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Carpathian Sky

Abstract Book

Oral presentations:

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Intrinsic colors and absolute stellar magnitudes of FGK supergiants

Report is devoted to the photometric and spectroscopic characteristics of FGK supergiants. The result of a search for the dependence between the intrinsic color indexes and fundamental parameters of the stellar atmospheres is presented. The overview of the search of calibration relations for obtaining the absolute stellar magnitudes from spectroscopic data is given.

The calculations of intrinsic colors and color excesses using the found dependence were made. We specified these data for 74 supergiants and 164 classical Cepheids. The error in determining of $(B-V)_0$ was less than 0.05m , which yielded us the possibility to obtain E_{B-V} with an accuracy better than 0.2m . Thanks to 80 found calibration relations we developed a technique that allows us to calculate the absolute stellar magnitudes for supergiants based on spectroscopic data. We conducted comprehensive testing of a new technique for the supergiants Galaxy and the Magellanic Clouds. We obtained improved values of absolute stellar magnitudes for 96 supergiants and 53 classical Cepheids. For the testing a new method of determining the M_V on spectroscopic criteria depending on pulsation phase we proposed the research of two classical Cepheids (δ Cep and η Aql) and three s – Cepheids (ζ Gem, FF Aql and V 473 Lyr). We obtained the conclusion that the technique is applicable with high reliability in the phase interval 0.2 — 0.5. Also we concluded that the proposed technique can be used as a spectroscopic method of the pulsation mode identification for Cepheids.

We determined the atmospheric parameters and abundances of 19 chemical elements for the 31 Magellanic Cloud Cepheids for the first time. Thanks to values of studied stars, the mean metallicity of LMC (– 0.20 dex) and MMC (– 0.54 dex) were obtained. These values are somewhat higher than traditional values, which can be explained by the sample of studied objects. As for the features of the chemical composition we would like to note that Na showed no excess, although a small excess was found for some α – elements (Si and S), as well as a marked excess in relation to iron neutron – capture elements. The results are generally in good agreement with previously published data. Along with the analysis of chemical composition, we calculated the absolute magnitudes for some individual objects using the proposed method of the determining M_V on spectroscopic criteria. For 9 LMC Cepheids the values of M_V were determined. Based on these M_V , the distance modulus for the LMC m−M = 18.4m ±0.3m has been defined. From this result we can conclude that the new method for determination M_V is quite applicable to objects from nearby galaxies with a temperate deficit of metals.

The new method of M_V determination for FGK supergiants in our Galaxy and MC has been tested comprehensively, based on this we defined the interval of applicability for the new technique: luminosity types Ia, Ib and II; spectral classes F2 — G8; range of effective temperatures 4500 — 7000 K; interval of the absolute stellar magnitudes from – 0.5m to – 8m ; supergiants must have non-anomalous chemical composition with near – solar metallicity, allowed a temperate deficit of metals.

P. A. Dubovský

Vihorlat Observatory, Humenné, Slovakia

Annual Report on Observational results of AO at Kolonica Saddle

Introductory presentation about observing program at Astronomical Observatory at Kolonica Saddle. Short overview of main observing campaigns during last year, most important results, interesting light curves, new publications based on observations at AO Kolonica Saddle.

P. A. Dubovský

Vihorlat Observatory, Humenné, Slovakia

East European Network of Small Telescopes - ENESTEL

We discuss the possibility to exploit the astronomical instrumentation of The Carpathian Sky project partners for astronomical research and education. Relatively small telescopes can be effectively used in network with different level of access rights.

L. Hric, E. Kundra

Astronomical Institute, Slovak Academy of Sciences

Preliminary discussion on IU Per

Abstract not submitted

M. Hricová Bartolomejová

Slovak Astronomical Society

Mayan Calendar and End of Time 2012

Abstract not submitted

J. Janík

Faculty of Science, Masaryk University Brno

Hot stars in Brno

Abstract not submitted

V. G. Karetnikov, A.V.Dragunova

RI "Astronomical Observatory" of Odessa National University

140 years of the Odessa Astronomical Observatory: personalities, sights, collections.

