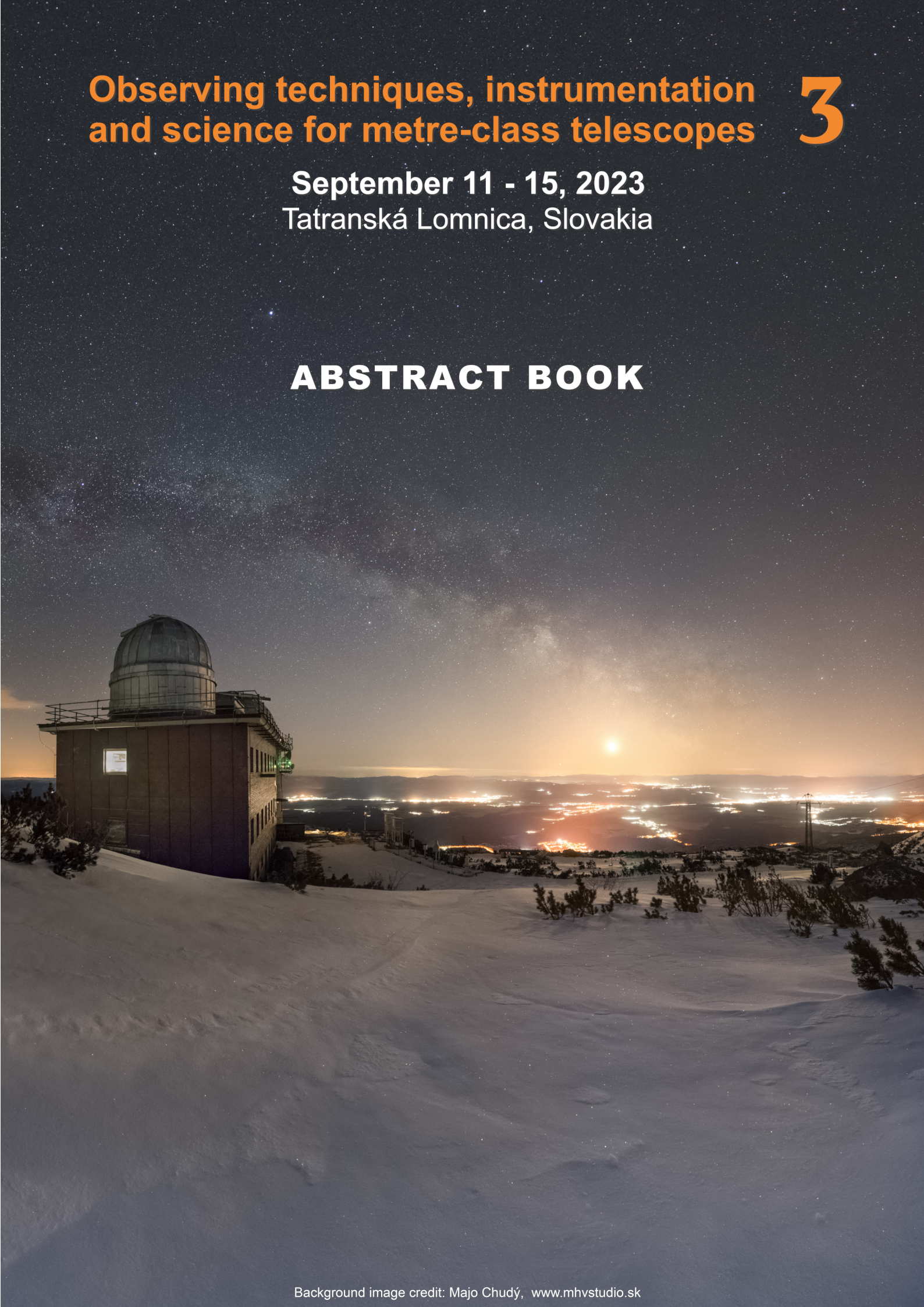
Observing techniques, instrumentation and science for metre-class telescopes 3

September 11 - 15, 2023

Tatranská Lomnica, Slovakia

ABSTRACT BOOK



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ABSTRACT BOOK

Edited by Ľubomír Hambálek, Richard Komžík, Theodor Pribulla

Observing techniques, instrumentation and science for metre-class telescopes III

Conference

Tatranská Lomnica, Slovakia

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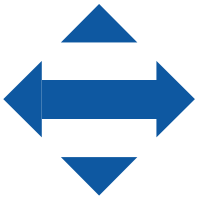

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Session A: OBSERVING TECHNIQUES AND INSTRUMENTATION FOR METRE-CLASS TELESCOPES

A 01 Spectrographs for small and meter-class telescopes

T. Pribulla

Astronomical Institute of the Slovak Academy of Sciences, 059 60 Tatranská Lomnica, The Slovak Republic

Small and meter-class telescopes still have a big potential to contribute with spectroscopic observations to various observing projects including variable stars, binaries, cataclysmic variables or even exoplanets. The key to success is to maximalize the spectrograph throughput and radial-velocity stability. The collimated beam size (and the costs) can be minimized using image slicers or/and slits. This also adds to the versatility. An important aspect is the efficient light injection, optimized and multi-coated optics. In addition to the high-resolution spectrographs using echelle gratings, low and medium-resolution spectroscopy with a wider spectral range is very useful. For hot objects and a reliable spectral classification extending the spectral range to near UV range is crucial.

A 02 MARVEL, a four-telescope array for high-precision radial-velocity monitoring

G. Raskin[1], J. Pember[1,2], C. Schwab[2], B. Vandenbussche[1], H. Van Winckel[1], The MARVEL team

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Since the first discovery of a planet outside of our Solar System in 1995, exoplanet research has shifted from detecting to characterizing worlds around other stars. The TESS (NASA, launched 2019) and PLATO mission (ESA, planned launch 2026) will find and constrain the size of thousands of exoplanets around bright stars all over the sky. Radial velocity measurements are needed to characterize the orbit and mass, and complete the picture of densities and composition of the exoplanet systems found. The Ariel mission (ESA, planned launch 2029) will characterize exoplanet atmospheres with infrared spectroscopy. Characterization of stellar activity using optical spectroscopy from the ground is key to retrieve the spectral footprint of the planetary atmosphere in Ariel's spectra. To enable the scientific harvest of the TESS, PLATO and Ariel space missions, we are building MARVEL as an extension of the existing Mercator Telescope at the Roque De Los Muchachos Observatory on La Palma (SPAIN). MARVEL consists of an array of four 80-cm telescopes linked through optical fibers to a single high-resolution echelle spectrograph, optimized for extreme-precision radial velocity measurements. It can observe the radial velocities of four different stars simultaneously or, alternatively, combine the flux from four telescopes pointing to a single fainter target in one spectrum. MARVEL is constructed by a KU Leuven (Belgium) led collaboration, with contributions from the Australia, UK, Austria, Sweden, Denmark, Germany and Spain. In this contribution, we present the MARVEL instrument with special focus on the optical design and the expected performance of the spectrograph, and report on the status of the project.

A 03 Semirobotic Kyiv Internet Telescope

Ya. Romanyuk

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In 2006 we won a grant from the Science Technology Center of Ukraine. Kyiv Internet telescope (KIT) developed by scientists and engineers from the Main Astronomical Observatory of NAS of Ukraine (MAO NASU) and Taras Shevchenko National University of Kyiv (TSNUK). Program complex for the telescope control and for producing the photometric frames in light filters provide a whole process beginning from pointing the telescope up to sending data files to the special server.

According to the plan KIT installed at the Lisnyky Observatory of the TSNUK what is 12 km on the South from ring road of Kyiv. Since 2012 we took part in some scientific observational programs devoted to asteroids, comets, satellites, exoplanet transits and variable stars. One of is the project "Search for extrasolar planets around White Dwarfs" initiated by Astronomical Institute of the Slovak Academy of Sciences.

A 04 Technical performance and first light of the new 1.5-meter telescope at the National Astronomical Observatory Rozhen

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A new 1.5-meter Ritchey-Chretien telescope has been inaugurated as part of the observational equipment of the Institute of Astronomy with the National Astronomical Observatory Rozhen at the Bulgarian Academy of Science. The telescope, designed with advanced optical and mechanical components, aims to enhance observational capabilities from NAO Rozhen. Here, we present the initial tests and setup procedures conducted for the new telescope and we describe the assembly process, alignment procedures, and calibration techniques implemented to ensure optimal performance. The tests involved nighttime observations and preliminary results highlight the successful alignment of the telescope's optics, the stability of its tracking mechanism, and the establishment of an efficient data acquisition workflow. The findings from these initial tests provide valuable insights into the telescope's capabilities and help us to set up a fully robotic telescope for observational campaigns and scientific research.

A 05 ObsMap: Preparing observing maps with best comparison stars for photometry

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Accurate and precise light curves are always desired in photometry, regardless of the observed object. These two elements depend not only on the brightness of the target object but also on the porperties of comparison stars within the field of view (FoV). An ideal comparison star should not be a variable star to ensure accuracy, and it should be bright enough to be observed with the variable but not saturate the detector to increase the precision of the relative flux of the target in a given passband. In this context, we present ObsMap, a Python framework that allows for the interactive creation of various alternative observation maps to maximize the potential of each observing night.

The code requires the user to input the star's name or equatorial coordinates, the passband of observation, FoV, desired count level together with the minimum and maximum count limits in ADUs for the detector. ObsMap queries the stars in the Gaia DR3 archive within an area twice the size of the FoV, as the target star could be located anywhere within the FoV. It then generates a list of stars in that area, along with additional information about each star. Variable stars are eliminated from the list. The total emitted energy in the specified filter is calculated with the blackbody approach for the remaining stars, utilizing Gaia's effective temperature, stellar radius, and parallax data. Using the filter-specific fluxes, the count levels of the stars are determined relative to that input by the user for the target.

As a result, ObsMap creates three maps: a) A large map that is twice the size of the FoV, where the effective temperature and count levels of the stars are annotated. The user can manually select the appropriate FoV, based on this map. b) A suggested FoV that minimizes photon noise (scatter). c) A suggested map to maximize the number of comparison stars. In some cases, a single comparison star with a high count level could outperform a combination of dim comparison stars. However, if that bright comparison star is variable and not flagged as such in the Gaia archive, choosing dimmer comparison stars could be a better option.

