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VIII SERBIAN-BULGARIAN ASTRONOMICAL CONFERENCE

Leskovac, Serbia, May 8-12, 2012

BOOK OF ABSTRACTS

Eds. Milan S. Dimitrijević and Milcho K. Tsvetkov



BELGRADE
2012

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Department of Astronomy, Faculty of Physics, Sofia University "St. Kliment Ohridski"

On the front cover: Panorama of the town of Leskovac

On the back cover: A forest on a secret planet, author Vladimir M. Dimitrijević

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INVITED LECTURES

Invited lecture

VIRTUAL ATOMIC AND MOLECULAR DATA CENTER AND STARK-B DATABASE 2010-2012

**Milan S. Dimitrijević^{1,2}, Sylvie Sahal-Bréchet², Darko Jevremović¹,
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The available atomic and molecular data are highly fragmented and provided in different non standardized formats, which is an obstacle for an efficacious and adequate search and mining, and consequently, for their adequate use. In order to overcome these obstacles, we need the search engines that must look “everywhere” for the needed A&M data and to create an accessible and interoperable e-infrastructure.

To make this, i.e. to build a flexible and interoperable e-science environment based interface to the existing Atomic and Molecular data, is in fact the main objective of Virtual Atomic and Molecular Data Center (VAMDC – Dubernet et al., 2010, Rixon et al., 2011), a FP7 funded project which started on July 1st 2009 with budget of 2.9 MEuros over 42 months.

In VAMDC will enter also STARK-B database, containing Stark broadening parameters for a large number of lines, obtained by the semiclassical perturbation method during more than 30 years of collaboration of authors of this work (MSD and SSB) and their co-workers. We will review here the VAMDC project and STARK-B database with the special emphasis on the development and progress within the 2010-2012 period. Also, we will make a mini-tutorial for the conference participants, how to use VAMDC software and STARK-B database.

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Rixon, G., Dubernet, M. L., Piskunov, N., et al.: 2011, 7th ICAMDATA - 2010, Vilnius, Lithuania 21-24 September 2010, eds. A. Bernotas, R. Karazija, Z. Rudzikas, *AIP Conf. Proc.*, **1344**, 107.

Invited lecture

SERBIAN ASTRONOMY AND LSST

**Darko Jevremović¹, Željko Ivezić², Milan S. Dimitrijević¹, Luka Č. Popović¹,
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We will briefly review the LSST project and present and future involvement of Serbian astronomers in the collaboration. By the time of conference we expect that MOU between Serbian technology group and LSST Corporation will be signed. We expect that broader regional collaboration will be possible.

Invited lecture

THE METHOD OF COMPRESSIVE SENSING APPLIED TO ASTRONOMICAL IMAGES

Ognyan Kounchev and Damyan Kalaglarsky

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We consider the application of some new Wavelet Analysis to Representation, Compression and Denoising of digitized astronomical plates. Our wavelets are a multidimensional generalization of the original Daubechies wavelets, and are based on a multidimensional subdivision process. Our experimental results show that they exhibit a good advantage over alternative multidimensional wavelet type bases. This talk is based on a joint research with N. Dyn, D. Levin (Tel Aviv), H. Render (Dublin), and D. Kalaglarsky (Sofia).

Invited lecture

CORRELATIONS BETWEEN SPECTRAL PROPERTIES IN AGN TYPE 1

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We analyse the correlations between spectral properties in a sample of AGNs selected from the SDSS.

The new template of optical Fe II is constructed and the relationships between different groups of iron multiplets and some properties of emission lines are examined.

We focus investigation on correlations between continuum luminosity and emission lines (Baldwin effect) and correlations from Boroson and Green's Eigenvector 1. The possible influence of starburst regions on observed correlations is analyzed.

Invited lecture

THE LINK BETWEEN ENERGETIC PARTICLES AND ERUPTIVE PHENOMENA IN THE SOLAR CORONA: STATISTICAL STUDY IN SOLAR CYCLE 23

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Solar energetic particles (SEPs) are transient enhancements of the intensities of energetic protons, ions and electrons observed in the interplanetary (IP) space (Klecker et al. 2006) that can pose serious risk for spacecraft crew and equipment, ground-based power grids in polar regions, communications. SEPs are known to follow in time eruptive phenomena in the solar corona, such as flares and coronal mass ejections (CMEs). The physical relationship between the observed in situ SEPs and the processes of coronal activity is not well known. This is because particle measurements near 1 AU are related to the coronal accelerator through a poorly understood chain of processes of acceleration, access to open magnetic field lines and propagation in the dynamic IP medium. Additionally, the SEP intensities are generally measured in only one point and the magnetic connection to the acceleration site is not well known. It is often approximated by a Parker spiral, but it has been also shown by case studies that SEP may reach the satellite detector in a transient interplanetary magnetic field (IMF) structure, i.e. interplanetary coronal mass ejection, ICME (Torsti et al. 2004, Malandraki et al. 2005).

We present a statistical study of near-relativistic electrons (tens to hundreds of keV) and deka-MeV protons and their parent solar activity (flares and CMEs) during the 23rd solar cycle (1997-2006). Previous studies have shown that SEP events are associated both with flares and CMEs (Kahler, 1982, Reames, 1999). We applied similar statistical approach on all SEP events associated with coronal phenomena at western helio-longitudes and additionally took into account the IMF conditions. We found that around 20% of all particle events propagate when an ICME is present in the IP space and hence these particles are subject to different injection and propagation conditions. This subset of SEP events shows strong correlation both with the flare parameters (soft X-ray flux) and the CME properties (on-sky-projected speed). In contrast, the SEPs propagating in quiet solar wind conditions show preferentially good correlation with the CME speed and not with the flare flux. We discuss possible interpretations for the observed

differences in terms of the acceleration agent and mechanism, particle injection site and propagation conditions.

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Torsti, J., Riihonen, E., Kocharov, L.: 2004, *ApJ*, **600**, 83-86.

Invited lecture

LINUX ASTRONOMICAL SOFTWARE

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Most popular astronomical software for scientist and non professional astronomers based on LINUX operational system are reviewed. Included are data reduction packages as IRAF and MIDAS, specialised GRID software – e.g. GADGET-2, simulation and modeling software – e.g. GALFIT, organisers – e.g. SkyCal, planetarium software – e.g. XEPHEM, analysis of radio and interferometric data as AIPS and MIRIAD, spectral analysis software – e.g. VISUALSPEC, visualisation software – e.g. ALADIN and DS9, specialised virtual observatory software – e.g. SAADA and analysis of X-ray data – e.g. XSPEC. More than 80 LINUX software products are presented.

Invited lecture

PROGRESS REPORT OF THE PROJECT DO-02-273 “WIDE-FIELD PLATE DATABASE: DEVELOPMENT AND INTERNET ACCESS” - 2010-2012

Milcho Tsvetkov

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The review of activities on the project DO-02-273 “Wide-Field Plate Database: Development and Internet Access”, granted by the Bulgarian National Science Fund of the Ministry of Education, Youth and Science from July 1st 2010 up to April 30 2012 is presented, together with the bibliography of published works.

Invited lecture

LONG-TERM PRECESSION MODEL

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Precession is the secular and long-periodic component of the motion of the Earth's spin axis in space, exhibiting a motion of about 50"/year around the pole of the ecliptic. All precession models, used in astronomy so far (Newcomb, IAU 1976, IAU 2006) approximate this motion by polynomial expansions of time. These models are however valid, with very high accuracy, only in the close vicinity of the reference epoch J2000.0. For epochs that are more distant (several centuries), this approximation quickly deviates from reality. As a reaction to this problem, a new model, comprising very long-period terms fitted to a numerical integration of the motion of solar system bodies, has recently been developed by the present author in cooperation with N. Capitaine (France) and P. Wallace (United Kingdom) and published in A&A (Vondrák *et al.* 2011). A shortened description of the new model, including an evaluation of its accuracy, will be presented.