140-year-old history of the Astronomical Observatory of the Novorossia (Odessa) University (OAO) is illustrated by means of the names of known scientists, objects of cultural heritage, rarity instruments and collections, which are related to OAO.

С. Г. Кашуба, С. М. Андриевский, А. Пихун

Одесская астрономическая обсерватория

Одесская коллекция астрофотопластинок

Презентация доклада о содержании одесской коллекции астрофотонегативов, охватывающей период 1909 - 1998 гг., ее хранении, подготовке и проведении работ по систематизации данных коллекции для размещения в глобальный каталог WFPDB.

Z. Mikulášek (1), J. Krtička (1), J. Janík (1), M. Zejda (1), J. Liška (1), J. Zverko (2), J. Žižňovský (2), I. I. Romanyuk, D. O. Kudryvtsev (3)

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Rotational deceleration and acceleration of magnetic chemically peculiar stars CU Vir and V901 Ori

We present recent revealing of surprising variations in the rotation of two well-known magnetic chemically peculiar stars CU Virginis and V901 Orionis. We propose that dynamical interactions between a thin, outer magnetically-confined envelope, braked by the stellar wind, with an inner, faster rotating stellar body is able to explain the observed rotational variability. A theoretically unexpected alternating variability of rotation periods in these stars would remove the spin-down time paradox and brings a new insight into structure and evolution of magnetic upper-main-sequence stars.

Š. Parimucha

Institute of Physics, Šafárik University, Košice

New astronomical instrumentation for Faculty of Natural Sciences of Šafárik University

Basic informations about new telescopes and detectors for Šafárik University is given.

Š. Parimucha (1), P. Dubovsky (2), T. Pribulla (3), M. Vanko (3)

(1) Institute of Physics, Šafárik University, Košice

(2) Vihorlat Observatory Humenné

(3) Astronomical Institute of Slovak Academy of Sciences

Preliminary analysis of neglected eclipsing binary DV Psc

We present our study of eclipsing binary DV Psc. We used multicolour CCD observations from 2005 to 2008 obtained at Stara Lesná Observatory of the Slovak Academy of Sciences and from Kolonica Observatory in the East Slovakia. New spectroscopic observations were obtained by Magellan-II Clay telescope in September 2005. Analysis of all available minima times suggest continuous period increase with a rate $dP/dt=1.87\times10^{-7}$ d yr^{-1} . Broadening function fitting revealed radial velocity of the both components and enable us to find mass ratio $q = 0.690 \pm 0.025$. The light curves of DV Psc show high variability. We fitted them by PHOEBE code and estimated spots parameters and their time evolution. Using spectroscopic and photometric parameters we derived absolute parameters of the both Components. We present our study of eclipsing binary DV Psc.

R. Prajsnar

I Liceum Ogólnokształcące w Jaśle

A newly - established school astronomical observatory in Jasło - with respect to the future cooperation between The Secondary School in Snina and The Secondary School in Jasło

A short history of the creation of the observatory in Jasło with respect to the across-the-border cooperation between Poland and Slovakia incorporated in the Carpathian Sky PROJECT (CSP). The possibilities of educational support with regard to astronomy and tourism by the partners of the CSP as well as other Polish and Slovakian school and institutions connected with astronomy.

R. Roháč

Technická univerzita Košice

Waste in the space or has pollution limits?

One of the most important questions, which the 21st century brought into fore of interest, is the question of ecology. At present, the pollution of Earth, which is the conseqence of human activity reaches a huge dimensions. But as the human activity is not limited to the earth, the pollution caused by humans overreaches the earth-space as well. According to American NASA scientists, there is more than a 5500 tons of wreckage bigger than 10 cm. Waste in outer space become a serious problem not only to astrologists and scientists, who have to monitor more than a 17000 fragments of satelits and space rockets circulating on orbit, but it also reflects moral decay of contemporary society. The idea of sending the radioactive waste to the outer space, which has been proposed several times (the most seriously by Kapica in 1959 and by Schlesinger in 1972) is the one of the most disturbing sign of decline.