A 06 An update on the recent polarimetry surveys with 1-m class telescopes and bigger

A. Słowikowska

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A 07 Calibrating optical astrometric measurements of resident space objects in Earth orbit and telescope locations of the Ukrainian-Polish telescope network

L. Shakun[1], K. Kaminski[2], O. Kozhukhov[3], O. Briukhovetskyi[3], E. Wnuk[2], J. Golebiewska[2], M. Kaminska[2], M. Kruzynski[4], N. Koshkin[1]

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During the last ten years, the number of resident space objects (RSOs) around Earth has doubled, leading to an increased risk of collisions and also an increased number of satellite trails affecting astronomical images. The motion of RSOs is influenced by various forces, including those unrelated to gravity, making their orbit complex and variable. Regular observations of RSOs, determining their orbit, and orbital maneuvers to avoid hazardous close passes are crucial to prevent collisions between space debris and active satellites. Improving the accuracy of orbit determination and observations is essential in predicting and avoiding potential RSO collisions. The astrometric observations in the optical range are one type of RSO observations. To verify observation accuracy, these measurements are compared to orbital products provided by International Laser Ranging System (ILRS), Doppler Orbitography and Radiopositioning Integrated by Satellite, and International GNSS Service. In the analysis of residuals between the measurements and accurate orbital propagation, it is often found that the standard deviation of one measurement is comparable with the amplitude of systematic trends in residuals. This means that systematic measurement deviation is the main factor limiting observation accuracy and, as a result, limits the determination accuracy of the object's orbit. In this presentation, we will discuss potential sources of systematic deviation trends that can affect the accuracy of measurements. We will show that not everyone's orbital ILRS prediction can be used to estimate observation accuracy. We will demonstrate that regular GPS coordinates for telescopes can cause systematic trends in measurement residuals. To address this issue, we will present an original method for deriving telescope location coordinates based on observations themselves. Finally, we will showcase a small Ukrainian-Polish telescope network example and how adjusting the telescope coordinates can lead to increased orbit determination accuracy.

A 08 High-resolution optical interferometry from the modelling point of view

M. Brož

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In order to use measurements from various optical-to-near-infrared interferometers (e.g., CHARA, NPOI, VLTI), it is necessary to compute various interferometric observables, in particular, a squared visibility, closure phase, triple product, differential visibility, or differential phase. We use LTE radiative-transfer computations by Pyhellspec (Budaj 2011, Mourard et al. 2018) to generate synthetic images and their Fourier transforms. The underlying parametrized shapes allow us to fit measurements even if the (u,v) coverage is sparse. We also combine these measurements with relative photometry, absolute photometry (SED), or spectroscopy ("Doppler tomography"). In this lecture, the respective computations, approximations and caveats will be explained.

As an example, the beta Lyr A mass-transferring binary was studied (Brož et al. 2021). It contains optically thick components (primary, secondary, disc) as well as optically thin (disc atmosphere, jets, envelope). Its model containing up to 38 free parameters was successfully converged using an OpenMP parallelisation. In the emission lines, synthetic images exhibit dramatic changes with the wavelength, which correspond to differential visibility measurements by CHARA/VEGA. As an alternative, we will describe simplified analytical models, which were previously used to constrain the QZ Car massive quadruple system, observed by VLTI/GRAVITY (Brož et al. 2022). New developments, i.e., exact polygonal and 'cliptracing' algorithms to compute precise light curves and synthetic images (Brož et al. 2023) will be discussed.

A 09 Fast photon counting optical astronomy

L. Zampieri[1], M. Fiori[1], G. Naletto[2], A. Spolon[1], C. Barbieri[2], A. Burtovi[3], U. Munari[1], G. Umbriaco[4], B. Gaiani[5], L. Lessio[1], P. Ochner[2]

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Fast sub-second optical variability exists in some important classes of astrophysical sources, in particular pulsars and X-ray binaries. We regularly perform ultra-fast optical photometric campaigns on some of the most interesting targets and transient events. At the same time we are tackling new campaigns searching for fast optical variability in other types of sources (Fast Radio Bursts, magnetars). To this end we use and develop dedicated fast photon counting instrumentation in the visible band, area in which our team is leader. Observations are carried out within the framework of multiwavelength campaigns and in synergy with facilities operating at other wavelengths. Here we report on some of the most recent observing campaigns and technological developments, and on the outcome of a km-baseline experiment of stellar intensity interferometry carried out in photon counting mode.

A P01 High-resolution échelle spectrograph at Skalnaté Pleso observatory

T. Pribulla, M. Vaňko, R. Komžík, P. Sivanič

Astronomical Institute of the Slovak Academy of Sciences, 059 60 Tatranská Lomnica, Slovakia

A clone of the MUSICOS (Multi-SIte COntinuous Spectroscopy) spectrograph mounted in the Nasmyth focus of the 1.3m telescope at Skalnaté Pleso Observatory (Slovakia) is described. The spectrograph is a cross-dispersed, bench-mounted, fiber-fed instrument with a maximum resolving power of 38 500 (FWHM). Fifty-six orders covering the spectral range between 4210 and 7260 Å are imaged on a 2k×2k CCD. The spectrograph is primarily used for observations of variable stars, binary, and multiple stellar systems. The radial-velocity stability (60 – 80 m/s) is sufficient to detect the orbital motion of hot-Jupiters around bright stars. The instrument is continuously being developed to improve its throughput and radial-velocity stability. The planned improvements (including an image slicer and better fiber injection) are described.

A P02 Bohyunsan Optical Astronomy Observatory (BOAO) in Korea

Hyun-Il Sung, Yoon-Ho Park, Young-Beom Jeon

Korea Astronomy and Space Science Institute, Daejeon, Republic of Korea

Bohyunsan Optical Astronomy Observatory (BOAO) was established in 1996 with a 1.8m reflecting telescope, the largest in Korea. BOAO successfully operated the 1.8m telescope and three instruments with a success rate of 99.6%, experiencing no technical failures during the observing season, except during the maintenance period from July to August. The three instruments for the telescope are as follows: 1) the high-dispersion Bohyunsan Optical Echelle Spectrograph (BOES), 2) the KASI Near Infrared Camera System (KASINICS), and 3) a 4k CCD camera for optical imaging and photometric observations.

At BOAO, various observations related to exoplanets, binary stars, symbiotic stars, and young planetary nebulae are being conducted. Experimental observations are also in progress. Additionally, a variety of Target of Opportunity (ToO) observations, including follow-up observations of GRB and energetic transients, are being carried out.

A P03 Automatisation of manual equatorial telescope made by Carl Zeiss Jena

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Cassegrain telescopes made by Carl Zeiss Jena with a 60cm primary mirror are excellent optical instruments. The only major drawback is the manual operation of their equatorial mount including fine motions. These telescopes are still useful for photometric observations of stars and other objects with visual magnitudes down to V = 18 (depending on the detector). To slew and track the telescope it is necessary to add an extra gearbox and a motor to both axes. Moreover, it is important to measure precisely actual position in both hour angle and declination. Angular resolution of the (absolute) rotational encoders depends on the focal instrument and observing program. For a long-slit or fiber-fed spectroscopy the required angular resolution is in the order of tenths of an angular second. For CCD photometry a lower resolution is sufficient. For the operation of the motors of our 60cm Cassegrain telescopes and reading of encoders we have developed a specialized control electronics and the firmware. The telescope is planned to be used with a custom-made INDI driver for Ekos planetarium under Kstars software. To enable fully-remote observations we will need to automatize the dome rotation and slit opening.

A P04 An explanation of how virtual waves are created, its negative effects and design and manufacturing of low-defect telescopes based on wavelength

Gh. Saleh

Saleh Research Centre, Netherlands

In 1929, Hubble showed that galaxies are receding away from us with a velocity that is proportional to their distance from us ($v = H.D$). We use this formula for a galaxy which is located at the observable boundary of universe, 10^{24} km. we perceive that these galaxies are currently moving at a speed faster than the speed of light:

$$v = H.D = 72 \times 10^{24} km^2/s.Mpc \Rightarrow v = 2.4 \times 10^9\ m/s \Rightarrow v \gg C$$

On the other hand, Redshift and Blueshift cause deviation in our perceptions. But now its formula must be back to classical form. Suppose a galaxy in 10^{25} meters distance from us that emit in visible range. The Redshift or Blueshift occurs but they are still in range of visible light. If the galaxy where further, there is a strong possibility that it cannot be seen in the visible light range. This means that the waves are emitted in range of visible and reach the observer, but the observer does not perceive it. For better understanding suppose that we work with x-rays telescope. It is a special telescope that is designed for observing x-rays. Therefore, it collects these specific wave ranges of space and probes them. The wrong observed waves by this telescope will be:

1. Blueshift effect: the observed waves have been actually in the range of visible light, but we perceive them as x-rays.
2. Redshift effect: the observed waves have been actually in the range of Gama rays, but we observe in the x-ray range.
3. Real x-rays: which are really in the range of x-rays, but cannot be observe in x-ray range and will disappear.

Therefore, we need a new receiver, sensitive to "λ" instead of frequency, that will explain.

Session B: SCIENCE WITH SMALL TELESCOPES

B 01 Using small telescopes for photometric monitoring of stellar and extragalactic objects

S. Zola

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I will describe small telescopes that can be used manually, remotely and in the robotic mode, with an aim of long term brightness monitoring of stellar objects and extragalactic sources. A brief desciption how to use them will be given as well as advantages and drawbacks in performing such observations.

In the second part I will present several results that were recently derived. This will concern two stellar targets and a sample of blazars and quasars.

B 02 A variety of binary targets for small telescopes

A. Miroshnichenko[1,2]

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I will review the results of a monitoring of a variety of binary systems that has been conducted since 2013 at the 0.81-m telescope of the Three College Observatory in North Carolina, USA, with an échelle spectrograph at a medium spectral resolution. A list of recognized and suspected binary systems contains normal stars (no spectral lines in emission), classical Be stars, and objects with the B[e] phenomenon. The results include orbital elements refinement for bright binaries previously observed with photographic plates, further evidence for phased-locked peak intensity variations of double-peaked line profiles in Be binaries, and recent discoveries of binaries with a B[e] component. An overview of the observatory features will be presented as well.

B 03 The exotic world of tight multiple stellar systems with the stereo eyes of metre-class space-borne and ground-based telesopes

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Recent extensive, long-term, ground-based and space-borne photometric surveys, especially the ongoing, (almost) all-sky observations of *TESS* space telescope (amongst many other fields of stellar astrophysics) have revolutionized the study of multiple stellar systems with the discovery of dozens or hundreds of peculiar stellar systems including many record-breaking tight multiple stars which manifest very strong and well-observable gravitational perturbations on timescales of months or years, not mentioning such exotic phenomena like multiple stellar eclipses. The vast majority of these currently identified systems are bright enough to be ideal targets for photometric and/or spectroscopic follow up observations with metre-class telesopes.

In this talk I give a short review about the importance of the study of peculiarly tight multiple stellar systems and discuss the synergy of high-tech space-borne photometries, ground-based all-sky photometric surveys as well as targeted follow up observations with metre class telescopes which, together with the necessary theoretical background and numerical modelling efforts, and with the collaboration of professional and amateur astronomers, has led (and continuously lead) to ground-braking new results in the area of multiple stellar systems.

B 04 Observing group for doubly eclipsing systems

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After the release of the second data set from the TESS probe, the interest of scientific groups focused on studying doubly eclipsing (quadruple) systems of stars which frequently consist of two eclipsing binaries. However, the majority of the new candidates need to be investigated and confirmed by ground photometric measurements. In this work, we present a complex analysis of the quadruple candidates that is primarily focused on multiple-band photometry with precise timings of light curves minima. Moreover, we also address corresponding numerical simulations to obtain the physical parameters of the observed systems. Our presented results can be contributed to future statistical visualization of the quadruple systems of stars and to discover novel physical relations.