References

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CONTRIBUTED PAPERS

Contributed paper

SERBIAN-BULGARIAN COOPERATION IN AMATEUR ASTRONOMY

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Astronomy is a science where amateurs take a considerable activity. Many people practice astronomy as their hobby, so a lot of amateur societies exist worldwide, organizing activities for general audience. In this paper, an overview of amateur astronomy in Serbia is presented with the review on cooperation with Bulgarian astronomers. Further, ideas for future activities for extending cooperation between Serbian and Bulgarian amateur astronomers are presented.

Contributed paper

OBSERVATIONS OF GALAXY IC342 IN NARROW BAND [SII] AND H α FILTERS

**Milica M. Andjelić, Bojan Arbutina, Dejan Urošević,
Aleksandra Dobradžić, Marko Z. Pavlović**

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We present preliminary results of the observations of IC342 galaxy, made with 2m RCC telescope at NAO Rozhen, using narrow band [S II] and H α filters. The main target was to identify supernova remnant (SNR) and HII region candidates in this galaxy. IC 342 galaxy was observed in optical range for SNRs in 1980 (D'Odorico et al. 1980), but only central part of the galaxy has been observed. Here, we observed its northern and western parts.

Our initial analysis reveals almost 400 HII regions, and 7 SNR candidates. Furthermore, there are new radio and X-ray data for this galaxy, and together with optical observations of entire galaxy the analysis will be complete.

References

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Contributed paper

HPC CLUSTER WITH GPGPU CAPABILITIES. PERFORMANCE AND FEATURES EVALUATION

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The high performance computing clusters that are being deployed lately increasingly incorporate GPGPU processing cards, in order to achieve high energy and space efficiency. This leads to development of hybrid computing models that attempt to balance and optimize the performance of the CPU- and GPU-based hardware elements. After the expansion of the HPC cluster at the Institute of Information and Communication Technologies with HP SL390S G7 nodes equipped with NVIDIA M2090 cards, we performed careful evaluation and benchmarking of the new capabilities of the cluster. In this paper we present the software and hardware architecture of the cluster and the results of our benchmarking process.

Contributed paper

FLICKERING AMPLITUDE FOR CATAclySMIC AND SYMBIOTIC VARIABLES

**Svetlana Boeva, Radoslav Zamanov, Rumen Bachev, Svetla Tsvetkova,
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We study dependence of the flickering amplitude in B and V band on the mean flux ($\Delta F \sim F^k$) for selected cataclysmic and symbiotic variables. We search for relations of the coefficient k to the photometric state and the type of the variables.

Contributed paper

4-PARAMETER TRANSFORMATION OF DIGITIZED ASTRONOMICAL IMAGES

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The accuracy of star celestial coordinates determined from astronomical images depends on various parameters. A part of these parameters are the celestial coordinates of the image center and the angle between image axes and the North direction. The 4-parameter transformation (two translations, one rotation and scale) is used to determine the orientation of the digitized astronomical images and the coordinates of their center. The transform parameters are estimated by means of coordinates of identical stars from two images. The influence of the star proper motion uncertainties on the 4-parameter transformation accuracy is investigated by models of digitized astronomical images of one and same part of the sky in different epochs and made from different instruments. The influence of nonlinear effects of optic distortion on the 4-parameter transformation accuracy is investigated. The ability of application of the 4-parameter transformation of the digitized astronomical images in determination of star coordinates and proper motions is discussed.

Contributed paper

RELATIVE EXISTENCE OF PHYSICAL OBJECTS

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In the quantum mechanics it is well established fact that the properties of the physical entities are directly related to the observer and the conditions of measurement. In this paper we go further and show that the physical objects them self can have distinct and relative existence only due to their local times. Here, the local times are assumed to have distinct structure or different parametrizations. The goal of the paper is to set up a direct relation between structure of the local time of the object and relative existence of the object in the referent frame of the observer.

Contributed paper

MORE ACCURATE FOCAL LENGTH DETERMINATION FOR THE ROZHEN 2-m TELESCOPE

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The focal length of a telescope is an important parameter in determining the relative coordinates (angular separation and positional angle) of double and multiple stars, as well as in determining the precise coordinates of radio sources that are visible in optical part of wavelengths. With the 2-m telescope of NAO Rozhen we have collected a large number of observations of these objects. In order to determine the focal length more accurately we have used CCD images obtained at Rozhen.

Contributed paper

KINEMATICS OF A LOOP-LIKE ERUPTIVE PROMINENCE AS OBSERVED BY AIA/SDO.

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We examined the kinematic and helicity pattern as well as the morphological and geometrical evolution of an EP on 2010 March 30. We used the He II 304 A AIA/SDO and EUVI/STEREO B observations. The unique combination of high-resolution limb observations of the EP in AIA and a central meridian position in EUVI permitted a view from significantly different perspectives and detailed analysis of the prominence eruption.

The eruption process consists of a prominence activation, acceleration, and a phase of constant velocity. The prominence body was composed of left-hand twisted threads around the main prominence axis. The twist during the eruption was estimated at 3 turns (6 π). The prominence reformed in the same place two days after its eruption.

The same sign of the prominence body twist and writhe, as well as the amount of twisting above the critical value of 2π after the activation phase indicate that the conditions for kink instability were present. The fact that the erupted filament re-formed at the same place two days after the eruption implies a confined type of eruption.

Contributed paper

**INVESTIGATIONS OF THE INFLUENCE OF COLLISIONAL
PROCESSES ON THE ASTROPHYSICAL PLASMA SPECTRA
2010-2011**

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The review of activities of participants of the project 146001 (up to 31. December 2010) and 176002 (from 1 January 2011) “Influence of collisional processes on the astrophysical plasma spectra”, supported by the Ministry of Science and Technology and the Ministry of Education and Science of Republic of Serbia, respectively, is given for the period 2010-2011, together with the bibliography of published works. The bibliography of the works of participants of the project, which are not connected to the project, is also provided.

Contributed paper

SOCIETY OF ASTRONOMERS OF SERBIA 2008-2012

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Society of Astronomers of Serbia is founded on 25. 02. 1981, and author of this paper was elected for President on the Assembly in October 2008. Activities where Society took part within the period October 2008 – April 2012 are:

International Year of Astronomy 2009

Astronomical Olympiads

Mobile Planetarium and the Project “Popularization of Astronomy in educational institutions and schools”

Scientific meetings in organization of SAS

Publishing activities of SAS

Foreign scientists – guests of SAS

Connections with European Astronomical Society

Connections with International Astronomical Union.

We will describe here in details all above mentioned activities.

Contributed paper

**TEN YEARS OF THE “YUGOSLAVIA” BRANCH OF THE
INTERNATIONAL ASTRONOMICAL INSTITUTE
“ISAAC NEWTON” OF CHILE AND OF SCIENTIFIC SOCIETY
“ISAAC NEWTON”**

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On the occasion of ten years jubilee, activities of the “Yugoslavia” Branch of the International Astronomical Society “Isaac Newton” of Chile are presented and analyzed. This is also the ten year jubilee of the Scientific Society “Isaac Newton” which members are all members of the “Yugoslavia” Branch.

