UBVRI photometry of variable stars in Lviv AO: first coloured light after telescope AZT-14 modernization

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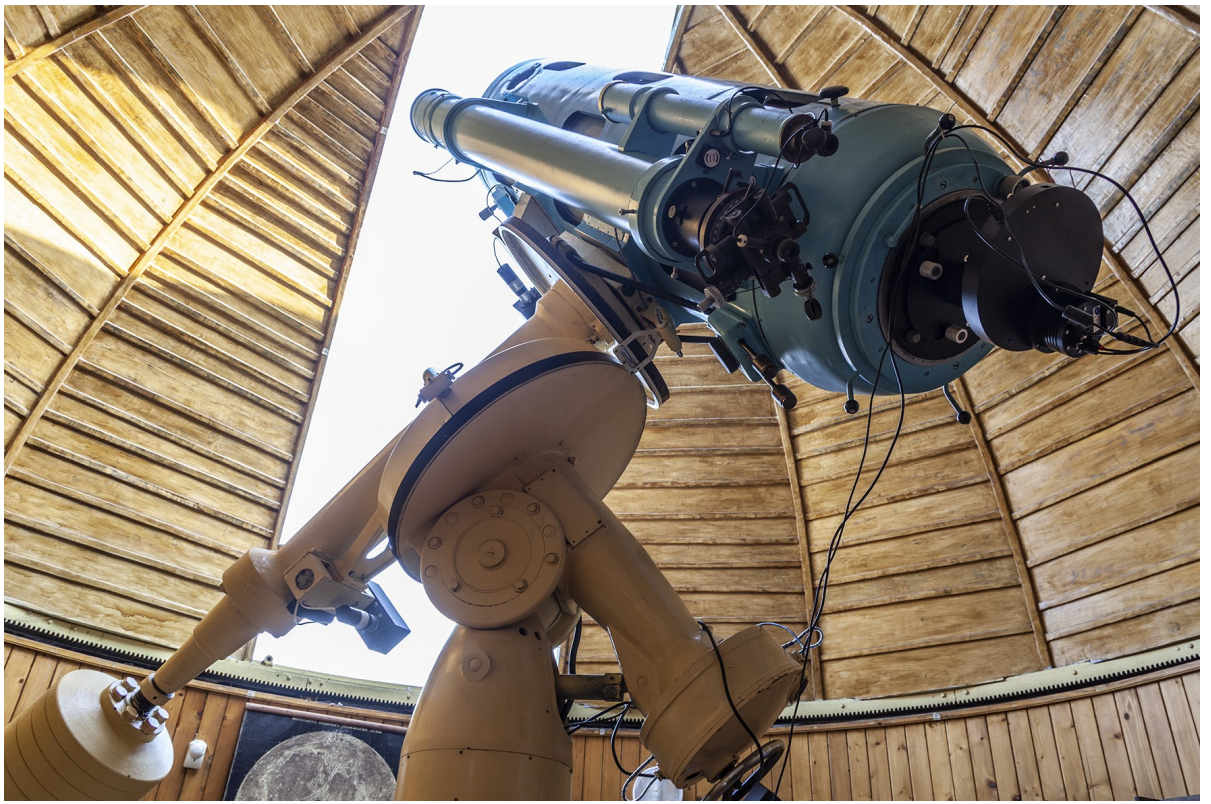
Telescope AZT-14