B 05 Low-mass contact binaries as probes of stellar merging events

K. Gazeas

Section of Astrophysics, Astronomy and Mechanics, Department of Physics, National and Kapodistrian University of Athens, GR-15784 Zografos, Athens, Greece

Gravitational interaction is important for nearly every aspect of astrophysics. Theoretical models are tough tested in cases when strong, stellar winds, angular momentum loss and mass transfer take place during stellar evolution within a common envelope. Stellar interaction impacts the formation and evolution of diverse type of binary and multiple stellar systems. Therefore, evolution in a binary (and moreover a multiple) stellar environment is still an open question in astrophysics while contact binaries are challenging the well established and solid theories that concern thermal equilibrium and orbital stability.

There is a vast number of such systems observed in our Milky Way and the Magellanic Clouds. Systematic (independent or combined) observations, all-sky surveys, ground-based and space telescopes have offered very detailed photometric and spectroscopic information about these systems. Special attention is given when extreme cases are observed, such as in ultra-short orbital period contact binaries or in extremely low-mass ratio systems. These cases can give insights for the physical and orbital parameters of low-mass contact binaries and their temporal variations. For example, one can investigate orbital period modulation, spot activity and the possibility of contact binaries to host planets, as well as predict stellar merger, red nova events and a possible connection with exotic stellar populations such as blue stragglers.

The purpose of this work is to present the recent developments on observations of low-mass contact binaries, highlighting the most important findings, in combination with existing theories. The research of such systems in an international level is constantly challenging our current knowledge on stellar interactions and advances our understanding of stellar dynamics in common envelope and contact phases.

B 06 Theory of mass transfer in binary stars

J. Cehula, O. Pejcha

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Mass transfer in semi-detached binary stars dramatically affects their evolution and is the cause of plentiful astrophysical phenomena, such as Algol variables, cataclysmic variables or blue stragglers – all of these objects can be readily observed by metre-class telescopes. To model evolution of binary stars one has to implement a mass-transfer model that gives mass-transfer rate as a function of the donor structure and the binary star geometry. Standard mass-transfer models used in stellar evolution codes rely on Bernoulli's principle to account for the gas flow. We develop a new model of mass transfer through the inner Lagrangian point, based on the assumption that the Roche potential sets up a converging-diverging nozzle around the Lagrangian point. By averaging 3D time-steady Euler equations, we derive a set of 1D hydrodynamic equations governing the gas flow, in which mass-transfer rate is the eigenvalue of the system. The inner boundary condition directly relates our model to the donor structure. Our model predicts mass-transfer rates that differ by a factor of a few (up to 4) compared to standard models. Conceptual uncertainties in the treatment of mass transfer affect the mass-orbital period relation in binaries that have evolved from a red giant donor with a degenerate core (now a white dwarf) through stable mass-transfer. This includes white dwarf-blue straggler binaries where the stellar parameters can be inferred from spectroscopic observations with metre-class telescopes. In this way, metre-class telescopes can help to constrain mass-transfer models.

B 07 Photometric sample of early B-type pulsators in eclipsing binaries observed with TESS

C.I. Eze[1,2], G. Handler[1]

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[2] *University of Nigeria, Nsukka, Nigeria*

The combined strength of asteroseismology and empirical stellar basic parameter determinations for in-depth asteroseismic analysis of massive pulsators in eclipsing binaries shows a great potential in treating the challenging and mysterious discrepancies between observations and models of stellar structure and evolution of massive stars. This paper compiles a comprehensive list of massive pulsators in eclipsing binary systems observed with TESS. The TESS light curves and Discrete Fourier Transforms (DFT) of a sample of 8055 stars of spectral type B0-B3 were examined for eclipses and stellar pulsations and the ephemerides of the resulting sub-sample of massive pulsators in eclipsing binaries were computed. The sub-sample of massive pulsators in eclipsing binaries, which accounts for approximately 1% of the sample, was also cross-matched with existing catalogues of massive pulsators. Our sample of pulsating massive stars in eclipsing binaries allows for future asteroseismic modelling to better understand the internal mixing profile and resolve the mass discrepancies in massive stars. We have already started follow up of some of the most interesting candidates. The spectroscopic observations at Skalenate Pleso Observatory, of some of the candidates, are under analysis.

B 08 V760 Scorpii: a bright southern star with apsidal motion

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We present new light and radial velocity curve solutions using old and new observational data of interesting eclipsing system V760 Scorpii. This determination of binary component parameters is a part of the project. There is plenty of old precise photometric data which have been published but not used in binary star modelling. We combine these data with the new ones for several tens of especially bright southern eclipsing binaries.

B 09 Accreting-only symbiotic stars in the era of large Galactic Archeology spectroscopic surveys

M. Perko

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Symbiotic stars are interacting binary systems consisting of a primary star, usually a red giant, and a companion star, usually a white dwarf, accreting material from a red giant. In general, there are two phases of symbiotic stars: accreting-only and burning type. In the burning phase, we observe a strong nebular continuum and a rich emission line spectrum, making these systems easy to detect. In contrast, the accreting-only systems are more difficult to detect because their optical spectrum is dominated by the red giant. In order to determine the significance of symbiotic stars, we need to characterize and quantify the entire population in the Galaxy, not just the easily observed systems.

In our search for new accreting-only symbiotic star candidates, we focus on properties that distinguish these systems from single giants. Our primary data set is based on spectroscopic observations from the GALactic Archaeology with HERMES (GALAH) survey using the HERMES instrument with the Anglo-Australian Telescope. We aim to find symbiotic stars with the lowest accretion rates by examining spectral features such as Hα and Hβ emission profiles that originate from the area of the accretion disk around a white dwarf. To confirm the presence of a symbiotic star, we also investigate other features using available spectroscopic and photometric data from public surveys.

Symbiotic stars provide important insights into the evolution and properties of our Galaxy. The mass accretion from a red giant onto the surface of a white dwarf can lead to nova outbursts enriching the interstellar medium with lithium and other elements. In addition, if a white dwarf reaches critical mass, the accretion can lead to an explosion, making them a promising Type Ia supernova progenitor.

B 10 Exploring outbursts of accreting white dwarfs in symbiotic binaries with small telescopes

A. Skopal

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I will present some basic effects resulting from wind accretion onto white dwarfs in symbiotic binaries, the nature of which can be understood using the method of multiwavelength SED modelling of their global spectrum. I will mention the issue of their outbursts, which are associated with the formation of a disk-like structure around the white dwarf in the orbital plane, enhanced mass outflow and ejection of bipolar jets. Based on optical multicolour photometry and spectroscopy obtained mainly by amateur astronomers, supplemented by observations from the archives of terrestrial and space observatories, I will demonstrate their contribution to valuable science.

B 11 A look at the wind asymmetries in the S-type symbiotic star EG Andromedae through the spectroscopy from Skalnaté Pleso Observatory

N. Shagatova[1], A. Skopal[1], E. Kundra[1], R. Komžík[1], S. Shugarov[1,2], T. Pribulla[1]

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EG Andromedae belongs to the S-type subgroup of symbiotic binaries, where a white dwarf accretes from the wind of a M2-3 III non-dusty giant companion. The measurements of the H^0 column densities for this high-inclination binary suggest that the efficiency of the giant's wind accretion can be increased due to the wind enhancement in the orbital-plane area.

The spectroscopic observations by the 1.3m telescope at the Skalnaté Pleso Observatory allowed us to resolve the two-component [OIII] 5007Å line, whose radial velocities point to the existence of diluted wind regions near the poles of the red giant, i.e. independently confirming the wind focusing towards the orbital plane.

Modelling the broadened profiles of Fe I absorption lines shed more light on the possible mechanisms of the wind focusing. The resulting rotational velocity of the red giant of $\approx 11 \mathrm{kms}^{-1}$ allows the wind compression by rotation. Additionally, the absorbed line flux and column density orbital variability point to the compression of the wind by the gravitational pull of the accretor. Our results, therefore, support the contribution of both rotational and gravitational wind focusing to the observed wind enhancement in the orbital plane of EG And.

B 12 Linear ephemeris of AX Persei determined by the method of the O-C diagram

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Symbiotic stars are interacting binaries in which is mass transferred from cool to hot component by stellar wind. This is responsible for outbursts - events connected with significant photometric and spectroscopic changes. We employed the method of the O-C diagram to determine the new linear ephemeris for one member of this group - the symbiotic system AX Persei. To achieve this goal we had to gather as many photometric data of the mentioned binary as possible. The light curves in the U, B and V filters were constructed by adopting the magnitude values from available scientific sources (papers, telegrams, circulars) and the AAVSO database. The *MAVKA* software and the linear ephemeris from 2011 were used to determine the observed and computed Julian dates of the eclipses for a given orbital cycle, respectively. The resulting O-C diagram was fitted by the linear function by employing the weighted least squares method. We got the final linear ephemeris of AX Persei as $JD_{\mathrm{ecl}} = 2\,447\,557.75(\pm 3.39) + 679.91(\pm 0.45) \times E$. This is in good agreement with the previous determinations of both the linear ephemeris and the orbital period of the investigated system.

B 13 PM 1-322: new variable planetary nebula

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Spectra of planetary nebulae (PNe) are characterised by strong forbidden emission lines and often also by an infrared (IR) excess. A few PNe show dust obscuration events and/or harbour long-period binaries. Some post-asymptotic giant branch stars, symbiotic stars, or B[e] stars may feature similar characteristics. Recently, dust clouds eclipsing white dwarfs were also detected. We report the discovery of an object with a very peculiar variability pattern that bears signatures compatible with the above-mentioned classes of objects. The object is ZTFJ201451.59+120353.4 and identifies with PM 1-322. The object was discovered in Zwicky Transient Facility archival data and investigated with historical and newly obtained photometric and spectroscopic observations. The ZTF r and g data show a one magnitude deep, eclipse-like event with a duration of about half a year that occurred in 2022. The variability pattern of the star is further characterised by several dimming events in the optical region that are accompanied by simultaneous brightenings in the red and IR regions. Apart from that, two fast eruption-like events were recorded in ZTF r data. Archival data from WISE indicate long-term variability with a possible period of 6 or 12 yr. Our follow-up time series photometry reveals a stochastic short-term variability with an amplitude of about 0.1 mag on a timescale of about one hour. The spectral energy distribution is dominated by IR radiation. Our high-resolution spectroscopy shows strong forbidden emission lines from highly ionised species and symmetric double-peaked emission in Halpha, which is very different from what is seen in earlier spectra obtained in 2007. Several explanatory scenarios are presented. Our most likely interpretation is that our target object involves a hot central star surrounded by gaseous and dusty disks, an extended nebula, and a possible companion star.

B 14 Study of exoasteroids orbiting WD 1145+017

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WD 1145+017 is the first white dwarf known to be orbited by disintegrating exoasteroids. It is a DBZ-type white dwarf with variable asymmetric transits. The analysis of WD 1145 light curve allowed us to identify at least 8 bodies which periodically eclipse the star, showing periods ranging from 4.490 to 4.493 hours. Waterfall diagram shows that some of these periods are not stable. Estimating transit depths gave us possibility to assess the disintegration rate.