Contributed paper

**IMAGE PROCESSING SUGGESTIONS TO IMPROVE
THE ASTRONOMICAL MULTIEXPOSURE WIDE PLATES
METHOD (*)**

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The method for discovering of variable celestial objects by photographing of star chains images is known in astronomy as the multiexposure wide plate’s method (Aniol et al. 1990). In its original form (with the use of photo plates) method is considered obsolete for the present, but there are visions for the renovation of its use simultaneously with the advent of CCD / LCD technologies in astronomy. The idea for this report comes from the difficulty of extensive computer processing of archival wide plates with star chains (Dimov et al, 2012). The configuration of the chains in a given plate is static and direction of the chains

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and the distances between their components (copies of the stars in time) are selected from the photo astronomers mainly on the principle of operational convenience when working with a given telescope. Thus we meet too many instances of overlapping star chains (partially or completely) in the available archive plates that hinders comprehensive identification of all chains in the plate for the subsequent localization of the desired star phenomena. This report describes the method of calculation, prior to the actual astronomical experiment, for the optimal configuration (without overlapping) of linear chains, i.e. for optimal parameters, the direction of movement of the plate (or redirect the telescope) and the magnitude of each displacement (telescope redirection). From computer science viewpoint, the proposed method is considerably effective – a linear complexity in relation to the size of input astronomical images. Thus, given the available world heritage archival star chains plates (over 2 million)** , the proposed method can be used for some improvements in computer processing of plates. But the main motivation for this report lies in expected return of astronomers' interest towards multiexposure method in view to CCD / LCD technologies that displace the classic photography.

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** <http://www.wfpdb.org/>

Contributed paper

MODELING OF MOLECULAR CLOUDS WITH FORMATION OF PRESTELLAR CORES

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We develop a statistical approach for physical description of dense structures (cores) in molecular clouds that might be progenitors of stars. Our basic assumptions are a core mass-density relationship and a power-law density distribution of these objects as testified by numerical simulations. The core mass function (CMF) was derived and its slope in the high-mass regime was obtained analytically. Comparisons with observational CMFs in several Galactic clouds are briefly presented.

Contributed paper

DYNAMICS OF AN ERUPTIVE PROMINENCE OBSERVED WITH THE H-ALPHA CORONAGRAPH AT NAO – ROZHEN ON 22 AUGUST 2006

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The dynamics of an eruptive prominence (EP) observed with the H-alpha coronagraph in the National Astronomical Observatory (NAO) – Rozhen on 22 August 2006 was studied. The eruptive event presents seven successive eruptions between 04:28 UT and 11:00 UT. The kinematic pattern of the first prominence eruption was examined and the basic parameters were determined. The seven eruptions of the EP are associated with a filament located at the western end of an active region NOAA 10904 at approximately the same place. The EP is associated with some activity events in solar radio emissions at 164 MHz (Nancay Radioheliograph) and 17 GHz (Nobeyama Radioheliograph).

Contributed paper

DO THE TIDES CONTROL ELEMENTAL ABUNDANCES IN STELLAR ATMOSPHERES OF A-TYPE STARS?

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Reasons for the abundance diversities observed in the atmospheres of A-type stars are discussed briefly. Magnetic fields and/or tidal interactions between components of binary systems can alter substantially the stratification of the chemical elements produced by the radiatively driven diffusion in these atmospheres. On the basis of a dozen metallic-line (Am) stars observed at Rozhen NAO we report our conclusions that the abundance anomalies in Am stars, all of them binary stars, depend on the orbital elements, mainly eccentricities and periods. The competition between diffusion (stratification) and tides (meridional mixing) in Am stars produces stronger anomalies when eccentricities and orbital periods are larger. Thus we found that peculiar elemental abundances in the atmospheres of Am stars are supported not only by slow rotation and diffusion but are tidally driven as well.

Contributed paper

TRANSITIONAL EVENTS IN THE CIRCUMSTELLAR ENVIRONMENT OF THE Be/shell STAR BU Tau

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Transitional events in the circumstellar environment of Be/shell stars are described on the example of cyclic variations of BU Tau (Pleione). Comparison with other Be stars with similar behavior is demonstrated, discussed are observational similarities and differences. Special attention is paid to exact determination of time prolongation of the cyclic phenomena.

Contributed paper

SERBIAN VIRTUAL OBSERVATORY 2010-2012 AND ITS CONNECTIONS WITH VIRTUAL ATOMIC AND MOLECULAR DATA CENTER (VAMDC)

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In this lecture we will review the progress in the developments in Serbian Virtual Observatory (SerVO) within 2010-2012 periode, as well as its relation with the European FP7 project: Virtual Atomic and Molecular Data Center - VAMDC.

Contributed paper

THE EXCESS RELATIVISTIC DENSITY IN THE EARLY UNIVERSE AND ITS EXPLANATIONS

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Recent cosmological data from Big Bang Nucleosynthesis (BBN) (Izotov, Thuan 2010, Aver et al. 2010), Cosmic Microwave Background (Komatsu et al. 2011) and Large Scale Structure observations and the analysis of global neutrino data (Kopp et al. 2011) point to the presence of an additional relativistic density in the early Universe. In this connection we review several possibilities for the

explanation of the excess density, namely: the presence of inert neutrinos, the possibility for active-inert neutrino mixing, possible MeV neutrino decays or the presence of a considerable neutrino-antineutrino asymmetry.

We show first that eventual inert neutrino, due to active-inert neutrino oscillations, may change non-trivially the early Universe processes and especially BBN (Kirilova, Chizhov 1997, Kirilova 2004). In particular, it may strengthen or relax BBN constraints on neutrino mixing parameters (Kirilova 2004, Kirilova, Panayotova 2006, Panayotova 2011).

Next, we review the cosmological lepton asymmetry. We discuss besides its well known kinetic and dynamical effects, also its effect on BBN via active-inert neutrino oscillations - enhancing or suppressing them (Kirilova 2011). Thus, lepton asymmetry may strengthen, relax or eliminate BBN cosmological constraints.

Finally we discuss the case of decaying neutrino of MeV mass range and present its capability to overproduce or underproduce the primordial production of He-4 (Dolgov, Kirilova 1986), i.e. of strengthening or relaxing the BBN bounds.

In conclusion we discuss extended cosmological models, with these additional components, that may be in agreement with cosmological observational data and neutrino experiments data.

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Contributed paper

**DATA REDUCTION PIPELINE FOR DIGITIZATION OF
ASTRONOMICAL PHOTOGRAPHIC PLATES
II. PLATE DIGITIZATION SOFTWARE AND FITS FORMAT
REQUIREMENTS**

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In this paper we present tools for helping the process of digitization of astronomical photographic plates. The Virtual Observatory requirements presume that any FITS file, which contains a digital image, has to be equipped with a complete header. The Wide-Field Plate Database (WFPDB, <http://www.wfpdb.org>, Tsvetkov 2006, Tsvetkov et al. 2012) offers the most of the meta-data needed for creation of FITS header. The FITS header software gives the user an appropriate tool for connecting the WFPDB catalogues and the digitized plate images. Using the professional flatbed scanners usually it is imposed to convert the inner format of the scanner (or driver) into the standard FITS format for digitized photographic plate. The tif2fits software converts the VueScan output TIFF file format to FITS and in case of scanning with grayscale wedge (Tsvetkov et al. 2012), divides the plate image and the wedge image.

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Contributed paper

SOME CHARACTERISTICS AT ASTRONOMICAL IMAGE ANALYSIS FROM SCANNED PHOTOGRAPHIC PLATES

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Instead of using a fixed basis from functions for image representations, such as Fourier series, DCT, wavelets, multiwavelets and so on we propose structures which can be used to optimize of the basic image representations for a large class of digital astronomic images. By using of the image basis we can construct dictionary for image analysis and processing. Some examples for scanned photographic plates (SPP) for astronomical images are given.