T. Roháčová

KSV, Technická univerzita, Košice

Cross-border cooperation and its impact on the development of multicultural competences of the students

Work points out the importance of developing multicurtural students powers. Global changes brought by globalization influence the content and form of education. With the development of the globalization also increases the importance of acceptance and tolerance of the other cultures. Multicultural competences is needed to develop in all of the students that way that when leaving school they carry with them foundations for life and work in a multicultural environment. They will be able to live and work not only in the specific othercultural conditions, but will also be able to participate in the cultivation of their own environment. As follows from the above mentioned, starting point in the present is represented by education characterized by democratic feeling and recognition of the distinct values in the current multi-faceted culture of human personality. Cross-border cooperation and joint activities of schools not only contribute to mutual understanding and to gain information about different cultures, but the educational activity is broader because it combines information with the development of skills, abilities and attitudes of students. It develops a respect towards another person, sense of own identity, supports and develops the acitivity of the individual on behalf of the society. Also these joint international projects like is Carpathian heaven are the contribution and support development of multicultural competences of the students of border region.

I. Romanyuk, E. Semenko

Special Astrophysical Observatory RAS, Russia

Novye rezultaty nabljudenij magnitnykh zvezd na 6-m teleskope SAO

Abstract not submitted

G. Sęk

Młodzieżowe Obserwatorium Astronomiczne w Niepołomicach

Remote controlled telescopes in astronomical education

Polish pupils have possibility to observe celestial bodies by use several networks of external telesopes. I will present qualitative and quantitative results obtained in Microobservatory, Bradford Telescope, Slooh Space Camera, Ironwood North Observatory.

Shulga A.V.[1], Kozyrev E.S.[1], Sibiryakova E.S.[1], Dragomyretskiy V.V.[2], Koshkin N.I.[2], Shakun L.S.[2], Vovchik E.B.[2], Blagodyh Ya.T.[3], Bilinskiy A.I. [3], Martynuk-Lototskiy K.G. [3], Epishev V.P.[4], Rychalskiy V.V.[5], Lopachenko V.V.5, Ryshenko S.V.[6]

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[2] RI Astronomical Observatory, Odessa National University (Odessa)
[3] Astronomical Observatory, Lviv National University (Lviv)
[4] Laboratory of Cosmic Researches, Uzhgorod National University (Uzhgorod)
[5] National Space Facilities Control and Test Center (Eupatoria)
[6] Center of the Spacial Information Reserving and Processing and the Navigational Field Control (Dunaivtsi)

Perspective of the networks of ground-based telescopes in research of near-Earth space

The increasing number of launches of artificial satellites (AS) leads to the essential increase of space debris (SD) on Earth's orbit. Leading space-faring nations make considerable efforts and contributions for creation, maintenance and development of Space Control System (SCS). Effective work of SCS is achieved by usage of radio and optical means based both on the ground and space.

At present, The Control System of Space Environment (CSSE) developed by the National Space Agency is in operation in Ukraine. CSSE provides space tracking of up to 300 priority space objects and provides the information about them to customers. Usage of optical telescopes belonging to Ukrainian research institutes and universities is prospective way to enlarge number of information sources about the SD at low orbits (up to 2500 km) for CSSE. The Ukrainian network of optical telescopes (UNOT) has a perspective in international cooperation, in particular with European Union, Russia, China, who are members of the Inter-Agency Committee on space debris (IADC) and in accordance with UN General Assembly #61/11, they are responsible for collection and distribution of data of SD.

Currently, includes telescopes from Lviv, Odessa, Uzhgorod, Nikolaev, Dunaevtsy, Evpatoria observatories.