B 15 ARAS spectroscopic monitoring of eruptive stars

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The ARAS eruptive stars group monitors novae, symbiotic stars, eventually dwarf novae ... with very small telescopes (typically 20-40 cm) equiped with slit (R=600 to 15000) and echelle (R=10000) spectrographs.4150 spectra of 65 novae and 8200 spectra of 103 symbiotics secured since 2013 are accessible in free access from the spectral database asdb.

From selected examples we show the interest of this long term monotoring, high cadency program and the reactivity of the members to special events such as ouburts, eclipses.

1. 516 spectra of the slow nova Cas 2021 (V1405 Cas) allows a precise description of the evolution of the spectrum along the multiple rebrightnings and to time precisely (2 days) the appearence of high ionized lines such as [Fe VII].

2. The 2021 outburst of the recurrent nova RS Oph was carefully studied with daily echelle spectra and flux calibrated low resolution spectra during one month. This monitoring allowed to construct the evolution of the ionisation state of the system during the outburst.

3. An example of monitoring an eclipse in an accretion powered symbiotic star BX Mon.

4. The flickering of the accretion powered symbiotic CH Cygni can be studied at medium resolution (R 10000) at a time scale of 90 seconds.

5. One of the main axes of our program is the long term monitoring of classical symbiotic symbiotics over serval orbital cycles following the suggestion of S. J. Kenyon (1986) and J. Mikolajewska. The complex behavior of the eclipsing AX Persei is shortly summarized.

6. With more than 800 spectra secured since 2013 we can study in detail the behavior of the recurrent symbiotic nova T CrB (1866,1946) before its next nova event expected in the very next months or years. The cadency of the observations has enabled us to to time precisely the end of the long high state detected in 2015.

B 16 Photometric investigation of the WZ Sge - type cataclysmic variable TCP J14225968+4122545

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The object TCP J14225968+4122545 displayed a 7-mag outburst in May 2022. *BVRI* as well as observations without filters, in the integrated light, were carried out in Slovakia with a 60-cm telescope in Stara Lesna and with a 28-cm telescope of the Vihorlat Observatory. These data was supplemented by obserbations from AAVSO. The periods of early ($0^d.05584$) and ordinary (on average $0^d.05653$) superhumps were found. The O-C diagram showed a stable period of early superhumps within the first 10 days. O-C for ordinary superhumps in the next 15 days showed a parabolic curve with $P_{dot} = 6 \cdot 10^{-5}$. The light and color indices phase curves constructed with specified periods are presented and described. Some physical parameters of the studied binary system are found: the mass ratio $q = M_{red}/M_{wd} = 0.07$, fractional period excess $\epsilon = 0.012$, distance between components $a = 0.64 R_{\odot}$.

B 17 V1006 Cyg: The SU UMa-type dwarf nova in the period gap that is wobbling between subclasses

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SU UMa-type dwarf nova V1006 Cyg pointed attention by sporadic appearance of long outbursts without superhumps and by some similarity with WZ Sge-type stars. Here we present a result of the multi-site campaigns on the multicolor observations of the V1006 Cyg in 2015-2017 and 2023. In 2015 it's long-term light curve displayed the superoutburst with ∼10-d duration and amplitude of $3.5^{\rm m}$. The series of the normal outbursts of ∼3-4 d duration and amplitude of $\sim 2.5^{\rm m}$ superposed on the quiescence. The brightness of 2015-2017 quiescence varied from $16.5^{\rm m}$ to $17.5^{\rm m}$. A long-term 2023 light curve represented two states: 1) a standstill terminated by outburst. Such behavior is a sign of the IW And-type CV. The amplitude of the outburst was $\sim 3^{\rm m}$, it lasted about a week. Despite a comparable duration of this outburst with 2015 superoutburst, it contained the orbital variations instead of superhumps. More over, according to ZTF, ASAS-SN and ATLAS, there have been relatively regularly spaced long outbursts since 2021, none of which turned out to be a superoutburst. We present the two-color diagrams for the 2015 superoutburst, 2023 outburst and quiescence data as well as the color-indexes of the superhumps. The UBVRcIc colors during the 2023 outburst consistent with a partially ionized disk and support an identification of V1006 Cyg as being on the IW And state. 2) After the 2023 outburst V1006 Cyg entered its quiescent state ($17.5^{\rm m}$). A few of small-amplitude flares lasted 4-5 d, superposed on this quiescence. The UBVRcIc colors in the quiescence point to a lower temperature as a whole from the disk and indicate that the radiation can come from the parts of the disk of different temperatures. There is no orbital brightness modulation, but large QPOs are recorded instead in 2015-2017 and 2023 quiescence.

B 18 Multicolour photometric study of the new WZ Sge-type variables

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We present the observations and their analysis for three cataclysmic variable stars which belongs to U Geminorum/WZ Saggitae type. The outburst of ASASSN-20ca was in February 2020. XM78HT showed the rapid brightening from 21 to 13 magnitude in October 2021 and slow dimming till mid-November 2021. TCP J23580961+5502508 (Gaia22eci) was detected in the outburst in September, 2022.

The UBVRI observations were made by using the 60cm telescope of the Astronomical Institute of Slovak Academy of Science.

We studied superhump evolutions from the early to late ones, calculated their periods as well as orbital periods, construct the O-C curves using our photometric observations and AAVSO photometric archive data, and estimate some parameters of the binary systems. The color indexes variations also were studied from the maximum of outburst till quiescence phase.

B 19 Nova Herculi 2021 as an Intermediate Polar

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We were experiencing an increased rate of nova eruption on the northern hemisphere in recent years. One of them is V1674 Her = Nova Herculi 2021. The progenitor of V1674 Her is an intermediate polar with known white dwarf spin period before the nova eruption. We have measured the spin period in 3 seasons. In this work we present analysis of the spin period evolution. The period change is extremely fast. The mean value in 2022 was 88 mili-seconds shorter than in 2021. The typical value of the period change in "normal" intermediate polars is around 1-2 mili-seconds per year. For this reason it is very difficult to correctly count the cycles. However we made an attempt to construct the O-C diagram of spin maxima. The result suggests that the spin acceleration is now stable and we can expect its slow decline in next decades.

B 20 Photometric monitoring of PMS stars with the telescopes at the Rozhen Observatory

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National Astronomical Observatory Rozhen (Bulgaria) is situated in the Rhodope Mountains at 1750 m altitude and it is a leading astronomical center in the South-East Europe. The observatory is equipped with four telescopes for optical observations: 2-m RCC telescope, 50/70 cm Schmidt telescope, 60-cm Cassegrain telescope, and from this year also with a new robotic 1.5-m telescope. For several decades we have been performing photometric monitoring of some of the star formation regions. Significant place in our program take observations of objects of the type FU Orionis, EX Lupi, UX Orionis and other similar but unclassified objects. These three types of young variable objects show changes in brightness with large amplitudes and attract the attention of star formation researchers. But it is not always possible to distinguish them from each other without the presence of long-term multicolor photometric data. For this reason, we collect data from current CCD observations and supplement them with data from the photographic plates archives.

In this presentation, we show the latest data from optical photometric studies of several FUor, EXor and UXor objects made at the Rozhen Observatory. Our collection contains the following objects: V2493 Cyg, V582 Aur, V900 Mon, V350 Cep, V2492 Cyg, V1647 Ori, V1180 Cas, V1184 Tau and GM Cep. Our monitoring is carried out in $BVRI$ filters, which allows studying the variability in color indexes also. By analysis the historical light curves of these objects we are trying to obtain information about the processes associated with the early stages of stellar evolution.

B 21 Stellar pulsations across the H.-R. diagram

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Stellar pulsations is a common phenomenon observed in almost all types of stars. Pulsating stars provide a unique tool for investigating stellar interiors, rotation and age of stars, which makes them crucial objects of interest. In addition, some of the pulsating stars serve as the standard candles allowing the estimation of the distances in the Universe. I will focus on recent discoveries in different types of pulsating stars across the Hertzsprung-Russell diagram.

B 22 Spectroscopy of young stellar objects: the case of T Tauri

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The results of long-term spectroscopic monitoring including 21 T-Tauri stars located in the Taurus-Auriga star-forming region (SFR) are presented. We combine medium and high-dispersion Échelle spectroscopy obtained at the Stará Lesná, Skalnaté Pleso (both in Slovakia), and Tautenburg (Germany) observatories with low-resolution flux-calibrated spectra from Asiago (Italy) observatory all taken between 2015 and 2018. The last part of our contribution will talk about future projects in this filed of study.

B 23 Exoplanet transit detection and characterization with small telescopes and telescope arrays

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In this talk we present the current state of the art of exoplanet transit surveys with small telescopes and arrays of small telescopes. Small telescopes have been pioneering in the detection of exoplanets by the transit technique and continue to play a pivotal role in current exoplanet science. This role they fullfil both in primary planet detection efforts, and as instruments for the follow-up of detections made by other methods and/or space missions. An overview over the most relevant past, current and future transit detection efforts from ground will be given, with an emphasis on the choices that led to their particular design. A second important application of meter-sized instruments is the follow-up of planet candidates that arise from space-based missions, such as the current TESS and the future PLATO mission, where several factors might be exploited. These are higher angular resolution, useful towards the verification of planet candidates; extended temporal baselines, useful for the detection of transit or eclipse-time variations; or different bandpasses that may be useful for both verification and characterisation of transiting planets. Lastly, we outline the plans for participation by both professional and amateur observatories in the follow-up of planet candidates from the upcoming PLATO space mission.

B 24 Confirming long-period transiting exoplanets with TESS and CHEOPS – the case of HD 22946 d

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Multi-planet systems are important sources of information regarding the evolution of planets. However, the long-period planets in these systems often escape detection, especially when their orbital periods are longer than the typical observing duration of photometric surveys. Due to the limited observing duration of the TESS primary mission, which observed the majority of the near-ecliptic sectors for only 27 days, planets on long periods produce only single transits. However, thanks to its extended mission, TESS re-observed the same fields 2 years later, and in many cases was able to re-detect a second transit. These 'duotransit' cases require follow-up in order to uncover the true orbital period due to the gap, which causes a set of aliases. The CHEOPS space observatory can be used to follow-up duotransit targets and to determine their true orbital periods and other characteristics.

CHEOPS observations already recovered orbital periods of duotransits, for example, in HIP 9618, TOI-5678, and HD 15906 planetary systems. In the present study, we investigated the HD 22946 system with a similar aim. HD 22946 is a bright ($G = 8.13$ mag) late F-type star around which three transiting planets were identified via TESS photometry, but the true orbital period of the outermost planet d was unknown until now. Based on the combined TESS and CHEOPS observations, we successfully determined the true orbital period of the planet d to be 47.42489 ± 0.00011 days, and derived precise radii of the planets in the system. Planet d, as a warm sub-Neptune, is very interesting because there are only a few similar confirmed exoplanets to date. Such objects are worth investigating in the near future, for example in terms of their composition and internal structure.