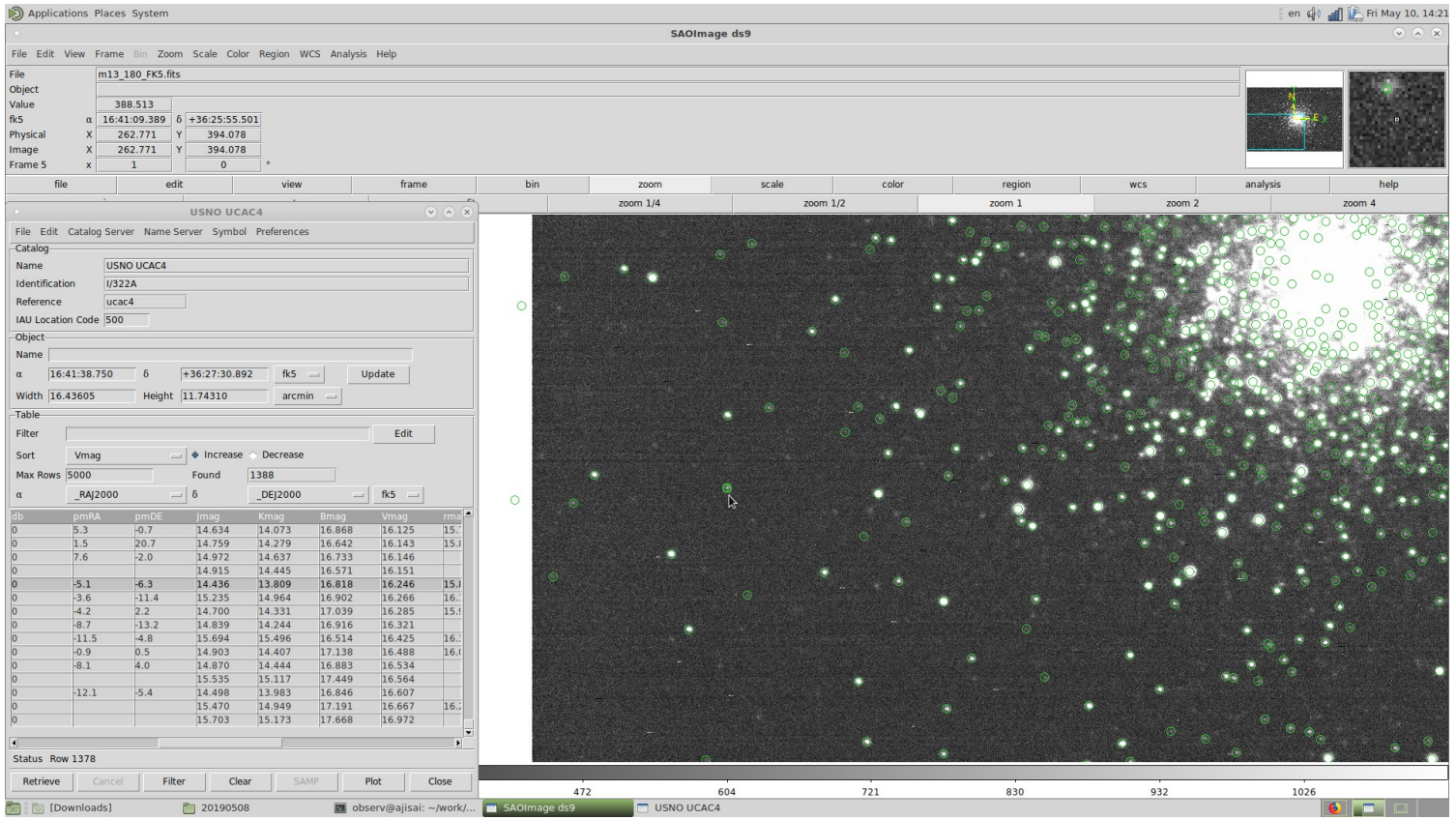
The telescope is located on the suburban station of AO LNU (10 km from the city of Lviv).

Technical info:
Main mirror = 480 mm
System focal length = 7715 mm
Tracking = stars
Corrections = manual remote control (upgrade)

Receiver (new 2019-21):
Trius SX-35 = 4008x2672
FOV = 15.3 x 10.2 arcmin
Filters = Astrodon UBVRI