City	Telescope	Lens F/D (мм)	View (°×°)	Tracking type	Mag min	CCD type
Eupatoria	AZT-28	750 / 230	0.4 × 0.3	mechanical	9	CCTV
Dunaivtsi	AZT-28	8000 / 500	0.2 × 0.3	mechanical	9	TV
Nikolaev	FRT	1500 / 300	1.4 × 1.4	electronic	17	CCD + TDI
		85 / 47	4.2 × 3.2	electronic	11	CCTV
	Mobitel (KT-50)	3000 / 500	0.7 × 0.7	electronic	18	CCD + TDI
	Mobitel (AFU-75)	750 / 260	2.8 × 2.8	electronic	16	CCD + TDI
	Mobitel (TV)	85 / 47	4.2 × 3.2	electronic	11	CCTV
Odessa	KT-50	3000 / 500	0.7 × 0.5	mechanical	11	CCTV
		85 / 56	4.2 × 3.2	electronic	11	CCTV
Lviv	TPL-1M	250 / 100	1.5 × 1.1	electronic	12	CCTV
	LD-2	85 / 56	4.2 × 3.2	electronic	11	CCTV
Uzhorod	TPL-1M	85 / 56	4.2 × 3.2	electronic	12	CCTV

Different methods of observations are carried out using UNOT: measurements of absolute sensors of angle on axles - telescopes in Evpatoria and Dunaevtsy, differential lock to the reference stars in TV frames - telescope in Odessa, synchronous mode of charge transfer (SMCT) for full-size CCD cameras on rotating platform – telescopes in Nikolaev, mode of accumulation of frames offset for the TV cameras - telescopes in Lviv, Nikolaev. Odessa and Uzhgorod.

UNOT observations provide the surveillance of space objects (SO) at altitudes up to 2500 km: for method of TV observations - objects with effective area of radio wave reflection (EARWR)> 0.1m2 and weight >50kg and for SMCT - objects with EARWR >0.01m^2 and a mass >1kg.

Orbit modeling of the EAS taken from the USSTRATCOM catalog in observation zone of network has shown that up to 1000 from 10500 objects may be tracked with a period of data update not more than 10 days. The usage of UNOT for calculating orbital elements allows us to obtain a forecast accuracy better than 0.1 for 20 days for SO at altitudes up to 3000 km and for 200 days for SO at altitudes from 20 000km to 40 000km, which is not worse than in the USSTRATCOM catalog.

The cooperation of UNOT with networks of optical telescopes from other countries will increase SO tracking on the orbit - from low to geostationary. Also, the dependence of combined networks from weather conditions will reduce and the ultimate accuracy of calculation of orbital elements of SO will increase.

I. A. Usenko, V. G. Klochkova

Dpt. of Astronomy, Odessa National University

Monitoring of the yellov hypergiant Rho Cas: results of the high-resolution spectroscopy in 2007-2011

Abstract not submitted

M. Zejda

DTPA MU Brno, Czech Republic

Time

Time calculating from historical time to modern reference frames and time scales. Problems of accurate time stamps of astrophysical measurements.

M. Zejda (1), Z. Mikulášek (2), J. Liška (2), P. Svoboda (3)

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(3) private observatory, Výpustky 5, Brno, Czech Republic

Photometry using microtelescopes

There is a great problem with the lack of photometry of stars brighter then 6-7 mag in the epoch of CCDs. We suggest to obtain new photometric measurements of such stars using very small telescopes.

P o s t e r s :

B. Dębski

Astronomical Observatory of the Jagiellonian University

On sdB+dM systems: from hot subdwarf B stars to planet detection possibilities

Hereby I present few facts about binary systems containing hot subdwarf type B and late-type main sequence star (dwarf M). Using latest publications and data from observational program conducted in the Kolonica Saddle Observatory I will show crucial characteristics of binary systems and sdB stars itself. Following work includes description of hot subdwarfs, main branch of studies on them and newest conclusions of the eclipse timing method.

P. Ďuriš

Slovak Astronomical Society

First results of continuous night sky brightness monitoring at Astronomical observatory at Kolonica Saddle

Abstract not submitted

N. Kablak

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Systematic weather forecasting in online mode made to support astronomic observations.

Great potential of GPS system has become available for the recent 30 years [1]. This system is designed for navigation and determination of geographic coordinates of different objects for the purposes of scientific and applied research. The development of RTK (Real Time Kinematic) technology in the evolution of GPS systems as well as joint application of new telecommunication facilities has provided for the wide use of GPS in different areas of navigation, geodesy and cadastre [2]. RTK technology allowed obtaining the level of coordinates with a centimetre precision directly during observations, i.e. time of technological processing is drawn to a minimum and is less dependent on subjective factors, which is very important for large-scale determinations of coordinates. Besides, time spent per determination of coordinates do not exceed several seconds per point. Currently scientific work is held in the area of definition and accounting for errors, which influence GNSS-observations in the network of active referential stations, including research on the influence of atmosphere (troposphere and ionosphere delays) [3].