B 25 The evaporation of planetary atmospheres

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In recent years the focus of exoplanet research has shifted from the mere detection to detailed characterization. Precise measurements of the masses and radii of transiting planets have shown that some low-mass planets have extended atmospheres while others are bare rocks. Hybrid atmosphere consisting of a mixture of Hydrogen and large amount of heavy elements have also been detected. A key factor in explaining this diversity of planetary atmospheres is the erosion by the X-ray and EUV-radiation (XUV) from the host-star. The evaporation through XUV-radiation has already been measured for a few exoplanets The apparent weakness of the Ca II HK and the Mg II h&k emission cores has been interpreted in the context of the evaporation planetary atmospheres. The idea is that the evaporating material from the planet forms a thick torus which absorbs the Ca II HK and the Mg II h&k lines from the host star. In this contribution I will propose a new way how to prove, or disprove this hypothesis by observations and discuss what we can learn about planet formation and evolution by studying the evaporation of planetary atmospheres.

B 26 Classifications for exoplanet and exoplanetary systems – could it be developed?

E. Plávalová

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We propose an exoplanet and exoplanetary system classification, which, using an easily readable code may inform you about a planet's main characteristics and the principal characteristics of a planetary system.

The proposed exoplanet classification code contains four parameters by which we can quickly determine the range of temperature, mass, density and eccentricity of planets. This code is very helpful in, for example, quickly delimiting if a planet can be found in the Habitable Zone; if it is terrestrial or not. The classification code for Venus, for example, could be *EG0t* (*E* - mass in the range of the mass of the Earth, *G* - Gaseous class, temperature in the range from 450 to 1000 K, *0* - circular or nearly circular orbit, *t* - terrestrial surface), for Earth it could be *EW0t* (*W* - Water class - a possible habitable zone).

The second proposal is for an exoplanetary system classification which should contain five parameters by which we can quickly determine a planet's place in the system. Using such a code we are immediately informed of the number of known planets, layout of the planets according to the Habitable Zone, mass distribution and system architecture and other very important information such as, if a parent star is single or a member of a multiple star system. The classification code for the Solar System could be *224GXO1.322* (*224* - two planets in the hot zone, two planets in the Habitable Zone and four planets in the cold/ice zone, *G* - the spectral class of the parent star, *X* - the parent star is a single star, *O* - ordered planetary system, *1.322* - one Jupiter mass planet, three Neptune mass planets, two Earth mass planets and two Mercury mass planets), and for the known four planet system 55 Cnc, the classification code could be *311KXM1.21* (*M* - mixed architecture).

B 27 Outer solar system small body science with 1m-class telescopes

C. Kiss

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Outer solar system small bodies – Centaurs and trans-Neptunian objects – are typically very faint, and are therefore out of reach for small, 1m-class ground based telescopes. Despite that, there are some specific areas, objects groups and phenomena where small telescopes are very helpful or even unavoidable. In this talk I present a few illustrative cases in which small telescopes played a crucial role and contributed to cutting edge science, leading to fascinating discoveries and the better understanding of these relic objects.

B 28 Physical properties of the comets showing considerable activity beyond Jupiter's orbit

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The Oort cloud and the Edgeworth-Kuiper belt represent the primary reservoirs that supply new comets to the inner region of the Solar System. Some cometary nuclei exhibit significant activity even at heliocentric distances beyond 4 au. Since 2011 our dedicated research program has focused on conducting polarimetric, photometric, and spectral investigations of active distant comets using the 6-meter telescope BTA (SAO). Additionally, we have employed 18 telescopes of varying sizes to carry out long-lasting photometric observations. The primary objective of our program is to comprehensively study the physical properties of dust and gas, the mechanisms governing their interaction with the interplanetary environment, and the formation processes of atmospheres and tails in comets that display notable activity beyond the orbit of Jupiter. The origins of this persistent activity in certain comets remain elusive, as existing theories fail to provide a widely accepted explanation for this phenomenon. However, we propose that the sublimation of various volatiles, including CO, CO_2, N_2, and water ice, combined with the interplay of different mechanisms, such as crystallization of amorphous ices and impact events, may contribute to their sustained activity. It is worth highlighting that the majority of proposed mechanisms fall short of completely elucidating the prolonged activity observed in these comets. Furthermore, the condensation of these gases onto dust grains or their capture by condensed water molecules is only feasible under temperature conditions not exceeding 25-30 K. Such temperature regimes could have existed either within the interstellar cloud from which the Solar System originated or during its early stages of formation. Moreover, the timescale for Solar System formation should considerably surpass the duration of comet formation. Most probably, distant comets may play a significant role in accounting for the observed excess of heavy elements within Jupiter. Given that the active phase of distant comets endures for a considerable period, our research also encompasses the investigation of their evolutionary aspects. Through the analysis of their physical properties, interaction mechanisms, and formation processes, our study aims to contribute to a comprehensive understanding of these celestial bodies, and their interaction with other small bodies, shed light on the formation and evolution of the Solar system.

B 29 Fast imaging applications in asteroid sciences

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Asteroid studies in the Solar System give us insight the origin, evolution and the internal dynamics of Solar System bodies. In this work, fast imaging techniques have been recently recognized as a very efficient tool, and some of these technique will be summarized in this talk. 1) Fast imaging gave us insight to the land of the fastest light variations, and helped reveal the rotation of very fast asteroids for example. These are tiny objects close to Earth, can be observed in fast projected motion, and time resolution and very good relative time coverage is very much required for a successful observation. 2) The well-resolved occultations of Main Belt asteroids and TNOs offer the single direct observation of the size and the shape of targets that have not been visited by a spacecraft, and have not been resolved by very precise imaging. 3) With even higher time resolution and image frequency, we can observe meteor/asteroid impacts on the Moon. The visible impactors are in the energy range where their impact to Earth can cause local harm, but they are luckily rarely seen from an Earth-based location. Viewing a much larger size on the Moon, they can be more frequently observed. With this technique, daytime showers can be also seen due to geometrical reasons. The impact physics is much simpler that impacting into an atmosphere, and inferring to the initial parameters is more straightforward.

B 30 Photometric observations of Comet C/2020 V2 (ZTF)

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Modern small telescopes can observe the activity of comets at large heliocentric distances. This is a great advantage for studying long-period and hyperbolic comets. Mainly, they have been observed episodically, but currently, we can obtain monitoring observations for detailed research.

Our work considers monitoring observations of hyperbolic Comet C/2020 V2 (ZTF) obtained in February-March 2022. We collected data to look for day-to-day dust color variations and estimate the microphysical dust properties. Moreover, the comet's heliocentric distance ranged from 5.148 au to 4.802 au during our observational period, so the gaseous emission contamination was absent. Photometry was performed using the 0.6-m telescope at the Peak Terskol observatory and the 0.61-m and 1.3-m telescopes at the Skalnaté Pleso observatory.

Using the obtained data, we estimated absolute magnitudes, the $Af\rho$ parameter, as a characteristic of the dust productivity level and the photometric dust color. We mostly found only slight variations of color from red to neutral, i.e., the color slope reached $S'_{VR} = -(3.2 \pm 1.6)\%$ per 1000 Å on March 6, while on other days, it ranged between 3.2% and 14.7% per 1000 Å. At the same time, the magnitude almost monotonically decreased and did not reveal any outbursts. The dust productivity ranged from 3600 cm up to 4400 cm, which is quite high for such a distant comet but not outstanding among other long-period and hyperbolic comets.

Further, we will supplement our photometric data with quasi-simultaneous photometric, spectroscopic, and polarimetric observations obtained using the 6-m BTA SAO on June 2, 2022. Finally, the microphysical properties of dust grains will be modeled.

B 31 Distinctive aspects of NEAs observations during close approaches

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Successful cataloging of discovered near-Earth asteroids (NEAs) depends on the quantity and accuracy of observations obtained during the discovery apparition. Despite the persistent growth in the number of newly discovered NEAs, the count of unnumbered (i.e., with an unreliable orbital solution) objects remains high. Research shows that 55% of NEAs have observations only during a single opposition. Although the average recovery period is 2-3 years, these objects have not been observed for 10 years or more. The successful recovery of NEAs in subsequent apparitions depends on the accuracy and length of the observation arc obtained during their discovery. Typically, discoveries of small-sized NEAs are made during their close approach (CA) to Earth when the objects become brighter and more accessible to the majority of telescopes.

In our study, we analyzed the dataset of NEA observations from the MPC database obtained during their closest approach period. We selected all asteroids that had CAs to Earth within a distance of 0.2 astronomical units (AU) between 2000 and 2023 from the CNEOS website and matched them to the existing positions in the MPC database. The final analyzed dataset includes 226,003 positions of 10,264 NEAs. The results of the statistical analysis of residual differences with JPL's Horizon ephemeris indicate that the high velocity of objects during CAs is the primary source of accuracy degradation in the absence of specialized observation methods.

Using the example of observations with the CCD Rotating drift-scan method, we demonstrate that the precision of even very fast-moving objects in this case reaches $0.1''$ to $0.2''$, which is comparable to the best ground-based observations of minor solar system bodies.

B P01 First determination of the system parameters in five contact binaries

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The Kraków Astronomical Observatory in cooperation with the Henryk Jordan Youth Center in Kraków commenced a pathfinder tutoring program. The astronomy classes, aimed for the gifted high school students, are focused on yearly individual projects. Such a hands-on approach allows turning the extracurricular classes into a comprehensive observational and theoretical study.

Several of such projects resulted in a complete light curve study of contact binaries The students obtained the system absolute physical parameters using the original photometric data. In this work we present the structure of the projects and resulting physical parameters acquired by the means of the Wilson-Devinney-code-based light curve numerical modeling.

B P02 Deep learning classifier for the classification of eclipsing binaries

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A deep learning model for the classification of eclipsing binaries is presented. Our classifier provides a tool for the categorization of light curves of eclipsing binaries into 4 classes: detached systems with and without spots and over-contact systems with and without spots. The classifier was trained on 400 000 synthetic light curves created using the ELISa code. For evaluation purposes, we randomly selected 100 light curves from the GAIA catalogue, which were fitted, and their morphology was determined. We tested several classifiers and found that the best-performing classifier combines a Long Short-Term Memory (LSTM) layer and two one-dimensional convolutional neural networks. The precision from the evaluation set was 97%, compared with the predicted precision of 94 % on synthetic data. Our classifier is now more likely to be successful in processing data from subsequent large observation surveys.

B P03 Eclipse timing variability of V471 Tau

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The post-common envelope binary V471 Tauri shows various phenomena due to its evolutionary state and unique properties, e.g. its magnetic accretion and eclipse timing variation (ETV). We present and analyse the variability of the eclipse timing of this star. We observed V471 Tauri over the last 10 yr and covered the second cycle of its period variation. Based on our analysis of the presented data, we assess the possible existence of a brown dwarf in this system and derive its orbital parameters. We compare the results of our dynamical modelling to the solution predicted by Applegate-mechanism theories, which have been developed in recent studies. We found that the observed ETV cannot be explained only by the presence of additional components to the binary.