Limiting magnitude tests: 2020



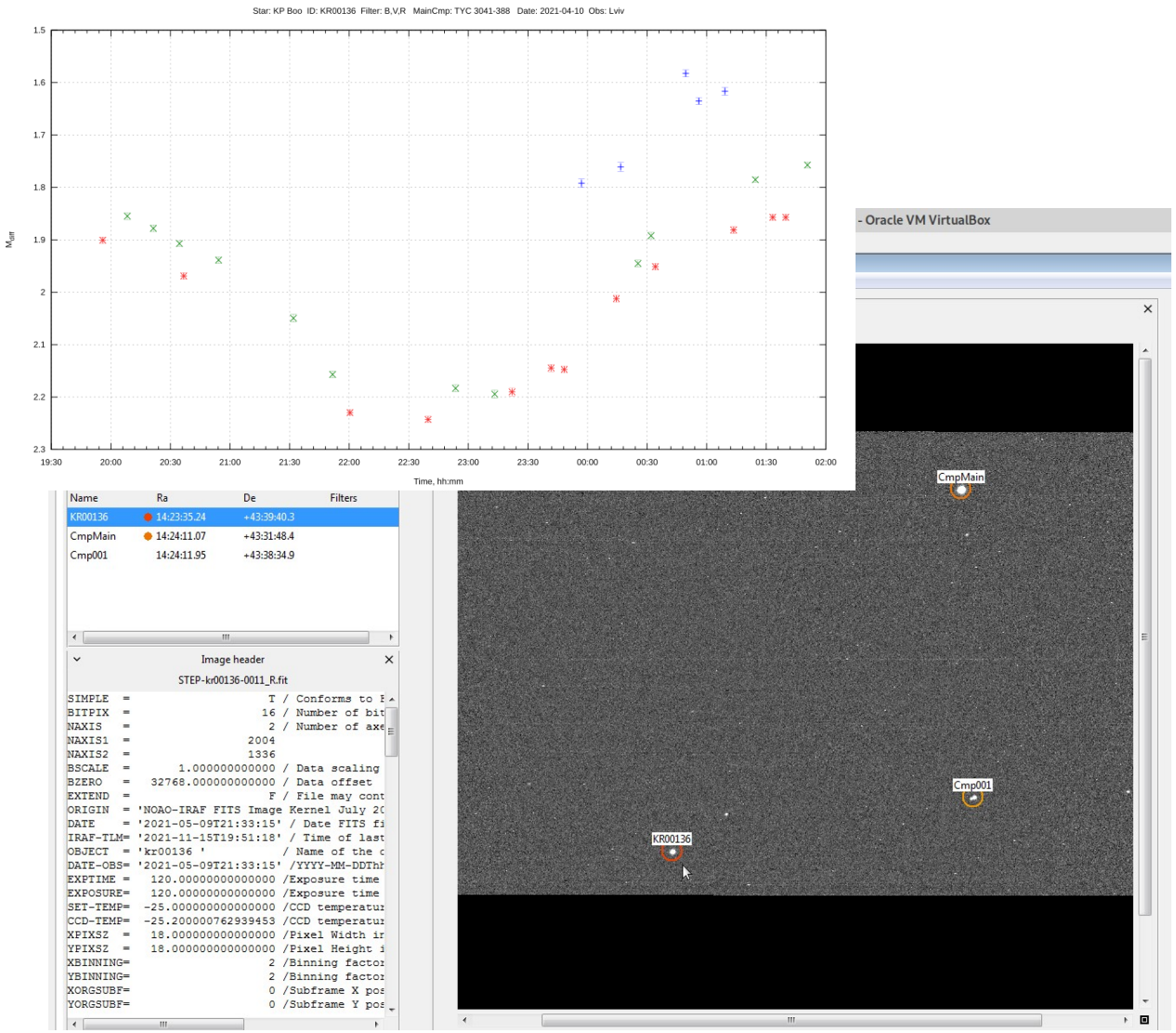
By the result of the conference KOLOS 2019, in the beginning of 2020 the first attempt of cooperation took place = within astronomy practics by astrophysics department and the partner from UJ (Poland) B.Debski.

M3 in colours tests: 2021

B,V,R
=>
RGB

by
IRAF,
DS9...

First real observations: KP Boo



VS = KP Boo = V +11.66 = KR00136 (B.Debski)