Contributed paper

A METHOD FOR ENHANCED IMAGE PROCESSING AND SEARCH FOR VARIABLE STARS

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The purpose of this report is to explain an enhancement in the standard procedure of processing signals extracted from astronomy photographs. There are well known problems related to imaging used in astronomy photography. For example, images taken with ground based telescopes are subject to the blurring effect of atmospheric turbulence. Another one is coming from the errors arising from the use of equipment such as dark and readout signals generated by CCD cameras, vignetting and uneven field illumination created by dust or smudges in the optical system. In the other hand, many astronomical imaging programs require higher resolution than is possible without some correction of the images. All these problems are multiplied if modest equipment is used such as we have. Of course, there are many methods used in post processing. All these procedures are in fact mathematical algorithms applied on digitized, numerical data representing

extracted signals. There are also preprocessing procedures applied on the series of astronomical photographs such as photo stacking, and they are mostly based on physical enhancement of the signal such as the strength of the signal by the accumulation of it from a group of photos. But as far as we know this procedure is used mainly for the production of a final photo, therefore not for a dynamic analysis of a time process related to the series of photos. Our method is the mixture of these two approaches. For a given set of photos representing a time process such as the variability of a star, we build a list of groups of photos. Groups are built in a certain pattern in order to preserve the physical characteristics of the time process, its strength, shape and periodicity. We implemented special software for building the list of groups of photos concordant to the prescribed pattern. Then each group is preprocessed by stacking photos in this group. In this way we averaged the signal strength, significantly reduced the noise coming from atmosphere turbulence, and eliminated errors generated by the used equipment. At this stage we used the software DeepSkyStacker for processing the groups of photos. So obtained, the new series of photos is then the subject to the analysis of the original time process, such as the star variability. At this stage we used software MaximDL and Peranso. A much better resolution of data and the curve representing the time process is achieved compared to the data and the graph obtained by direct numerical analysis without the described preprocessing. In this way we confirmed transits of two exoplanets Tres 2b and Tres 3b. We also found suspects of variability of two stars; they are 3UC 317-048727 and TYC 3549-2704-1.

Contributed paper

OBSERVATIONS OF ERS FROM ICRF2 LIST USING ASV 60-cm AND ROZHEN 2-m TELESCOPES

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During 2011 we observed the extragalactic radio sources (ERS, which are visible in the optical domain) from ICRF2 list using the ASV 60-cm (Serbia) and Rozhen 2-m (Bulgaria) telescopes with CCD camera. It is of importance to compare the ERS optical and radio positions (VLBI ones) and to search for a relation between optical and radio reference frames. A few ERS were observed with both telescopes, and it is useful to check the possibilities of ASV 60-cm instrument via the Rozhen 2-m results. At the ASV 60-cm we used the CCD camera Apogee E42 (2048x2048 pixels, the pixel size is 13.5x13.5 mkm), and at the Rozhen 2-m it is the CCD VersArray 1300B (1340x1300 pixels, 20x20 mkm). The observations, reduction and preliminary results of common ERS are presented here.

Contributed paper

**BRANISLAV MILOVANOVIĆ ABOUT
MILANKOVIĆ'S CYCLE OF INSOLATION**

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Professor Branislav Milovanović (1908-1977) wrote a book named “Mysterious Earth” in 1942. He describes and interprets some interesting parts of Milanković’s cycle of insolation. Milovanović is one of the first Serbian geologists who understood Milanković’s theory, its influence on the planetary climate in the geological past, and mathematical/physical mechanism. In this paper we describe Milovanović’s ideas and his understanding of Milanković’s theory, mainly the frame of absolute rock ages. The book “Mysterious Earth” is 70 years old, however, Milovanović’s physical explanations are still young, geologically and paleoclimatologically correct. We use two examples from Milanković’s diagram of insolation to illustrate Milovanović’s geological, paleoclimatological and planetary explanation of Milanković’s cycle of insolation.

Contributed paper

FINE STRUCTURE OSCILLATIONS OF A QUIESCENT PROMINENCE

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High resolution H-alpha spectrum observations of a quiescent prominence obtained at Pic du Midi Observatory are digitized and studied. The long time series (> 3 hours) of spectrograms reveal different periods of oscillations from different parts of the prominences body. The computed line-of-sight velocities of the fine structure demonstrate amplitudes fading with time. The analyzed fine structures represent Alfvén kink-mode oscillations of short and average periods.

Contribute paper

PERTURBATIONS OF THE TERRESTRIAL LOW IONOSPHERE CAUSED BY SOLAR FLARES

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The main influence on the terrestrial ionospheric plasma during the day is solar radiation. The variation of radiation intensity that enters into a local medium directly affects the photo-ionization rate. Consequently, the changes in the concentration of certain types of particles vary the rate of electron loss processes.

The plasma characteristics have an influence on the electromagnetic wave propagation through it. The very low frequency (VLF) waves, emitted from the Earth's surface, are reflected from the low ionosphere at altitudes which primarily depend on the free electron concentration. For this reason, the analysis of the signal amplitudes and phases can be used for the diagnostics of the

aforementioned atmospheric layers, and consequently, to study the affects of different perturbers on the plasma in this area.

In this work, the analysis of the solar flares affect to the D-region is presented. The data characterizing the VLF signals, emitted by transmitters around the world, are recorded by the AWESOME (Atmospheric Weather Electromagnetic System for Observation Modeling and Education) VLF receiver located in the Institute of Physics in Belgrade. The study includes an analysis of the influence of parts of the solar radiation spectrum and the use of the data recorded on satellites, calculation of the electron concentration and the estimate of effective coefficient that relates to the electron loss process.

In the calculation LWPC (Long-Wave Propagation Capability) computer program (Ferguson, 1998) is used for the relevant comparisons of amplitude and phase changes with recorded data and, further more, for calculations of time and height distributions of electron concentrations, and characteristics of electron gain and loss processes (Nina et al. 2011a, Nina et al. 2011b).

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Contributed paper

ON THE COMPOSITE NATURE OF THE GALAXY NGC 5929

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The galaxy NGC 5929 is a member of the double system NGC 5929/5930. The two objects are at a distance of 0'.5 from each other. They figure under No. 90 in the Arp Catalogue of Peculiar Galaxies, and Zwicky mentioned them as compact objects (I Zw 112). Karachentsev included them under No. 466 in his catalogue of isolated double galaxies. Huchra et al. (1982) classified it as SyG type2. CCD spectra of the nucleus of the galaxy NGC 5929 for two different emission line regions obtained January 2012 with 1.93-m OHP telescope (M.D.) and covered spectral interval from $\lambda 3650$ to $\lambda 7300$ Å are analysed. Dual emission line regions, reported from other authors too, are revised. A lot of emission lines as H α , H β , H γ , $\lambda 6300$, $\lambda 6363$ [OI], $\lambda 3727$ [OII], $\lambda 4959$, $\lambda 5007$ [OIII], $\lambda 6717$, $\lambda 6731$ [S II], $\lambda 6548$, $\lambda 6584$ [N H], $\lambda 6312$ [SIII], etc. and several absorption lines have been identified. The $\lambda 5199$ [N I] line is faintly visible, as well as the Fraunhofer absorption feature b, representing the neutral magnesium line $\lambda 5175$ Mg I. The components found in the line profiles of the NGC 5929 nucleus by other authors too can be interpreted as evidence for radial motion of gaseous masses at speeds of 200-300 km/sec. The physical parameters of the nucleus are estimated. The relative abundance of several ions is evaluated. For the emission-line spectrum to result from shock heating of the gas is inconsistent with the observational evidence. The discovery of kinematic shock signatures associated with a localized radio jet interaction in the merging Seyfert galaxy NGC 5929 (Rosario et al., 2010) and their interpretation the relative prominence of shocks to the high density of gas in nuclear environment as other models are briefly discussed.

Contributed paper

**ASTROPHYSICAL SPECTROSCOPY OF EXTRAGALACTIC
OBJECTS: INVESTIGATION AT ASTRONOMICAL
OBSERVATORY (2010 – 2011)**

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The project “Astrophysical spectroscopy of extragalactic objects” started in 2001, and after ten years the project gave a significant results in the investigation of active galactic nuclei (AGNs) and gravitational lenses. Here we will present some results obtained in last two years (2010-2011) and also give a short overview of activity on the project in past ten years.