B P04 Eclipse timing variation analysis of NSVS 14256825 with recent data including TESS observation

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NSVS 14256825 has been studied many times in the literature in terms of its eclipse timing variations (ETV) but still no consensus has been achieved regarding the nature and parameters potential companion sub-stellar objects suggested so far. Although multiple periodic variations have been detected, their origin and parameters have been the subject of debate. In this study, for the first time, we present timing measurements from TESS minima and ground-based multi-band photometric light curves. We discuss the potential explanation of the ETV in the light of recent observations.

B P05 FM CMa: hot and massive eclipsing binary with a pulsating component

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FM CMa is a hot eclipsing binary composed of a B2 primary and a colder secondary star orbiting in $P = 2.78945$ days. The TESS high-precision satellite photometry (sectors 7 and 33) shows that the eclipses are total and there is a slow apsidal motion resulting in the secondary minimum shift. The light curve is modulated by low-amplitude variability, very probably radial pulsations. The light-curve analysis indicates the presence of third component. Additional ground-based photometry obtained at the Kolonica Saddle Observatory is also presented.

The system was observed spectroscopically at the Skalnaté Pleso (Slovakia) and Cerro-Tololo Interamerican Observatory (Chile) during 2017–2023. The observations confirm the early spectral type manifested by the dominant hydrogen Balmer and neutral helium lines. Only the strongest metallic lines are visible, which complicates the determination of the radial velocity and spectra disentangling. Preliminary SB2 spectroscopic orbit, photometric elements, and atmospheric parameters are given.

B P06 The uniqueness of determination of the photometric mass ratio of contact binary stars with applications to selected binaries

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The shape of components of a binary star is dictated by the surface equipotential Ω and the mass ratio $q = M_2/M_1$. A direct way to find the mass ratio q is by measuring radial velocities of both components and finding the ratio of their semi-amplitudes $q_\mathrm{s} = K_1/K_2$. Contact binary stars are a special case, where the surface potential is the same for both components. In general, estimating the mass ratio from photometry only q_p is imprecise even with rigorous 3D surface modelling.

Today, the availability of high-precision space-borne photometry (like that by *TESS*) is ideal for detecting small changes in the shape of the overall light curve.

We have used a Roche-geometry code to pre-generate light curves of contact binary stars for almost twelve thousand physical configurations based on mass ratio q, fill-out f of the Roche lobes, and observed inclination i of the orbital plane. We wanted to compare *TESS*-observed light curves of selected close binaries with previously known mass ratios q_s obtained by spectroscopy to our light-curve library. We used a new Python version of our code `UNiQUE` to find the best fit of the overall shape of the observed light curve and its associated parameters (q, f, i). By manually tweaking the limit of "difference", we also did a statistical distribution of results. Objects with more sectors of *TESS* observation were analyzed separately by individual sectors. Finally, we compare the best results in parameters (q, f, i) and a possible third light contamination from our analysis to that found by rigorous modelling with spectroscopic data.

B P07 Comprehensive photometric study of WZ Sge-type dwarf nova ASASSN–19oc

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Dwarf novae are binary star systems with a white dwarf primary and a red or brown dwarf of late spectral type filling its Roche lobe. WZ Sge-type stars are a subgroup of SU UMa-type dwarf novae with long (several years or even decades) recurrent times of superoutbursts and the largest outburst amplitudes, up to 8 mag.

ASASSN-19oc is a WZ Sge-type dwarf nova that had a superoutburst on June 2, 2019. We have already investigated this system and calculated its main parameters, including the periods and amplitudes of superhumps at different stages of the superoutburst, the duration and amplitude of the superoutburst, and the values of O-C for the extrema of ordinary superhumps. Using this relation, we estimated the value of Pdot, which characterizes the rate of change of the superhump period. Now, we present a continuation of multicolor photometric investigation of this system. We calculated the color indices and showed their change with phase. By analyzing our two-color diagrams we found the average color temperature of the system. Based on the mass ratio of the system components calculated by us, we estimated the mass of the white dwarf, the distance between the components, and the distance to the system ASASSN-19oc.

B P08 TYC 1083-12-1 – an SB2 binary mimicking as exoplanetary candidate

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We identified TYC 1083-12-1 as a potential exoplanetary candidate due to the small amplitude of eclipses in the photometric survey with a 30-cm telescope. From the radial velocity observations of the star with a 2-m Perek telescope at the Astronomical Institute of CAS, we realized that it is a double-lined binary with similar components. We present the basic parameters of this system.

B P09 Optical observations of RS Oph after its 2021 outburst

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RS Oph is a recurrent symbiotic novae and consists of a red giant and a massive white dwarf with a heavy mass loss during activity. Its last 2021 outburst began on August 8.93 and was observed over the whole electromagnetic domain. Here we report high-resolution Hα spectroscopy of the system, obtained at days 11–15 of the outburst with the Coude spectrograph of the 2m RCC telescope at Rozhen National Astronomical Observatory as well as observations with the Echelle spectrograph of the same telescope in a later period. We also present low-resolution observations (the resolving power is R $\approx$ 1100) secured with the 2-Channel-Focal-Reducer Rozhen, attached to the Cassegrain focus of the 2m RCC telescope. We derived some parameters of the system's components and outflows and their evolution during our observation.

B P10 Spectroscopic characterization of superflares on solar-type stars - a coordinated campaign

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During the last decade numerous superflares have been detected on solar-type stars using broadband photometry from the Kepler and TESS satellites. Still the spectroscopic exploration of this high-energy phenomenon is lacking. This exploration would reveal what makes normal flares different from superflares. The spectroscopic detection of superflares requires dedicated observational efforts, as this phenomenon is sporadic. We present here one step of joint observational efforts to spectroscopically characterize superflares. We focus on the solar-type stars EK Dra, V833 Tau, and BY Dra, as those are relatively bright and active, and especially V833 Tau shows a high superflare rate in TESS data. The spectroscopic observations have been done at the Skalnate Pleso observatory operated by the Slovak Academy of Sciences and the Ondrejov observatory operated by the Czech Academy of Sciences. Coordinated photometry in two filters has been done at Stara Lesna/Skalnate Pleso observatories run by the Slovak Academy of Sciences, Gothard observatory, Szombathely, Hungary, and Lustbühel Observatory run by the University of Graz, Austria. In total around 24 hours were spent on EK Dra, 12 hours on BY Dra, and 20 hours on V833 Tau. However, no superflares have been detected. We discuss detection probabilities and the importance of studying superflares spectroscopically.

B P11 Spotted eclipsing binary KIC 7023917 with δ-Scuti pulsations

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Eclipsing binary KIC 7023917 is one of nearly three thousand other binaries in the well-known Kepler Eclipsing Binary Catalog. However, it has some uncommon features. We focused on this system because we detected fast anti-correlated changes on the O-C diagram which could suggest the presence of apsidal motion. Though, these changes are very fast for apsidal motion and the orbit of this binary is circular. Detailed analysis of the Kepler and TESS light curves reveals deformation of the light curve by short-periodic pulsations and the O'Connell effect caused by stellar spot(s). Here, we present our initial study of this system and a possible explanation of the observed O-C diagram.

B P12 Spectroscopic observations of field RR Lyr stars

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We performed time-series spectroscopic observations of field RR Lyr stars from 2017 to 2022. Targets are selected from the TESS catalog brighter than 11 mag. Such as SU Dra, TU UMa, X Ari, RZ Cep, SW And and RR Lyr itself. We have obtained preliminary results of changes in H-alpha and He I D3 profiles for observed RR Lyr stars. Observations were made with the Echelle spectrometer of the 1.8m telescope (BOES) at the Bohyunsan Optical Astronomy Observatory (BOAO). We typically exposed 1,800 seconds with R=30,000 to obtain $S/N > 40$. Exposure, however, varied from 600 to 2400 seconds depending on object brightness and weather conditions.

B P13 Photometric study of Delta Scuti variable 2MASS J13122513+5443409 in Ursa Major

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We continue the investigation of a new variable of Delta Scuti type 2MASS J13122513+5443409 discovered by our group previously. An analysis of data obtained not only from the relatively small telescopes of Slovakia and Ukraine, but also from the TESS mission, revealed intriguing results. We calculated period and amplitude using Lomb-Scargle periodogram. We found that the best value for period is about 0.079 days.However, the oscillations displayed some variability for both the period and amplitude, indicating a dynamic nature of the Delta Scuti variable. Further studies are required to understand the underlying causes of these variations and their implications on our understanding of such astronomical phenomena.

B P14 Result of the 13-years monitoring of the accreting pulsator EZ Lyn

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The WZ Sge-type dwarf nova EZ Lyn is one of the eight known accreting pulsators that entered the instability strip after the dwarf nova outburst. We present our 13-year continues photometric observations of this star since 2010 outburst using the 2.6-m Shajn telescope of the Crimean Astrophysical Observatory. Our data shows that EZ Lyn still did not stop pulsing and displayed uneven increase in the pulsations period during the WD cooling after the outburst. The period of dominant pulsation increased from 257 seconds to 864 seconds, and this increase did not occur evenly (as expected), but sharply. Similar effect was also observed in GW Lib. This is one of the main differences between the behavior of pulsations of single white dwarfs and those accreting in close binary systems, but its detection requires long-term monitoring.

B P15 First detailed study of Gaia19cuu during superoutburst

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The object was first detected by MASTER in 2012 (ATel No.4257) as a 17.4 m source and named MASTER OT 183342.09+654019.1. After this discovery, the object was not studied until 2019, when Gaia detected a transient source during an outburst in 0.31 arcsec from the MASTER source mentioned above (TNS Astronomical Transient Report No.41054). The published Gaia light curve clearly shows the two previous outbursts (https://gsaweb.ast.cam.ac.uk/alerts/alert/Gaia19cuu/) that occurred on 2 May 2017 and 21 November 2018. After Gaia published information about new transient observations with clear superbumps, the following page appeared (https://gsaweb.ast.cam.ac.uk/alerts/alert/Gaia19cuu/followup). The presence of superhumps in the light curve prompted us to include this object in our list of CV for continuous monitoring.

During our observations in August 2023, we discovered Gaia19cuu in a superoutburst (vsnet-alert 27949) and began intensively observing it. We found clear superhumps with an approximate period of 0.078d. The amplitude of the superoutbursts for the object, according to our estimates, is about 4 mag. Currently, the superoutburst is still ongoing, so the detailed characteristics of the superhumps will be presented during the conference and in the conference publication, as well as the results of the analysis of data from other observing facilities.

B P16 Tilted accretion discs in poorly studied cataclysmic variables

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The rich photometric data available from space-based sky surveys such as TESS, ASAS-SN, and Kepler/K2 can be used to discover superhumps in many poorly studied cataclysmic variables. Here we present our follow-up of several nova-like systems that show superhump features in TESS and ASAS-SN data. Our observations of the nova-like system BG Tri with the 50/70 cm Schmidt and 2.0m RCC telescopes at Rozhen Observatory, Bulgaria, confirm a negative superhump period of $P_{sh} = 0.1515(2)$ d in data from 2019 and 2020. The next observational season of 2021 we show that the negative superhump has disappeared. Along with superhumps, the gathered light curves display a rich mixture of simultaneously overlapping quasi-periods ranging from 5 to 25 min. Another nova-like system – OR And shows two periodicities available in the power spectra of TESS data from 2022. If we interpret them as a negative superhump with $P_{sh} = 0.1252(5)$ d and orbital period with $P_{sh} = 0.1357(5)$ d the system shows an unusually high superhump deficit of -0.077(3). This interpretation is supported by the presence of a third signal in the light curve corresponding to the expected precession period of the disc. Recent observations with the 1.5m RC telescope at Rozhen Observatory show that the superhump in OR And is still present and its period is stable.

