



**Financované
Európskou úniou**
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Astrocamp VARIABLE 2024

Satellite data - acquisition, reduction, analysis and follow-up ground based observations

- Organizer:** Vihorlat Observatory in Humenné
In collaboration with: Variable Star Section of Slovak Astronomical Society and Slovak Union of Astronomers, Astronomical Institute of Slovak Academy of Sciences, The Slovak Central Observatory, Hurbanovo, Faculty of Science Pavol Jozef Šafárik University in Košice
- Aim:** Training of observing methods used in variable stars research
Dates: **26/7/2024 – 03/8/2024**
Venue: Astronomical Observatory on Kolonica Saddle, Snina district, Slovakia
Accommodation: In accommodation facilities of the AO on Kolonica Saddle.
Expenditures There is no registration fee. The participants will eat at their own expense. The organizer offer the service of local catering company. Expected total food costs are around 110 Euro.
- Meeting point:** 26/7/2024 (Friday), AO on Kolonica Saddle at 15:00
Registration: Use the registration form at variable.astrokolonica.sk. Please fill the form no later then 7/7/2024
Questions: Should be addressed to P. A. Dubovský: var@kozmos.sk

Participants:

Young researchers, students and amateur astronomers involved or interested in variable stars research. Basic knowledge of the topic is required. The participants will be divided in groups. Each group has to solve one announced research task. At the end of the astrocamp the results should be presented in the form of short talk. The organizers provides observing equipment and theoretical supervision.

Each participant is required to bring the following equipment:

1. Warm clothing, including jacket and shoes for observation during the cold night, toiletry
2. Stationery - workbook, pencil
3. Watches or stopwatch
4. Identification card or passport
5. Red light flashlight
6. Your own IT equipment – notebook



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Organizing comitee

The head: Pavol A. Dubovský
Technical assistant: Tomáš Medulka
Head lecturer: RNDr. Theodor Pribulla, CSc.,

DAILY SCHEDULE (in CEST = UTC+2 hours)

10⁰⁰ - 11⁰⁰ personal hygiene, breakfast
11⁰⁰ - 14⁰⁰ lectures and practical exercises
14⁰⁰ - 15⁰⁰ lunch
15⁰⁰ - 17⁰⁰ observational data reduction, research tasks solving
17⁰⁰ - 19⁰⁰ leisure and sports events
19⁰⁰ - 20⁰⁰ BoRo – information about observing program for the night; reports of the researchers and operators
20⁰⁰ - 21⁰⁰ dinner
21⁰⁰ - 02⁰⁰ observation (~24:00 midnight refreshment)
02⁰⁰ - 10⁰⁰ night rest

RESEARCH TASKS

Besides the usual research tasks this year the main topic of the astrocoamp will be the use of satellite data in variable star research. The lectures will be provided again by Dr. Pribulla from Astronomical Institute of the Slovak Academy of Science.

The usual research tasks are the following:

1. Visual observations of long period variables and symbiotics binaries

Description: Acquire several points on light curves of Semiregular and Symbiotic variable stars from the "MEDÚZA" list. Construct the light curves using your own and archival data. As a preparation activity, perform visual determination of the time of minima of one eclipsing binary.

2. Calibration methods of photometric measurements

Description: Determine the extinction coefficients of 1th and 2nd order for the locality. Compare the results from different nights. Determine the transformation coefficients of given instrument. Use the suitable star field with secondary photometric standards (open cluster IC 4665 or the field around SS Cyg is recommended). Then make the observation of selected variable star in 4 filters and transform data to the standard system.

3. Orbital period evolution of eclipsing binaries

Description: Construct O-C diagrams of times of minima of several eclipsing binaries. Use the data from available databases and at least one personal measurement using CCD camera. Determine time of minima using different methods. The MAVKA software is recommended. Compare the obtained results. Explain the sense of constructed plots.

4. Period analysis of short period processes in cataclysmic variables

Description: To construct the O-C diagram of pulse maxima connected with white dwarf rotation in the intermediate polar system. Use the data from literature and at least one personal CCD observation. Intermediate polars has asynchronous rotation. On the light curve we can see the orbital motion and spin of the primary component as well. The spin period value is typically 10 - 20 minutes. So we need long observing run lasting several hours with good time resolution (max. ¼ of the spin period). One filter is sufficient. We have to subtract the orbital wave mathematically. The corresponding point in the O-C diagram you get after fitting the measured points with sinusoidal fit. All necessary mathematical operations can be done with the program "MCV".



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AVAILABLE INSTRUMENTS

For ccd observations:

1. VNT telescope - 1000/9000 mm, FLI PL1001E camera, filters B V Rc Ic Clear
2. * There is high probability that two new 16" telescopes will be available at the time of the astrocamp in new observing pavillions.

For spectroscopy:

3. C14 telescope - Celestron Edge HD CGE Pro 1400, 356/3000 mm, LHiResIII spectrograph and 300 mm Soligor photolense with MII G2-1600 camera, filters B V Rc Ic Clear for simultaneous photometry

For visual observations:

4. Dobsonian Skywatcher 16", 406/1800 mm, Yogajtódo
5. Dobsonian Meade LightBridge 16", 406/1829 mm
6. 100 mm APM Binocular
7. Dobsonian "Chermelin" 300/1500 mm

9. Private equipment of some participants

RECOMMENDED SOFTWARE

For main course: Python and Jupyter notebook installed

For planning of the observations

POZOR (request to the organizers)

For managing the observations

[CCD Ciel](#), [EKOS](#)

For data reduction

Photometry: [C-Munipack](#), [MAVKA](#), [MCV](#),

Some previous experience with recommended software helps to save a lot of time.



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