Contributed paper

BAR PARAMETERS IN SEYFERT AND INACTIVE GALAXIES

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We present bar parameters and their correlation with the corresponding host galaxy properties for selected Seyfert galaxies and a matched sample of inactive galaxies.

Contributed paper

**THE MANIFESTATIONS OF THE NON- SYMMETRIC
ION –ATOM ABSORPTION PROCESSES IN THE SOLAR
ATMOSPHERES IN UV AND VUV REGION**

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In this work we draw attention to the radiative processes in strongly non-symmetric ion-atom collisions as factors of influence on the opacity of the solar atmosphere in UV and VUV region. For several ion-atom systems, $\text{He}+\text{H}^+$ and $\text{H}+\text{A}^+$, where A is the atom of one of the metal (Mg, Si, Al etc), some characteristics have been determined, such as molecular potential curves and dipole matrix elements. Here the non-symmetric radiative processes are considered under the conditions characterizing the non-LTE standard model of the solar atmosphere. In this work the calculations of the corresponding spectral absorption coefficients have been performed. It is shown that the examined processes generate rather wide and firm molecular absorption stripes in the UV and VUV regions, whose intensity is comparable and sometimes even larger than the intensity of known one's generated in the $\text{H}+\text{H}^+$ radiative collision processes. Due to all these reasons the processes have to be consistently included in standard models of the solar atmosphere.

Contributed paper

**DATA REDUCTION PIPELINE FOR DIGITIZATION OF
ASTRONOMICAL PHOTOGRAPHIC PLATES
III. WCS TRANSFORMATION AND PUBLISHING THE DATA IN
WFPDB**

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In the third paper from the series we present tools for completing the FITS headers adding World Coordinates System (WCS) transformation. We use the Astrometry.net helping software. This procedure is a final stage of preparing the FITS header transformation after the process of digitization of astronomical photographic plates using the VueScan software (Tsvetkov et al. 2012) According to the Virtual Observatory requirements the WFPDB data reduction pipeline completes the scanning procedure and prepares the FITS files standardized for the further photometric plate analyzes and data mining of the photographic plates surveys.

The publishing in the WFPDB of the output FITS data in the end of the scanning procedure is discussed.

References

Tsvetkov, M., Tsvetkova, K., Kirov, N.: 2012, Technology for scanning of astronomical photographic plates, *Serdica Journal of Computing*, in press.

Contributed paper

**HISTORICAL ASTRONOMICAL PROJECTS: KAPTEYN'S PLAN
OF SELECTED AREAS IN ASTROPHYSICAL OBSERVATORY IN
POTSDAM**

Katya Tsvetkova

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The history, development and achievements of the international astronomical project known as Kapteyn's Plan of Selected Areas are presented. The archiving of the stored photographic plates obtained in the frames of this project in Astrophysical Observatory of Potsdam is a topic of the bilateral cooperation between Institute of Astronomy of the Bulgarian Academy of Sciences and Leibniz Institute for Astrophysics Potsdam granted by the German Research Foundation. The results from the plate inventory and analysis of the assembled catalogues are presented.

Contributed paper

DATA REDUCTION PIPELINE FOR DIGITIZATION OF ASTRONOMICAL PHOTOGRAPHIC PLATES I. WFPDB METADATA FORMAT PREPARATION

Katya Tsvetkova¹, Milcho Tsvetkov², Nikolay Kirov³

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²*Institute of Astronomy and NAO, Bulgarian Academy of Sciences*

³*Informatics Department, New Bulgarian University*

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In a series of 3 papers we present tools for helping the process of digitization of astronomical photographic plates. This is the first paper considering the preparation of plate metadata. In order to index and make as much as possible informative search and plate selection, the Wide-Field Plate Database (WFPDB, <http://www.wfpdb.org>, Tsvetkov 2006, Tsvetkova and Tsvetkov 2006, 2008) requires well-formatted plate metadata and data reduction pipeline. We present an overview of the accepted formats as standards for plate/archive description, the used software for data reduction applied to original plate catalogues, as well as the work of making the existed logbooks accessible online.

References

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- Tsvetkova, K. and Tsvetkov, M.: 2008, VizieR Online Data Catalog: VI/126, 10/2008.

Contributed paper

GENERATION AND DEVELOPMENT OF THE DISK CORONA

Krasimira D. Yankova

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This paper considers the magneto-hydrodynamics of the advective accretion disk and its corona. The aim is to build an adequate addition to the disk evolution model, which treats the mechanisms of self-structuring in the system disk-corona. Discussed generation the corona as a result influences of the distribution of entropy and the development of advection in disc, over energetic (for individual components or total) of the system.

POSTERS

Poster

3D NUMERICAL ANALYSIS AND STRUCTURES FORMATION IN ACCRETING WHITE DWARFS

Daniela Boneva¹, Lachezar Filipov²

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The majority of accreting white dwarfs are dynamically bounded with a companion in a binary star configuration. We aim to examine structure's properties of the flow in accreting zone, surrounding the white dwarf star. We consider a gas-dynamical system that allows 3D modeling of physical processes in the close components. Multi-physics, multi-algorithm, adaptive numerical codes are applied. The codes are both suitable for time-dependent, explicit computations and imply a hydrodynamical module in their architectures. The results reveal the character and dynamics of interaction in the binary star's flow. It is suggested a pattern distribution model through the whole disc's structure.

Poster

INHOMOGENEOUS BARYOGENESIS MODEL AND ANTIMATTER IN THE UNIVERSE

Daniela Kirilova, Mariana Panayotova

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Cosmic ray and gamma-ray data at present do not rule out antimatter domains in the Universe, separated at distances bigger than 20 Mpc from us. Hence, it is interesting to explore the possible generation of vast antimatter structures during the early Universe evolution.

We present an inhomogeneous baryogenesis model, based on a SUSY baryogenesis scenario (Affleck, Dine 1985, Kirilova, Chizhov 2000, Dolgov, Kirilova 1991). We have numerically followed the evolution of the baryon charge carrying field and the baryon charge of the Universe from the inflationary stage till the baryon asymmetry formation. We have accounted for the particle creation processes that were shown to play an essential role for the correct determination of

the final value of the baryon asymmetry, generated in these baryogenesis scenarios (Kirilova, Panayotova 2007). The initial values of the field, corresponding to a natural monotonic distribution which due to the unharmonicity of the potential, soon transfers into quasiperiodic distribution. Thus the region which initially was characterized with its baryon excess splits into regions with baryon excess and such of baryon underdensities.

We have shown that for a natural range of the model's parameters this model is able to provide a successful baryogenesis, i.e. to explain the value of the locally observed matter-antimatter asymmetry and also to predict astronomically interesting vast antimatter domains, separated from the matter ones by baryonically empty voids. The antimatter domains can be interpreted as antigalaxies, groups of antigalaxies and clusters of antigalaxies (Kirilova, Panayotova, Valchanov 2002, Kirilova 2003).

References

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Dolgov, A., Kirilova, D.: 1991, *J. Moscow Phys. Soc.*, **1**, 217.
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STARK BROADENING OF C II SPECTRAL LINES

Neila Larbi-Terzi¹, Sylvie Sahal-Bréchet², Nebil Ben Nessib¹,
Milan S. Dimitrijević^{2,3}

¹*Groupe de Recherche en Physique Atomique et Astrophysique, Institut National des Sciences Appliquées et de Technologie, University of Carthage, Centre Urbain Nord B. P. No. 676, 1080 Tunis Cedex, Tunisia*

²*Paris Observatory, CNRS-UMR8112 and University Pierre et Marie Curie, LERMA, 5 Place Jules Janssen, 92190 Meudon, France*

³*Astronomical Observatory, Volgina 7, 11060 Belgrade, Serbia*
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Using semiclassical perturbation approach in the impact approximation, we have obtained Stark broadening parameters (full width at half maximum and shift) for 148 CII multiplets. Energy levels and oscillator strengths are taken from the TOPBASE database. Results are presented for temperatures of 5000 K, 10 000 K, 20 000 K, 30 000 K and 50 000 K, for perturber densities of 10^{14} - 10^{18} cm^{-3} . In addition to electron-impact full halfwidths and shifts, Stark broadening parameters due to singly ionized carbon-impacts have been calculated. Thus, we have provided Stark broadening data for the important charged perturbers in the atmospheres of carbon white dwarfs.