B P17 Tidal heating of the eccentric hot Jupiter WASP-186b

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The field of exoplanet studies almost exclusively relies on relative metrics between the planet and its host star. Transiting hot Jupiters are therefore prime candidates for many subfields, including internal and atmoshperic charaterization. These studies are enhanced by radial velocity (RV) observations that can be obtained easily by small ground-based telescopes, which help constrain the orbit (and mass) of the planet. We present a joint analysis of the publicly available SOPHIE RV data in combination with TESS observations of the eccentric ($e \approx 0.3$) hot Jupiter WASP-186b – one of the very few such systems. The ground-based RVs allow us to (*i*) model the Doppler beaming and the ellipsoidal variability of the host star efficiently; (*ii*) constrain the position and duration of the secondary occultation; (*iii*) disentangle the degeneracy between the beaming effect and the light reflected from the planetary atmosphere. We measure an occultation depth of 168 ± 81 ppm with $p = 0.001$. We use this to place constrains on the Bond albedo (0 – 0.66), the heat redistribution efficiency (0.7 – 1) and intrinsic temperture (2570 ± 260 K) of WASP-186b. The latter is the result of tidal heating, producing internal luminosity 0.00048 ± 0.00022 $L_\odot$. Following efforts to estimate the Love-number of hot Jupiters, we assume $k_2 = 0.61$ and constrain the planetary (heat) dissipation parameter $Q_p = 140 \pm 108$. Similar values of Q_p have been observed for terrestrial planets in the Solar System. The presented case of WASP-186b illustrates how smaller-class ground-based telescope (e.g. SOPHIE, installed on a 1.93 m reflector) can support very efficiently the ever increasing amount of ultra-high-precision spaceborn light curves.

B P18 LEMUR is software for automatically searching for asteroids and comets in astronomical images

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The LEMUR software package has been on the market since 2009 and has been successfully used in various observatories. Using the LEMUR software package, more than 600,000 measurements were sent to the Center for Minor Planets at Harvard University, more than 1500 asteroids, 4 comets, 21 Trojan asteroids of Jupiter, and 1 Centaur were discovered.

The LEMUR includes a whole line of software products dedicated to computational automation, brightness alignment of frames, photometry, astrometry, and processing of asteroidal overviews. The current version of the LEMUR software package is implemented on the basis of a client-server architecture. This approach allows you to transfer the entire computational load of processing to the server, and leave the setting of processing parameters and analysis of processing results on the client side.

The LEMUR project offers cooperation to astronomical observatories in providing asteroidal overviews, observing variable stars, organizing virtual observatories with the provision of software and its maintenance.

B P19 Photometric and colorimetric studies of target objects using small and medium-size telescopes

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Follow-up photometry is an important component of astrophysical studies, helping to reveal the nature and characteristics of stellar objects and transient events. Ground-based small- and medium-aperture telescopes, equipped with additional instruments and sensitive CCD cameras, are still able to provide good enough opportunities for short- and long-term observation programs, especially in response to survey alerts. This paper presents an overview of some results obtained from photometric observations through BVRI filters of variable stars, Gaia transients, and QSOs, which were performed in recent years using astronomical facilities at Terskol, Stara Lesna, and in the Crimea. Our findings show that systematic, integrated use of small and medium-size telescopes leads to early detection of changes in the behavior of objects and better information about their evolution.

B P20 Multiwavelength photometric research of symbiotic variables PU Vul, RT Ser and CH Cyg

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We analyzed the UBVRI observations made in Astronomical Institute of Slovak Academy of Sciences as well as AAVSO multicolor observations and other archival data for symbiotical variables PU Vul, RT Ser and CH Cyg.

For symbiotic nova PU Vul, we have found for the first time, that the pulsational period of red giant increase from about 210 to 222 days during the 50-year inerval of observations. Analysing variability in V, R, I pathbands, we found that the pulsational variability breaks its regularity is some time interval with non-stable cyclicity which can be correlated with orbital motion (14-year period). The parameters of eclipses in this system were analysed using U, B, V pathbands. We identified long-period brightness wave (especially iin R-band and R-I color index) with cycle close to the orbital period and we suggested that it is are caused by varying visibility conditions (during orbital motion) of partially optically thick nebula ionized by the hard radiation from the white dwarf.

For symbiotic nova RT Ser, the orbital period of 4468.5 days was corrected and the cycles of variability of about 92-107 days were found, they could be due to pulsation variability of red giant.

For symbiotic variable CH Cyg we searched for variability on timescale of hours and analyzed flickering properties by using long series of observations during several dozens of nights during the 2014-2015, 2018 and 2023.The cyclicity of 0.18 days was found in some nights of the high state of variable. In 2023, when the variable was in low state, the flickering was absent, but 0.12-days cyclicity was found in some nights as well as in some nights in 2018.

Session C: GROUND-BASED SUPPORT OF COSMIC MISSIONS AND TELESCOPE NETWORKS

C 01 Small aperture telescopes supporting exoplanetary space missions - the PLATSOPec project

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The small aperture telescopes (1-2-m) are gaining on importance especially in exoplanetary science as space missions like TESS and PLATO begin to operate. Essential advantage compensating the smaller aperture is typically a lot of proprietary observing time. If such a telescope is operated in a remote mode and it is located in places with good observing conditions, such as Chile or La Palma, the amount of observing times can beat the noise.

I will present the project PLATOSpec which is a new spectrograph planned for E152 telescope at La Silla, Chile. PLATOSpec will be an échelle spectrograph with a resolving power of 70,000 and covering the wavelength range from about 370 till 700 nm with a blue sensitive CCD chip. The projects first results will be introduced. Furthermore, I will discuss also an advantage of networks of telescopes and also present some recent results from the KESPRINT collaboration.

C 02 Attitude determination of cylindrical rocket bodies by using quasi-simultaneous bistatic photometric measurements

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The space debris population includes various types of objects. One of the most dangerous objects which are also primary targets for active debris removal (ADR) missions are rocket upper stages. Because of their large dimensions, masses and types of orbits they are parent bodies to large portion of fragmentation debris. Monitoring of the dynamical properties (rotation period, tumbling axis direction) and their evolution are essential for accurately predicting the attitude and providing information for potential ADR missions.

We calculate the tumbling axis direction by using the low resolution Williams model and photometric measurements. Used method strongly requires at least two observations under different observation geometry. Additionally, these observations must be acquired within a relatively short period when no large changes in the tumbling axis are expected due to torques acting on the object. One of the possible ways to deal with these challenging conditions for data acquisition is to acquire the data simultaneously from two different locations to secure required different geometries.

The presented results were obtained using our own photometric measurements acquired with two different telescopes. The 70-cm reflector AGO70 located at Astronomical and geophysical observatory in Modra is operated by the Comenius University Bratislava and it is situated in Slovakia (MPC code M34, 48.37N +17.27E). The 1-m reflector ZIMLAT situated at the Swiss Optical Ground Station operated by the Astronomical Institute of the University of Bern (MPC code 026, 46.88N +07.48E) situated in Zimmerwald, Switzerland. In our work we present the observed population, photometric campaign utilizing both involved sensors, photometric methods used for the data reduction and the results we obtained for selected populations.

C 03 Ukrainian Network of Optical Stations for satellite monitoring

Ya. Romanyuk[1], O. Shulga[2,], M. Koshkin[3], Ye. Vovchyk[4], K. Martyniuk-Lototskiy[4], L. Shakun[3], M. Kozyryev[2], A. Bilinsky[4], V. Kudak[5], O. Kozhukhov[6], Yu. Ivaschenko[7]

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Ukrainian Network of Optical Stations (UMOS) established in 2012 provides active astrometric and photometric observations of the artificial space objects both in the low-Earth orbit and geostationary Earth orbit. UMOS is a common partnership of organizations interested in satellite observations for scientific and the practical purposes near Earth space monitoring above Ukraine. A list of institutes shows all members of the network. Before 2014 two observational sites (Alchevsk and Evpatoria) were included to Network but they were occupied with the russian aggression in Ukraine.

Every institution use own instruments and a methodology for observations and data reducing. Therefore we needed to provide a same format of files for raw data to reduce them later with same software.

During the active operation of UMOS data for about 300000 positions of satellites were obtained.

C 04 Validation of selected *TESS* exoplanetary candidates

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The goal was to select suitable exoplanetary candidates from the *TESS* database which was observable using a network of small ground-based telescopes to collect the photometric transits during follow-up observation. We have made a new reduction of *TESS* photometry using a custom aperture, as well as reducing the ground-based aperture photometry. We have refined the period of transits and constructed O-C diagrams. Mean transit was fitted in all observed photometric filters and we derived individual candidate's physical parameters. Using the color indices during transit, we hint at the exoplanetary nature of candidates. In the case of TOI-1834.01 we have proposed another scenario incompatible with the original assumption as an exoplanetary candidate. TOI-3604.01 was also modelled with respect to parasitic light in the aperture. Individual models suggest a body too large for an exoplanet.

C 05 Eclipse timing variations of evolved eclipsing binaries: Potential targets for meter-sized telescopes in the light of TESS observations

E.M. Esmer, Ö. Baştürk, S.O. Selam, F. Akar, E. Sertkan, B. Güler, E. Demir, S. Yalçınkaya

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Evolved eclipsing binaries, featuring a white dwarf or a subdwarf companion on relatively short orbital periods of a few hours, exhibit interesting characteristics in their eclipse timing variations (ETV), analysis of which brings several advantages. Firstly, their small total masses enable us to detect substellar mass objects by observing the light-time effect, due to a subtle wobbling of the binary system around the barycenter. Additionally, the short orbital periods of these binaries allow for the accumulation of a large dataset comprising numerous observations, facilitating rigorous analysis and enhancing statistical significance. Moreover, their minima profiles have symmetric V-shapes in most cases, which decrease the uncertainties in the measurements of minima timings.

In this study, we collect and analyze all available photometric data from the Transiting Exoplanet Survey Satellite (TESS), using observation cadences of 20 and 120 seconds of such systems identified by various surveys. Our sample includes more than 60 evolved eclipsing binaries, whose primaries are either white dwarf or subdwarf companions. By calculating mid-eclipse timings, we construct detailed ETV diagrams and apply the Lomb-Scargle period analysis to determine the amplitudes and periods of their ETVs. Finally, we assess the feasibility of observing such variations using meter-class ground-based telescopes on the basis of their ETV characteristics.