Researches of troposphere using GNSS-observations are designed to examine weather and climate processes, and eventually, to enhance weather forecasting. [4]. Atmosphere forecast is highly dependant on the data on atmosphere circulation, and the researcher should be aware of the physical processes of dynamic interfusion of mass and energy (as well as radiation influence).

The atmosphere is instable both in vertical and horizontal directions. Dynamics of troposphere is much complicated by the phase of water vapour. The structure of humidity level is rather complex and is influenced by many different processes taking place in different layers of atmosphere. Consequently, it is characterised by natural and accidental changes in time and space. Large-scale irregularities if humidity areas can reach thousand of meters. There can also be small irregularities if humidity areas sized from hundreds of meters to millimetres. Numerical characteristics of water vapour are used in operating meteorology for short-term weather forecasts (distance between stations up to 70 km) and for numerical weather forecasting in climate applications of the whole region (distance between stations up to 100 km). Online weather forecast is usually based on observations as to relative humidity along with pressure and temperature, which are determined using radiosondes and land-based meteorological devices.

A method of evaluation and determination of integrated water vapour (IWV) based on GNSS-observations was developed in the end of last century [4,5]. The advantage of this method is the possibility of its continuous application using the existing GNSS-infrastructure (network of active referential stations with single control centre), as well as the fact that levels of water vapour defined based on GNSS-observation do not depend on the rain or cloudiness.

Therefore, the usage of GNSS allows conducting long-term regional and global monitoring of water vapour levels in the atmosphere. Permanent networks of tracking GNSS-satellites have become extremely important tool for there scientific researches. Such networks are namely IGS (International GNSS Service) and regional EPN network (EUREF Permanent Network) [6,7]. They also include national networks of referential stations working in permanent mode, and in the recent years – networks of active referential stations, which allow users to receive results of observations in online mode.

Continuous determination of water vapour on large territories allows to determine and forecast water vapour dynamics, and hence, atmospheric precipitation in online mode. Ukraine borders four countries, where there are functioning networks of active referential stations: SKPOS (Slovakia), GNSSnet.hu (Hungary), ROMPOS (Romania), ASG-EUPOS (Poland) [8-11]. In Ukraine the first network of active referential stations ZAKPOS/UA-EUPOS was created in Transcarpathian region [12]. ZAKPOS (Transcarpathian Position Determination System) was created in 2008 in Transcarpatian region with computational centre in Mukachevo. The purpose of system creation is to satisfy needs of geodesic companies in high-precision GPS observations, in RTK mode in the first place. ZAKPOS network is fully built according to the principles and requirements of EUPOS [13,14]. It uses hardware and software made by Trimble. During 2009-2011 ZAKPOS network was developed to cover neighbouring regions: Lviv, Volyn, Rivne, Chernivtsi, Ivano-Frankivsk, Ternopil, Khmelnytsky. Effectively, ZAKPOS has become the network of western Ukraine. Due to geographical location of Transcarpathian region and cross-border cooperation with European countries we can have precise, dense and frequent sample of IWV values to cover large territories, which allows determining and forecasting dynamics of water vapour on large territories in online mode. The purpose of this work is to determine precision of precipitation of water vapour based on network GNSS data.

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Total lunar eclipse

Poster presented total lunar eclipse observed by use Slooh Space camera 15th of June 2011 was prepared.

P. Sowicka, J. Put

Astronomical Observatory of the Jagiellonian University

V795 Her - a hard nut to crack

We analyzed archival observational data on object changes in brightness. After selection we chose data from telescope Pupava in filter V. Then we did period analysis and received change the value of the period as 0.1154 d. After subtraction the periodic curve with proposed period the brightness distribution shown no periodicity. If periodicity exist, it is covered by noise. We conclude no periodicity brighter then 0.1 mag. More observations with less dispersion are needed.

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