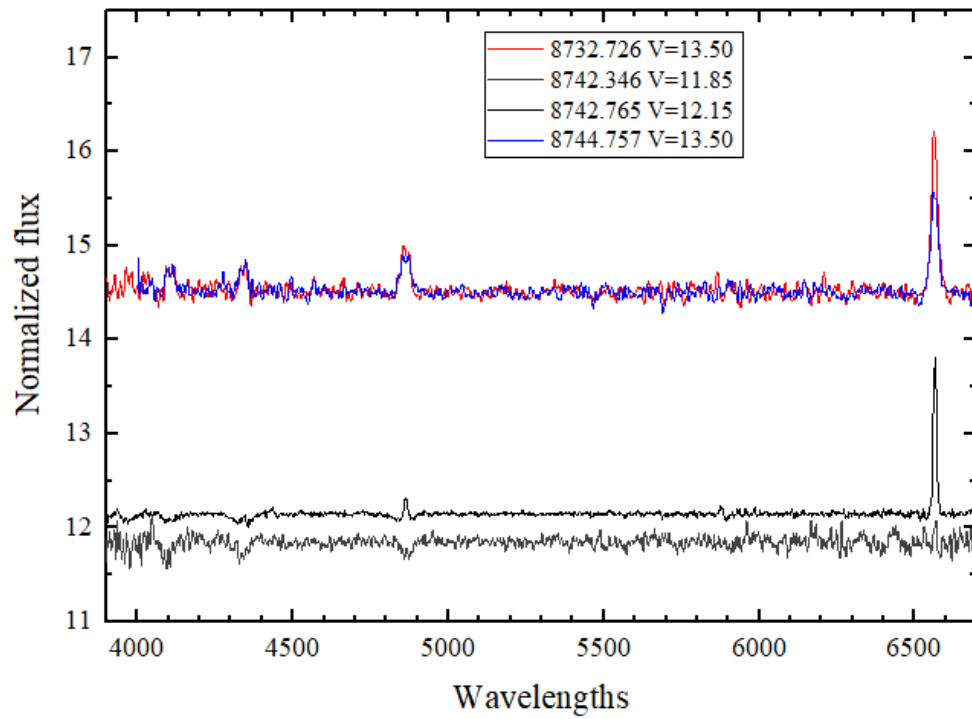
The optical light curve of TCP2104. The times of spectroscopic observations are marked by blue and red ticks.



Our extensive optical spectroscopic monitoring showed a notable difference between the spectra obtained during the first and the second plateau stages. During the second plateau, the flux in the emission lines was much reduced, and especially higher-order Balmer lines were significantly weakened. The spectra obtained in the beginning of both superoutbursts and in rebrightenings (shown in blue), and also two spectra from both superoutbursts but when the object's brightness was closer to the last observation. To the right from the spectra their JD times (-2450000) are shown.



The spectra are normalised to continuum and shifted according to the V magnitude of TCP2104 during those observations.



The spectroscopic observations from the previous plot are marked by orange ticks over the light curve.