We made a comparison between our theoretical electron impact widths and available experimental ones. Also, we investigated the influence of the choice of oscillator strengths on the results of calculations on the example of 3s-np and 3d-nf series. In order to do this, we repeated the calculations for the line widths within these series, with oscillator strengths calculated within the Coulomb approximation. Additionally, we investigated the systematic trends of Stark widths in angular frequency units, within 3s-np and 3d-nf series. Our results will be published elsewhere (Larbi-Terzi et al., 2012) and here, only a part of results will be shown.

References

Larbi-Terzi, N., Sahal-Bréchet, S., Ben Nessib, N., Dimitrijević, M. S.: 2012, *MNRAS*, in press.

Poster

THE DIGITAL ARCHIVE OF PROFESSOR MARIN KALINKOV - STRUCTURE AND CONTENT

Petko Nedialkov¹, Sunay Ibryamov²

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We present a short description of the most interesting part of the archive of professor Marin Kalinkov – a legacy left only a few months before his passing away in 2005. We have prepared a digitized version and construct a chronograph for all dated archive units.

Poster

STAR CLUSTERS IN THE LARGE MAGELLANIC CLOUD

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In this contribution we present our investigation of a sample of Large Magellanic Cloud star clusters. This galaxy is the closest neighbour to the Milky Way. The LMC cluster system comprises a large number of young and intermediate-age clusters. In our sample the cluster ages vary from 6 Myr to 13.5 Gyr. We construct the radial profiles of the clusters, derive structural parameters and study the distribution of the stars within the clusters.

ON THE KINEMATICS OF STARS FROM THE SOLAR NEIGHBOURHOOD – CASES OF THE TWO DISC COMPONENTS

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The kinematics of stars from the Solar neighbourhood which belong to either of the two discs – thin or thick - is modelled following particular Gaussian distributions of their random velocities. As the mean motion in both cases rotation (circular motion of the centroid) is admitted. Assuming a given value for the galactocentric speed of Local Standard of Rest (LSR) it is possible to model the same samples in their motion with respect to LSR. Here for each sample (each of the discs) one has five parameters: three velocity dispersions, rotation speed and LSR speed. Varying these parameters we find the fractions of stars, members of either disc, which occupy a given volume in the velocity subspace centred on the LSR. Given volumes in the velocity subspace are organised in the following way: a sphere of a sufficiently small radius around LSR, an internal envelope with finite outer radius and an outer envelope with infinitely large outer radius. A small volume is of special interest since, within it, the stars belonging to the thin disc are expected to dominate. On the other hand within other volumes the situation becomes different due to increasing of fractions of both thick disc and halo.

THE WIDE-FIELD PLATE COLLECTION OF THE 2-m RCC TELESCOPE OF THE ROZHEN NATIONAL ASTRONOMICAL OBSERVATORY

Milcho Tsvetkov¹, Nikola Petrov¹, Asya Tzvetkova¹
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In this paper we present the last developments of the incorporation in the WFPDB (Tsvetkov 2006) of the updated catalogue of the wide-field photographic plate observations of the 2m Ritchey-Chrétien-Coude telescope of the Rozhen National Astronomical Observatory of the Institute of Astronomy, Bulgarian Academy of Sciences. We describe the complete plate catalogue containing 2100 wide-field plates with plate size mainly: 30x30cm (Stavrev and Barzova, 1994, Tsvetkova et al. 2010), as well as the digitized original logbooks.

The process of digitization of the astronomical photographic plate collection of Rozhen Observatory is also presented. Up to the moment 1200 plates taken with the 2m RCC telescope are digitized (Tsvetkov 2010, Petrov et al. 2012). The work is supported by the Bulgarian National Science Fund Grants DO-02/273-275 of the MONM.

References

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- Stavrev, K. Y. and Barzova, I. S.: 1994, Direct-Photography Observations with the 2 m RCC Telescope at NAO- Rozhen: Catalogue of Plates and Archive-Data Analysis in Proc. of IAU Symp. 161 "Astronomy from Wide-Field Imaging", eds. H. T. MacGillivray et al. (Dordrecht: Kluwer Acad. Publ.), p.371.
- Tsvetkova, Katya; Tsvetkov, Milcho; Dimitrijević, Milan S.; Protić-Benišek, Vojislava; Benišek, Vladimir; Jevremović, Darko: 2010, Wide-field plate archives in Rozhen and Belgrade observatories, *Memorie della Societa Astronomica Italiana Supplement*, **15**, 192.

Nikola Petrov, Asia Tzvetkova and Milcho Tsvetkov: 2012, Digitizing of the Astronomical Photo Plates in the National Astronomical Observatory Rozhen, Proceedings of the VII Bulgarian-Serbian Astronomical Conference (VII BSAC), Chepelare, Bulgaria, June 1-4, 2010, eds. M. K. Tsvetkov, M. S. Dimitrijević, K. Tsvetkova, O. Kounchev, Ž. Mijajlović. *Publ. Astron. Soc. "Rudjer Bošković"* No 11, (ppt presentation:

http://wfpdb.org/ftp/7_BSAC/presentations/2_Nicola_Petrov.ppt)

Milcho Tsvetkov: 2009, Wide-Field Plate Database: Development and access via internet in the period January 2009 - June 2010, (ibid) http://wfpdb.org/ftp/7_BSAC/pdfs/i02.pdf

Poster

THE UPDATED 50/70/172 cm SCHMIDT TELESCOPE PLATE CATALOGUE OF ROZHEN OBSERVATORY

**Katya Tsvetkova¹, Milcho Tsvetkov², Nikolay Kirov³ and
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We present the updated 50/70/172 cm Schmidt telescope plate catalogue of Rozhen Observatory. The added information about more than 500 plates concerns the observations made after the preparation of the first version of the Rozhen Schmidt telescope plate catalogue (Mutafov et al. 1994), i.e. the period February 1994 to February 1998. The re-analysis of the updated plate catalogue changes the results given in Tsvetkova et al. (2010) and Tsvetkov (2010) made of the basis of data retrieval from the Wide-Field Plate Database (<http://www.wfpdb.org>) for 7348 plates obtained in the period 1979-1994.

References

Mutafov, A., Ilcheva, P., Kusheva, M., Michailov, M., Borisov, Z. and Lazarov, N.: 1994, in Astronomy from wide-field imaging, Proceedings of the IAU Symposium 161, eds. H. T. MacGillivray, E. B. Thomson, B. M. Lasker, I. N. Reid, D. F. Malin, R. M. West and H. Lorenz, Kluwer Academic Publishers, Dordrecht, p.377.

Tsvetkova, K. Tsvetkov, M., Dimitrijević, M., Protić-Benišek, V., Benišek, V., Jevremović, D.: 2010, *Memorie della Societa Astronomica Italiana Supplement*, **15**, 192.