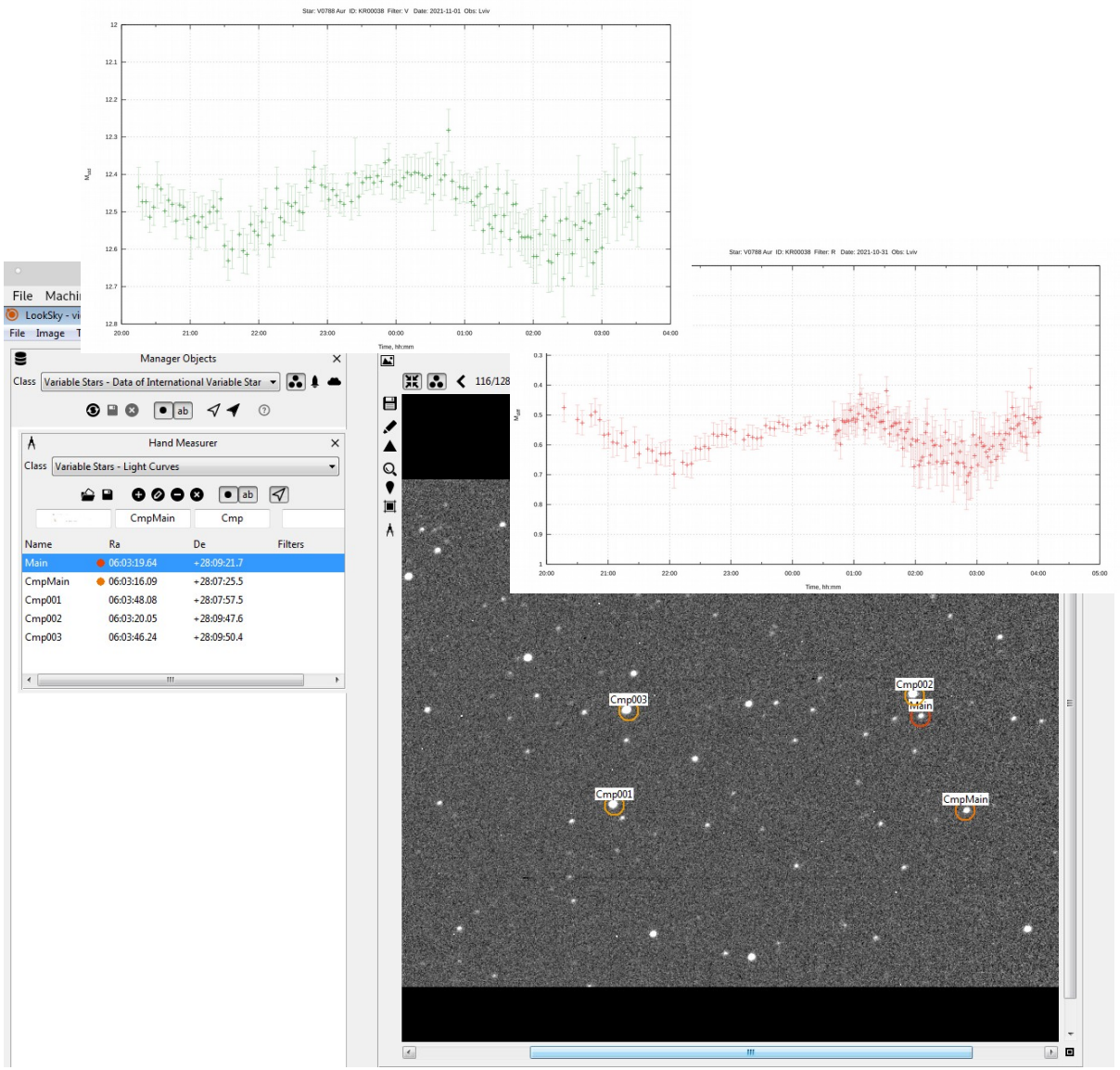
Observations = 4 nights in April-May 2021.

Technics = BVR, bin 2x2, exposure 2-3 min.

CoLiTecVS 1.8.6.1
Processing FITS = problems !!! = too few stars in FOV...

...

Autumn 2021 observations: V0788 Aur



VS = V0788 Aur = G +12.8
= KR00038 (B.Debski)