C 06 Three decades of the OGLE survey

I. Soszyński

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The Optical Gravitational Lensing Experiment (OGLE) is one of the most extensive sky surveys on a global scale. It focuses on optical astrophysical variability and is carried out using the dedicated 1.3-meter Warsaw Telescope located at Las Campanas Observatory in Chile. Since 1992, the OGLE project has been continuously observing the densest regions of the southern sky, namely, the Galactic bulge, Galactic disk, and Magellanic Clouds. To date, the survey has collected over a trillion individual photometric observations of approximately two billion stars. Throughout its long history, the OGLE project has yielded significant contributions to various fields of astrophysics, including gravitational lensing and microlensing, variable stars, exoplanets, cosmic distance scale, the structure of the Milky Way and other galaxies, interstellar extinction, Kuiper Belt objects, and more. In my presentation, I will highlight the key achievements of the OGLE survey, placing particular emphasis on its accomplishments related to variable stars.

C 07 Discovery of star systems at the merger limit by large astronomical sky surveys

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Department of Physics, University of Patras, 26500 Patra, Greece

The theoretically predicted mass-ratio lower limit and the orbital period cutoff of contact binaries are still open research questions that need to be revisited based on the wealth of observational data from large astronomical sky surveys. Theoretical studies suggested that a contact binary undergoes tidal instability (Darwin instability) and is driven to a merger of its components, during which it suddenly flashes as a red nova. I will present our method for detecting new candidate systems from large modern surveys, which in combination with photometric observations, both space and ground-based at different wavelengths, and sophisticated analysis lead to the extraction of their physical parameters. Thus, we can increase the sample size and study them statistically. Why only one such system has been observed to date? Can we also consider ultrashort period contact systems (with periods below the period cut-off) progenitors of red novae? Systems at both mass and period thresholds are more unstable?

C P01 Photometric monitoring of eclipsing dwarf novae using two robotic telescope networks

S. Kurowski[1], W. Waniak[1], L. Schmidtobreick[2]

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Eclipsing dwarf novae are considered to be the perfect laboratories to study accretion. As high inclination systems, they allow to reconstruct a brightness distribution across an accretion disc using indirect techniques like Doppler tomography or eclipse mapping. However, such observations are very challenging. High quality data from large telescopes is needed and it is difficult to predict variability of dwarf novae (semi-periodic outbursts, superoutbursts or standstills). In order to select the most interesting and suitable targets for such observations, I performed a photometric monitoring program of bright, eclipsing dwarf novae. To cover both the northern and southern hemispheres, as well as obtain sufficient time resolution, I used two networks of robotic telescopes with diameters around 0.5 m - iTelescope and Skynet. In the poster I will present characteristics of both networks as well as preliminary results for the most interesting targets.


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AUTHOR INDEX

PROGRAM

Sunday September 10, 2023

17:00 – 20:00 Registration (foyer of Hotel Academia)
19:00 – 21:00 *Welcome party (Hotel Academia)*

Monday September 11, 2023

08:00 – 08:45 Registration (foyer of Hotel Academia)

Welcome address

09:00	Peter Gömöry	Institute Director
	Theodor Pribulla	SOC Chair
	Ľubomír Hambálek	LOC Chair
09:15	Theodor Pribulla	80 years of the Skalnaté Pleso observatory

Session A: OBSERVING TECHNIQUES AND INSTRUMENTATION FOR METRE-CLASS TELESCOPES

Chair: Miloš Zejda

09:30 – 09:55	Theodor Pribulla	Spectrographs for small and meter-class telescopes (A01)
09:55 – 10:30	Gert Raskin	MARVEL, a four-telescope array for high-precision radial-velocity monitoring (A02)
10:30 – 11:00	*Coffee Break*	

Chair: Staszek Zola

11:00 – 11:25	Yaroslav Romanyuk	Semirobotic Kyiv Internet Telescope (A03)
11:25 – 11:45	Milen Minev	Technical performance and first light of the new 1.5-meter telescope at the National Astronomical Observatory Rozhen (A04)
11:45 – 12:10	Selçuk Yalçınkaya	ObsMap: Preparing observing maps with best comparison stars for photometry (A05)
12:10 – 13:40	*Lunch*	

Chair: Ján Budaj

13:40 – 14:15	Agnieszka Słowikowska (on-line)	An update on the recent polarimetry surveys with 1-m class telescopes and bigger (A06)
14:15 – 14:40	Leonid Shakun	Calibrating optical astrometric measurements of resident space objects in Earth orbit and telescope locations of the Ukrainian-Polish telescope network (A07)
14:40 – 15:15	Miroslav Brož	High-resolution optical interferometry from the modelling point of view (old: Long-baseline interferometry with meter-class telescopes) (A08)
15:15 – 15:45	*Coffee Break*	

Session B: SCIENCE WITH SMALL TELESCOPES

Chair: Gert Raskin

15:45 – 16:10	Staszek Zola	Using small telescopes for photometric monitoring of stellar and extragalactic objects (B01)
16:10 – 16:45	Anatoly Miroshnichenko	A variety of binary targets for small telescopes (B02)
16:45 – 17:20	Tamás Borkovits	The exotic world of tight multiple stellar systems with the stereo eyes of metre-class space-borne and ground-based telesopes (B03)
17:20 – 17:50	*Poster session A + B*	
18:00	*Dinner*	

Tuesday September 12, 2023

Chair: Theodor Pribulla

09:00 – 09:35	Luca Zampieri	Fast Photon Counting Optical Astronomy (A09)
09:35 – 09:55	Jakub Kolář	Observing group for doubly eclipsing systems (B04)
09:55 – 10:30	Kosmas Gazeas	Low-mass contact binaries as probes of stellar merging events (B05)
10:30 – 11:00	*Coffee Break*	

Chair: Anatoly Miroshnichenko

11:00 – 11:25	Jakub Cehula	Theory of mass transfer in binary stars (B06)
11:25 – 11:50	Christian Eze	Photometric sample of early B-type pulsators in eclipsing binaries observed with TESS (B07)
11:50 – 12:10	Miloslav Zejda	V760 Scorpii: a bright southern star with apsidal motion (B08)
12:10 – 12:45	Manica Perko	Accreting-only symbiotic stars in the era of large Galactic Archeology spectroscopic surveys (B09)
12:45 – 14:15	*Lunch*	

Chair: Manica Perko

14:15 – 14:40	Augustín Skopal	Exploring outbursts of accreting white dwarfs in symbiotic binaries with small telescopes (B10)
14:40 – 15:00	Natalia Shagatova	A look at the wind asymmetries in the S-type symbiotic star EG Andromedae through the spectroscopy from Skalnaté Pleso Observatory (B11)
15:00 – 15:20	Pavol Mártonfi	Linear ephemeris of AX Persei determined by the method of the O-C diagram (B12)
15:20 – 15:40	Ján Budaj	PM 1-322: new variable planetary nebula (B13)
15:40 – 16:10	*Coffee Break*	

Chair: Hans Deeg

16:10 – 16:30	Andrij Maliuk	Study of exoasteroids orbiting WD 1145+017 (B14)
16:30 – 17:05	François Teyssier	ARAS Spectroscopic Monitoring of Eruptive Stars (B15)
17:05 – 17:50	*Poster session B*	
18:00	*Dinner*	

Wednesday September 13, 2023

Chair: Miroslav Brož

09:00 – 09:20	Sergey Shugarov	Photometric investigation of the WZ Sge - type cataclysmic variable TCP J14225968+4122545 (B16)
09:20 – 09:40	Elena Pavlenko (online)	V1006 Cyg: The SU UMa-type dwarf nova in the period gap that is wobbling between subclasses (B17)
09:40 – 10:05	Vladyslava Marsakova	Multicolour photometric study of the new WZ Sge-type variables (B18)
10:05 – 10:25	Pavol Dubovský	Nova Herculi 2021 as an Intermediate Polar (B19)
10:25 – 10:55	*Coffee Break*	

Chair: Eike Guenther

10:55 – 11:20	Evgeni Semkov	Photometric monitoring of PMS stars with the telescopes at the Rozhen Observatory (B20)
11:20 – 11:55	Marek Skarka	Stellar pulsations across the H.-R. diagram (B21)
11:55 – 12:15	Martin Vaňko	Spectroscopy of young stellar objects: the case of T Tauri (B22)
12:15 – 13:15	*Lunch*	
13:15 – 17:30	*Conference trip to Pribylina*	
18:00	*Dinner*	

Thursday September 14, 2023

Chair: Kosmas Gazeas

09:00 – 09:35	Hans Deeg	Exoplanet transit detection and characterization with small telescopes and telescope arrays (B23)
09:35 – 09:55	Zoltán Garai	Confirming long-period transiting exoplanets with TESS and CHEOPS - the case of HD 22946 d (B24)
09:55 – 10:20	Eike Guenther	The evaporation of planetary atmospheres (B25)
10:20 – 10:40	Eva Plávalová	Classifications for exoplanet and exoplanetary systems – could it be developed? (B26)
10:40 – 11:10	*Coffee Break*	

Chair: Petr Kabáth

11:10 – 11:45	Csaba Kiss	Outer Solar System Small Body Sciences with 1m-class telescope (B27)
11:45 – 12:05	Tomáš Hrobár	Attitude determination of cylindrical rocket bodies by using quasi-simultaneous bistatic photometric measurements (C02)
12:05 – 12:40	Oleksandra Ivanova	Physical properties of the comets showing considerable activity beyond Jupiter's orbit (B28)
12:40 – 14:10	*Lunch*	

Chair: Csaba Kiss

14:10 – 14:45	Gyula Szabó	Fast imaging applications in asteroid sciences (B29)
14:45 – 15:05	Anhelina Voitko	Photometric observations of Comet C/2020 V2 (ZTF) (B30)
15:05 – 15:30	Anton Pomazan	Distinctive aspects of NEAs observations during close approaches (B31)
15:30 – 16:00	*Coffee Break*	

Session C: GROUND-BASED SUPPORT OF COSMIC MISSIONS AND TELESCOPE NETWORKS

Chair: Gyula Szabó

16:00 – 16:35	Petr Kabáth	Small aperture telescopes supporting exoplanetary space missions - the PLATSOPec project (C01)
16:35 – 17:25	*Poster session B + C*	
18:30	*Conference dinner*	

Friday September 15, 2023

Chair: Tamás Borkovits

09:00 – 09:25	Yaroslav Romanyuk	Ukrainian network of optical stations for satellite monitoring (C03)
09:25 – 09:50	Ľubomír Hambálek	Validation of selected TESS exoplanetary candidates (C04)
09:50 – 10:15	Ekrem Esmer	Eclipse timing variations of evolved eclipsing binaries: Potential targets for meter-sized telescopes in the light of TESS observations (C05)
10:15 – 10:45	*Coffee Break*	

Chair: Martin Vaňko

10:45 – 11:20	Igor Soszyński	Three decades of the OGLE survey (C06)
11:20 – 11:45	Eleftheria Panagiota Christopoulou	Discovery of star systems at the merger limit by large astronomical sky surveys (C07)
11:45 – 12:15	*Conference closing*	
12:15 – 13:45	*Lunch*	