Milcho Tsvetkov, Wide-Field Plate Database: Development and access via internet in the period January 2009 - June 2010, Proceedings of the VII Bulgarian-Serbian Astronomical Conference (VII BSAC), Chepelare, Bulgaria, June 1-4, 2010, eds. M. K. Tsvetkov, M. S. Dimitrijević, K. Tsvetkova, O. Kounchev, Ž. Mijajlović. *Publ. Astron. Soc. "Rudjer Bošković"* No **11**, p. 25-40, 2012, http://wfpdb.org/ftp/7_BSAC/pdfs/i02.pdf

Poster

WIDE-FIELD STELLAR PHOTOMETRY WITH THE SCHMIDT TELESCOPE OF THE NAO ROZHEN

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We used observations obtained with 50/70-cm Schmidt telescope of NAO Rozhen on different nights and in different time in order to study the scale factor and the FWHM, the ellipticity and the orientation of the stellar image as a function of its position on the selected images.

LANGMUIR WAVES ASSOCIATED WITH TYPE III BURSTS AND IMPULSIVE ELECTRON EVENTS

**Sonja Vidojević^{1,2}, Arnaud Zaslavsky¹, Milan Maksimović¹, Milan Dražić²,
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Radio observations of the waves, starting from 1994 to 2010, in a range of 4 - 256 kHz from the WAVES experiment onboard the WIND spacecraft have been statistically analyzed. A subset of 36 events, with Langmuir waves (LW) and type III bursts occurring at the same time, has been selected. After background has been removed, the remaining power spectral density has been modeled by Pearson's system of probability distributions (type I, type IV and type VI). This is in contradiction with the Stochastic Growth Theory which predicts a log-normal distribution for the power spectral density of the LW. To examine a possible instrumental influence on the measured distributions of the LW, we simulated LW as simple wave packets with few different amplitude distributions and different rates of wave packets in 1 s. The simulations demonstrated that nothing can be stated on the initial amplitude distributions when one uses spectral data such as Thermal Noise Receiver on WIND. Finally, a relation between the power of LW, the energy and the flux of the electrons (3DP instrument on WIND) in the impulsive electron events corresponding to the occurrence of the LW has been analyzed. We have found the strong power-law dependence between flux and energy of the electrons (power-law index equals 2.47 ± 0.06). We have also found a dependence of the LW as a function of the electron beam energy that we will discuss.

VIII SERBIAN-BULGARIAN ASTRONOMICAL CONFERENCE

Leskovac, Hotel Hajat, 8-12 May 2012

PROGRAM

8 May 2012, Tuesday

19:00 WELCOM COKTAIL

9 May 2012, Wednesday

14:00-14:30 Opening Ceremony

ASTROINFORMATICS I

Chairman: Žarko Mijajlović

14:30-15:00 **Darko Jevremović**, Željko Ivezić, Milan S. Dimitrijević, Luka Č. Popović, Predrag Jovanović, Dejan Urošević, Zoran Knežević: SERBIAN ASTRONOMY AND LSST (IL)

15:00-15:30 **Milcho Tsvetkov**: PROGRESS REPORT OF THE PROJECT DO-02-273 “WIDE-FIELD PLATE DATABASE: DEVELOPMENT AND INTERNET ACCESS” - 2010-2012 (IL)

15:30-16:00 **Milan S. Dimitrijević**, Sylvie Sahal-Bréchet, Darko Jevremović, Andjelka Kovačević, Veljko Vujičić, Luka Č. Popović, VAMDC consortium (P.I. Marie-Lise Dubernet): VIRTUAL ATOMIC AND MOLECULAR DATA CENTER AND STARK-B DATABASE 2010-2012 (IL)

16:00-16:10 Katya Tsvetkova, Milcho Tsvetkov, Nikolay Kirov: DATA REDUCTION PIPELINE FOR DIGITIZATION OF ASTRONOMICAL PHOTOGRAPHIC PLATES I. WFPDB METADATA FORMAT REPARATION

16:10-16:20 Nikolay Kirov, Milcho Tsvetkov, Katya Tsvetkova: DATA REDUCTION PIPELINE FOR DIGITIZATION OF ASTRONOMICAL PHOTOGRAPHIC PLATES II. PLATE DIGITIZATION SOFTWARE AND FITS FORMAT REQUIREMENTS

16:20-16:30 Milcho Tsvetkov, Nikolay Kirov, Katya Tsvetkova: DATA
REDUCTION PIPELINE FOR DIGITIZATION OF ASTRONOMICAL
PHOTOGRAPHIC PLATES
III. WCS TRANSFORMATION AND PUBLISHING THE DATA IN WFPDB

16:30-17:00 Coffee break

ASTROINFORMATICS II

Chairman: Milcho Tsvetkov

17:00-17:30 **Georgi T. Petrov**: LINUX ASTRONOMICAL SOFTWARE (IL)

17:30-17:50 **Ognyan Kounchev**, Damyan Kalaglarsky: THE METHOD OF
COMPRESSIVE SENSING APPLIED TO ASTRONOMICAL IMAGES (IL)

17:50-18:05 Darko Jevremović, Milan S. Dimitrijević, Veljko Vujičić, Luka Č.
Popović, Vojislava Protić Benišek, Vladimir Benišek, Jovan Aleksić, Andjelka
Kovačević, Milcho Tsvetkov, Katya Tsvetkova, Zoran Simić, Miodrag Malović:
SERBIAN VIRTUAL OBSERVATORY 2010-2012 AND ITS CONNECTIONS
WITH VIRTUAL ATOMIC AND MOLECULAR DATA CENTER (VAMDC)

18:05-18:20 E. Atanasov, Momchil Dechev, Georgi T. Petrov, A. Karaivanova,
T. Gurov, M. Durchova: HPC CLUSTER WITH GPGPU CAPABILITIES.
PERFORMANCE AND FEATURES EVALUATION

18:20-18:30 Katya Tsvetkova: HISTORICAL ASTRONOMICAL PROJECTS:
KAPTEYN'S PLAN OF SELECTED AREAS IN ASTROPHYSICAL
OBSERVATORY IN POTSDAM

18:30-18:40 Dimo Dimov, Milan S. Dimitrijević: IMAGE PROCESSING
SUGGESTIONS TO IMPROVE THE ASTRONOMICAL MULTIEXPOSURE
WIDE PLATES METHOD

18:40-18:50 Žarko Mijajlović, Aleksandar Simonović, Nadežda Pejović: A
METHOD FOR ENHANCED IMAGE PROCESSING AND SEARCH FOR
VARIABLE STARS

18:50-19:00 Vasil Kolev: SOME CHARACTERISTICS AT ASTRONOMICAL
IMAGE ANALYSIS FROM SCANNED PHOTOGRAPHIC PLATES

10 May 2012 Thursday

9:00 EXCURSION

11 May 2012 Friday

ASTROPHYSICS I

Chairman: Milan S. Dimitrijević

9:00-9:30 **Rositsa Miteva**, Karl-Ludwig Klein: THE LINK BETWEEN ENERGETIC PARTICLES AND ERUPTIVE PHENOMENA IN THE SOLAR CORONA: STATISTICAL STUDY IN SOLAR CYCLE 23 (IL)

9:30-10:00 **Jelena Kovačević**, Luka Č. Popović, Milan S. Dimitrijević: CORRELATIONS BETWEEN SPECTRAL PROPERTIES IN AGN TYPE 1 (IL)

10:00-10:15 Yavor Chapanov: 4-PARAMETER TRANSFORMATION OF DIGITIZED ASTRONOMICAL IMAGES

10:15-10:30 Momchil Dechev, K. Koleva, M. S. Madjarska, P. Duchlev, C. J. Schrijver, J.-C. Vial, E. Buchlin: KINEMATICS OF A LOOP-LIKE ERUPTIVE PROMINENCE AS OBSERVED BY AIA/SDO.