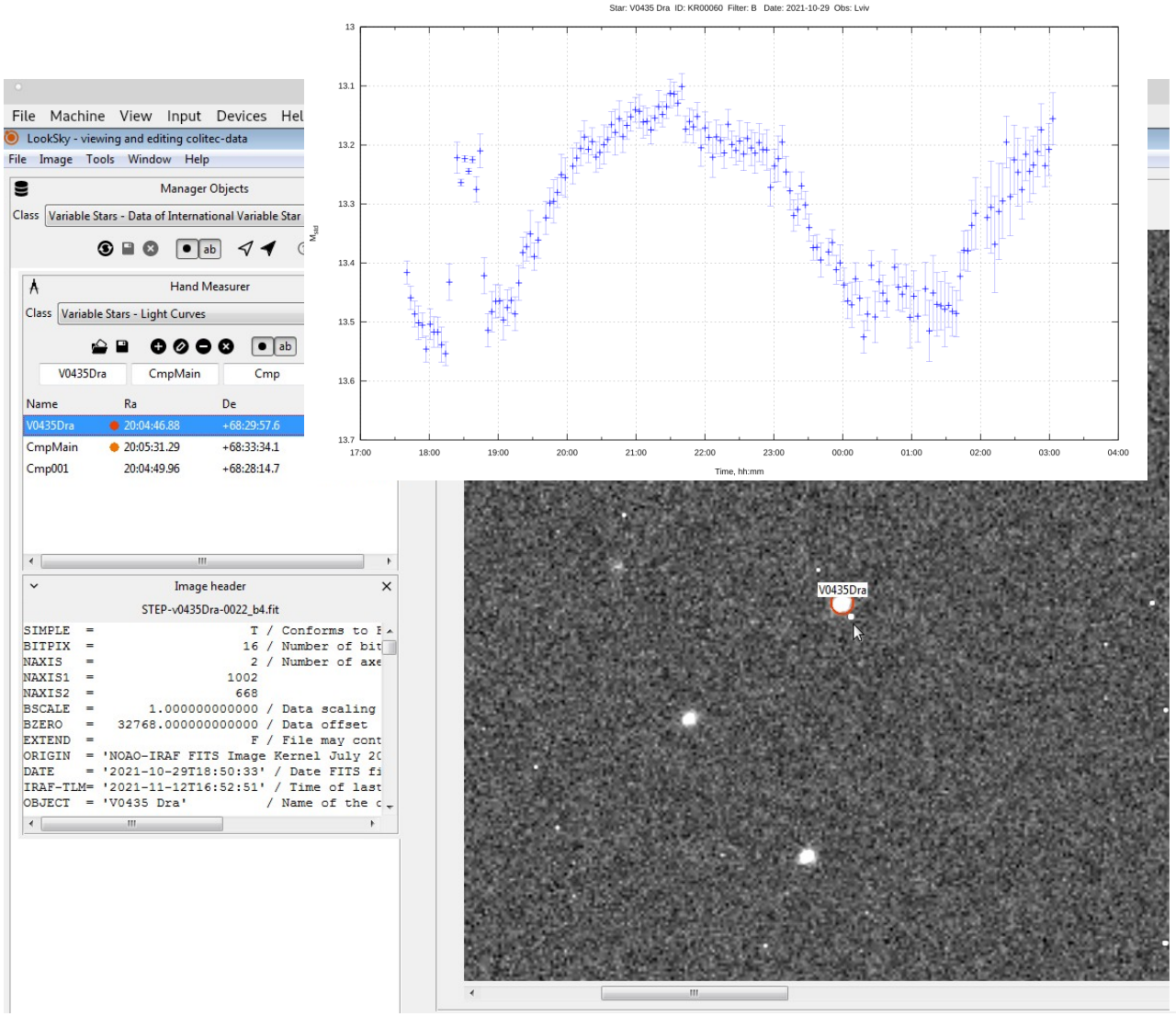
Observations = 2 nights in Oct-Nov 2021.

Technics = V(R,I), bin 4x4, exposure 30-60 sec.

CoLiTecVS 1.8.6.1
Processing FITS = ...

...

Autumn 2021 observations: V0435 Dra



Cooperation with SRL UzhNU (Ukraine) = V.Kudak, V.Perig

VS = V0435 Dra = G +12.2 = KR00060

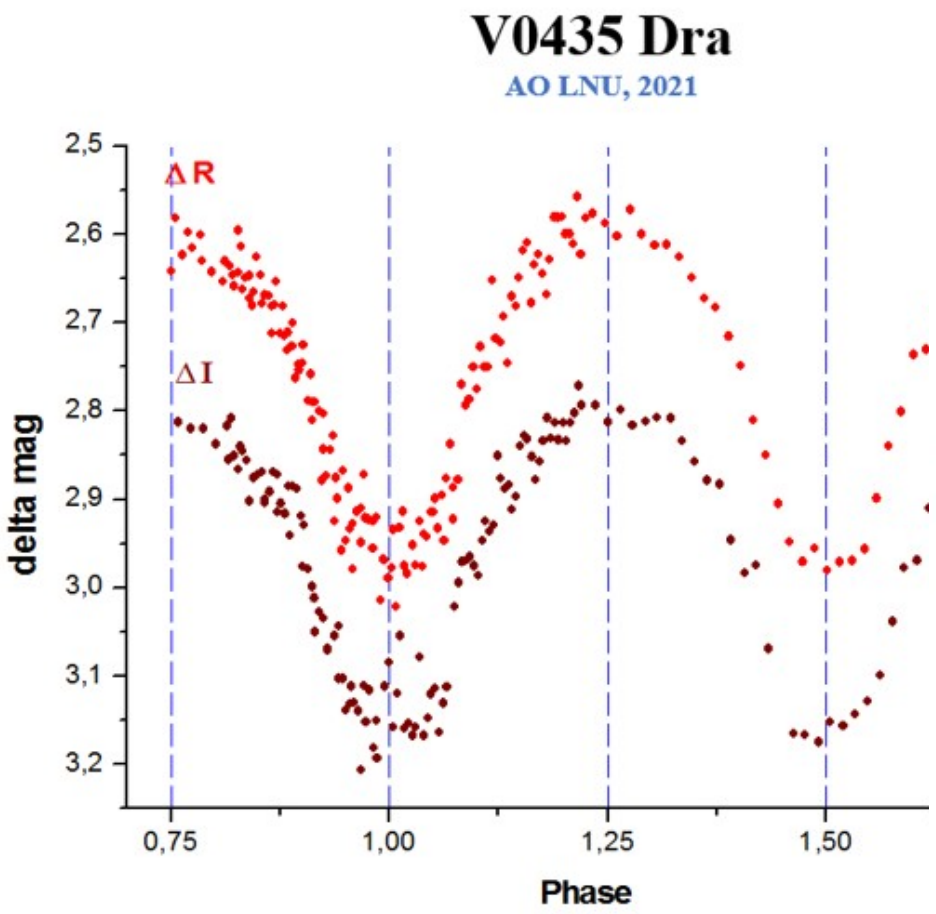
Observations = 4 nights in Oct-Nov 2021.

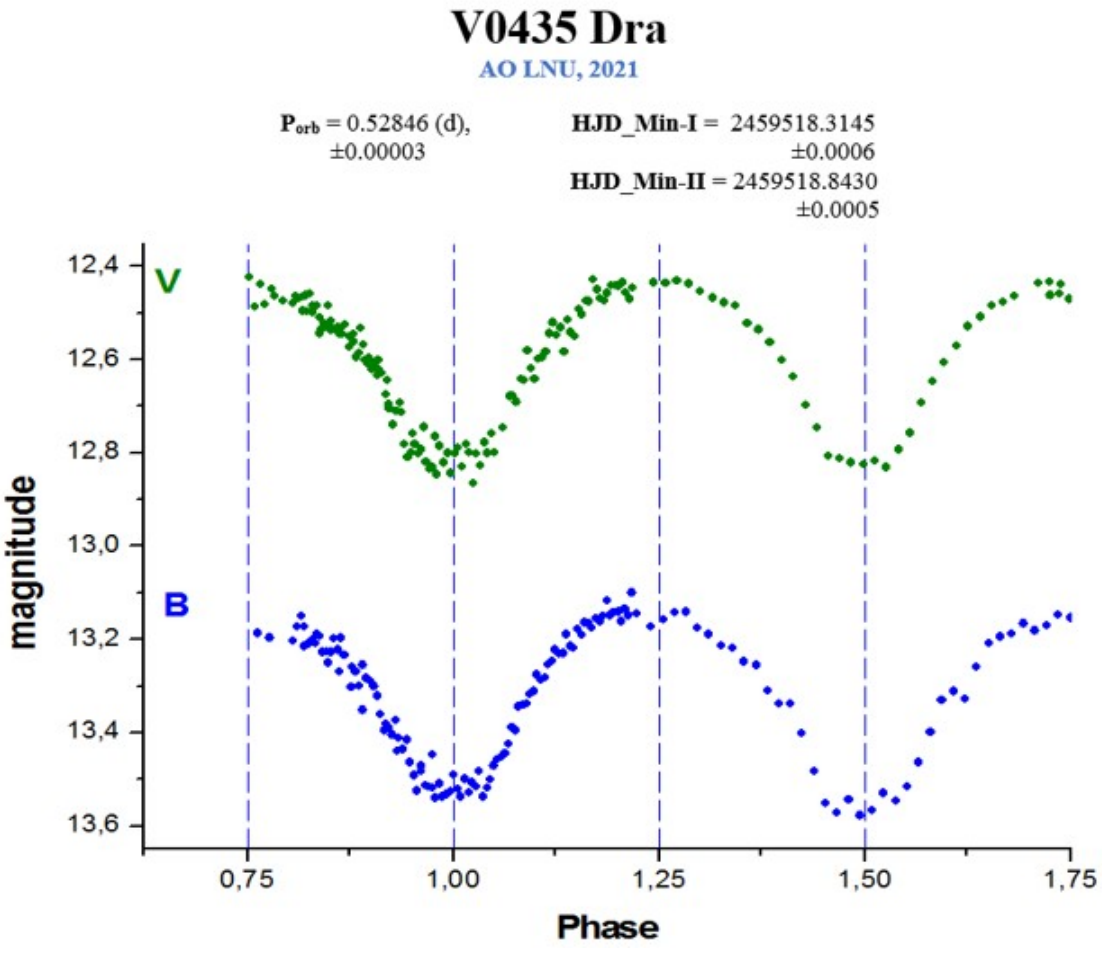
Technics = BVRI, bin 2x2, 4x4, exposure 120-180, 30-60 sec.