10:30-10:45 Milan S. Dimitrijević: INVESTIGATIONS OF THE INFLUENCE OF COLLISIONAL PROCESSES ON THE ASTROPHYSICAL PLASMA SPECTRA 2010-2011

10:45-11:00 Georgi T. Petrov, Michelle Dennefeld: ON THE COMPOSITE NATURE OF THE GALAXY NGC 5929

11:00-11:30 Coffee Break

ASTROMETRY AND CELESTIAL MECHANICS

Chairman: Ognyan Kounchev

11:30-12:00 Jan Vondrák: LONG TERM PRECESSION MODEL (IL)

12:00-12:15 Zorica Cvetković, Goran Damljanović, Rade Pavlović: MORE ACCURATE FOCAL LENGTH DETERMINATION FOR THE ROZHEN 2-m TELESCOPE

12:15-12:30 Ivana S. Milić, Goran Damljanović: OBSERVATIONS OF ERS FROM ICRF2 LIST USING ASV 60-cm AND ROZHEN 2-m TELESCOPES

12:30-12:45 Vojislava Protić-Benišek: AFTER FORTY YEARS AT THE BELGRADE OBSERVATORY: HIGHLIGHTS IN KINEMATICS AND DYNAMICS OF SOLAR SYSTEM BODIES

12:45-13:00 Svetlana Boeva, R. Zamanov, Rumen Bachev, S. Tsvetkova, Kiril Stoyanov, Georgi Latev, B. Spasov: FLICKERING AMPLITUDE FOR CATAclysmic AND SYMBIOTIC VARIABLES

13:00-15:00 Lunch Break

ASTROPHYSICS II

Chairman Petko Nedyalkov

15:00-15:15 Ilian Iliev, Ivanka Stateva, Jan Budaj: DO THE TIDES CONTROL ELEMENTAL ABUNDANCES IN STELLAR ATMOSPHERES OF A-TYPE STARS?

15:15-15:30 Sava Donkov, Orlin Stanchev, Todor Veltchev: MODELING OF MOLECULAR CLOUDS WITH FORMATION OF PRESTELLAR CORES

15:30-15:45 Peter Duchlev, Kostadinka Koleva, Momchil Dechev, N. Petrov: DYNAMICS OF AN ERUPTIVE PROMINENCE OBSERVED WITH THE H-ALPHA CORONAGRAPH AT NAO-ROZHEN ON 22 AUGUST 2006

15:45-16:00 Lyubomir Iliev: TRANSITIONAL EVENTS IN THE CIRCUMSTELLAR ENVIRONMENT OF THE Be/SHELL STAR BU Tau

16:00-16:15 Vladimir A. Srećković, Anatolij A. Mihajlov, Ljubinko M. Ignjatović, Milan S. Dimitrijević, Aristophanes Metropoulos: THE MANIFESTATIONS OF THE NON-SYMMETRIC ION-ATOM ABSORPTION PROCESSES IN THE SOLAR ATMOSPHERES IN UV AND VUV REGION

16:15-16:30 Daniela Kirilova: THE EXCESS RELATIVISTIC DENSITY IN THE UNIVERSE AND ITS EXPLANATIONS

16:30-16:45 Plamen Nikolov, Tanyu Bonev, Peter Duchlev, Pavel Rudawy, Bogdan Rompolt, Nikola Petrov: FINE STRUCTURE OSCILLATIONS OF A QUIESCENT PROMINENCE

16:45-17:00 Luka Ćirić, Dušan Ćirić: RELATIVE EXISTENCE OF PHYSICAL OBJECTS

17:00-17:30 Coffee break

ASTROPHYSICS III

Chairman Jan Vondrák

17:30-17:45 Lyuba Slavcheva-Mihova: BAR PARAMETERS IN SEYFERT AND INACTIVE GALAXIES

17:45-18:00 Milica M. Andjelić, Bojan Arbutina, Dejan Urošević, Aleksandra Dobradžić, Milan Z. Pavlović: OBSERVATIONS OF GALAXY IC342 IN NARROW BAND [SII] AND H α FILTERS

18:00-18:15 Krasimira Yankova: GENERATION AND DEVELOPMENT OF THE DISK CORONA

18:15-18:30 Luka Č. Popović: ASTROPHYSICAL SPECTROSCOPY OF EXTRAGALACTIC OBJECTS: INVESTIGATION AT ASTRONOMICAL OBSERVATORY (2010 – 2011)

19:30 CONFERENCE DINNER

12 May 2012 Saturday

Chairman: Dušan Ćirić

10:30-10:45 Jovan Aleksić, Milan Jevtović: SERBIAN-BULGARIAN
COOPERATION IN AMATEUR ASTRONOMY

10:45-11:00 Milan S. Dimitrijević: SOCIETY OF ASTRONOMERS OF SERBIA
2008-2012

11:00-11:15 Milan S. Dimitrijević: TEN YEARS OF THE “YUGOSLAVIA”
BRANCH OF THE INTERNATIONAL ASTRONOMICAL INSTITUTE
“ISAAC NEWTON” OF CHILE AND OF SCIENTIFIC SOCIETY “ISAAC
NEWTON”

11:15-11:30 Aleksandra Nina: PERTURBATIONS OF THE TERRESTRIAL
LOW IONOSPHERE CAUSED BY SOLAR FLARES

11:30-11:40 Vlado Milićević: BRANISLAV MILOVANOVIĆ ABOUT
MILANKOVIĆ CYCLE OF INSOLATION

11:40-12:30 POSTER PRESENTATION 5 minutes per poster

12:30 CLOSING CEREMONY

POSTERS

Vladimir Benišek: ASTEROIDS AND EXOPLANETS – REVIEW OF CCD
PHOTOMETRIC RESULTS OBTAINED DURING THE PERIOD 2008-2011

Daniela Boneva, Lachezar Filipov: 3D NUMERICAL ANALYSIS AND
STRUCTURES FORMATION IN ACCRETING WHITE DWARFS

Milan S. Dimitrijević, Magdalena Christova, Zoran Simić, Andjelka Kovačević,
Sylvie Sahal-Bréchet: STARK BROADENING OF B IV LINES

Daniela Kirilova, Mariana Panayotova: AN INHOMOGENEOUS
BARYOGENESIS MODEL AND ANTIMATTER IN THE UNIVERSE

Neila Larbi-Terzi, Sylvie Sahal-Bréchet, Nebil Ben Nessib, Milan S. Dimitrijević:
STARK BROADENING OF C II SPECTRAL LINES

Petko Nedialkov, Sunay Ibryamov: THE DIGITAL ARCHIVE OF PROFESSOR
MARIN KALINKOV - STRUCTURE AND CONTENT

Grigor B. Nikolov, Maria Kontizas, Anastasios Dapergolas, Maya K. Belcheva ,
Valery K. Golev , Ioannis Bellas-Velidis: STAR CLUSTERS IN THE LARGE
MAGELLANIC CLOUD

Slobodan Ninković, Milan Stojanović, Zorica Cvetković: THE KINEMATICS OF
STARS FROM THE SOLAR NEIGHBOURHOOD - CASES OF THE TWO
DISC COMPONENTS

Milcho Tsvetkov, Nikola Petrov, Asya Tzvetkova, Katya Tsvetkova: THE WIDE-
FIELD PLATAŃ COLLECTION OF THE 2-m RCC TELESCOPE OF THE
ROZHEN NATIONAL ASTRONOMICAL OBSERVATORY

Katya Tsvetkova, Milcho Tsvetkov, Nikolay Kirov, Damyan Kalaglarsky: THE
UPDATED 50/70/172 CM SCHMIDT TELESCOPE PLATE CATALOGUE OF
ROZHEN OBSERVATORY

Antonia Valcheva, Evgeni Ovcharov, Petko Nedialkov: WIDE-FIELD STELLAR
PHOTOMETRY WITH THE SCHMIDT TELESCOPE OF THE NAO ROZHEN

Sonja Vidojević, Arnaud Zaslavsky, Milan Maksimović, Milan Dražić,
Olga Atanacković: LANGMUIR WAVES ASSOCIATED WITH TYPE III
BURSTS AND IMPULSIVE ELECTRON EVENTS

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