CoLiTecVS 1.8.6.1
Processing FITS = ...

...

V0435 Dra data analysis





V0435 Dra data analysis

These observations were analyzed using the period-search software WinEF (Goranskij V.P. 2017WinEF, http://www.vgoranskij.net/software/). To compute the moments of minima and their errors, the software MAVKA _1.0 (Andrych K.D., Andronov I.L., 2019OEJV...197...65A) was used.

To assess the accuracy of determining the $\mathbf{P_{orb}}$ orbital period and the moments of both **HJD_Min-I** and **HJD_Min-II** minima of the V-curve V0435 Dra, the accuracy of each brightness estimate was taken into account. Brightness curves were generated for existing observation moments, in which each luminance estimate was shifted randomly by the normal distribution according to the accuracy of the corresponding observed luminance estimate.

As a result, we received :

AO LNU, 2021

$\mathbf{P_{orb}}$ = 0.52846 (d), ±0.00003

HJD_Min-I = 2459518.3145 ±0.0006

HJD_Min-II = 2459518.8430 ±0.0005

Since for V0435 Dra there are V - estimates of brightness obtained according to the program ASAS-SN (https://asas-sn.osu.edu/variables), we similarly obtained for them the following:

ASAS-SN, 2014

$\mathbf{P_{orb}}$ = 0.52219 (d), ±0.00003

HJD_Min-I = 2456906.8493 ±0.0006

HJD_Min-II = 2456906.5791 ±0.0016

We see that over the last 7 years $\mathbf{P_{orb}}$ for V0435 Dra has increased by 9 minutes (+ 1.2%), although according to data obtained in 1999/2000. according to the ROTSE-I program ((O-C) GATEWAY, http://var2.astro.cz/ocgate/) it remained unchanged:

$\mathbf{P_{orb}}$ (NSVS) = 0.52219 (d)

Conclusions

- The telescope AZT-14 was upgraded (e.g CCD camera, UBVRI filters).
- During 2021 the several variable stars were observed. The FITS were processed by CoLiTecVS 1.8.6.1.
- V0435 Dra observed data were analysed with programs WINEF and MAVKA-1.0.
- Our period (2021) of the variability for the star V0435 Dra differs by 1.2% (9 minutes) from the ASAS-SN (2014) and ROTSE-1 (1999/2000) data.
- The presented observations were performed in cooperation with SRL UzhNU (Uzhgorod, Ukraine) and UJ (Krakow, Poland). We hope to continue our participation in these joint projects.

Thanks for your attention !

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