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SUMMARY OF THE IX BULGARIAN-SERBIAN ASTRONOMICAL CONFERENCE: ASTROINFORMATICS

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Abstract. We present a summary of the IX Bulgarian-Serbian Astronomical Conference: Astroinformatics (IX BSAC: Astroinformatics), held in Sofia in July 2014 (http://www.wfpdb.org/ftp/9_BSACA/), as well as our view on achieving the goal of these regular conferences started in 1998. We discuss the basic scientific directions and prospects of the Bulgarian-Serbian collaboration in Astronomy and Astroinformatics.

1. INTRODUCTION

The regular Bulgarian-Serbian/Serbian-Bulgarian astronomical conferences have been started in Belogradchik (Bulgaria) since August 1998. A brief overview of the goals, which these conferences have intended, includes:

- Increasing the visibility of the Bulgarian and respectively Serbian astronomical achievements;
- Effective use of the existing and future planned facilities and data sets in both countries;
- Enlarging the topics of the joint cooperation and experience exchange;
- Revealing the place and role of the Bulgarian and Serbian astronomy into international projects, and the strategy in development of a given project;
- Giving possibility of young scientists to present their work in the native language.

The regular biennial conferencesthat followed in the period 1998 - 2014 enabled to refocus the main topic - the last threeconferences have been dedicated to Astroinformatics – in accordance with the existing trend in Astronomy – to develop from empirical one to theoretical, from computational one to data extraction and e-Science.

2. THE CONFERENCE ORGANIZATION

The IX BSAC: Astroinformaticswas held in the period2-4 July 2014 in Sofia, in the Institute of Mathematics and Informatics of the Bulgarian Academy of Sciences (IMI-BAS) under the auspices ofBAS and Ministry of Education, Science and Technological Development of Serbia. The organizers were IMI-BAS and the Astronomical Observatory Belgrade (AOB) with co-organizers the Institute of Astronomy and National Astronomical Observatory (IA and NAO) of BAS, the Department of Astronomy of the Faculty of Physics of Sofia University (DAFPSU), the Department of Astronomy of Faculty of Mathematics to the Belgrade University (DAFMBU), as well as the Society of Astronomers of Serbia.

The Scientific Organizing Committee (SOC) was chaired by Ognyan Kounchev (IMI-BAS) and Darko Jevremovic (AOB). The SOC included also Milan S. Dimitrijevic (AOB), Milcho Tsvetkov (IA and NAO, and IMI-BAS), Luka Popovic (AOB), Zoran Simic (AOB), Žarko Mijajlovic (Mathematical Faculty, Belgrade University), Katya Tsvetkova (IMI-BAS), Vasil Popov (IA and NAO, BAS), Nikola Petrov (IA and NAO, BAS), Petko Nedialkov (DAFPSU). The Local Organizing Committee (LOC) included Ognyan Kounchev (Co-chairman) from IMI-BAS, Milcho Tsvetkov (Co-chairman) from IA and NAO and IMI-BAS, Viktoria Naumova (Secretary) from IMI-BAS, and the members Anna Sameva (IMI-BAS), Katya Tsvetkova (IMI-BAS), Svetlana Boeva (IA and NAO, BAS), Momchil Dechev (IA and NAO, BAS), Damyan Kalaglarsky (IMI-BAS).

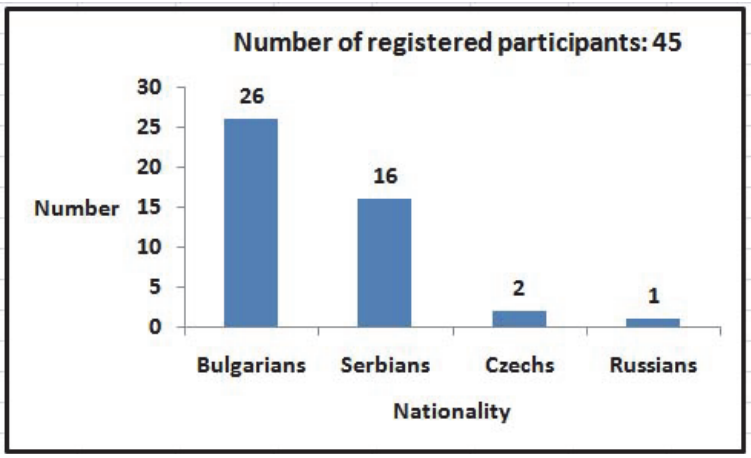

Figure 1: Distribution of the registered participants by nationality.

The total number of the registered participants was 45. The distribution of the registered participants by nationality is shown in Fig. 1.The youngest participant was 25 years old.

The official languages of the conference were announced to be English, Bulgarian and Serbian in the spirit and tradition of these conferences. But according to the distribution of the spoken languages presented in Fig. 2 from 30 oral presentations – invited lectures and contributed talks, only 6 or 20% of all were not in English. All 7 posters were presented in English. It deserves to mention two facts – the young astronomers for whom it had been supposed to use their native language spoke English; the astronomers who wanted to keep the tradition speaking Bulgarian or respectively Serbian had to overcome the inertia to speak English at other conferences.

3. BRIEF OVERVIEW OF THE SCIENTIFIC TOPICS

The main topic of the IX BSAC: Astroinformatics was Astroinformatics and that is why 4 sessions were devoted to Astroinformatics, 4 sessions were devoted to Astrophysics and to poster presentation. All abstracts and presentations of the 16 invited lectures, 14 contributed talks and 7 posters can be downloaded from the website of the IX BSAC Astroinformatics (http://wfpdb.org/ftp/9_BSACA/ Programme.html).

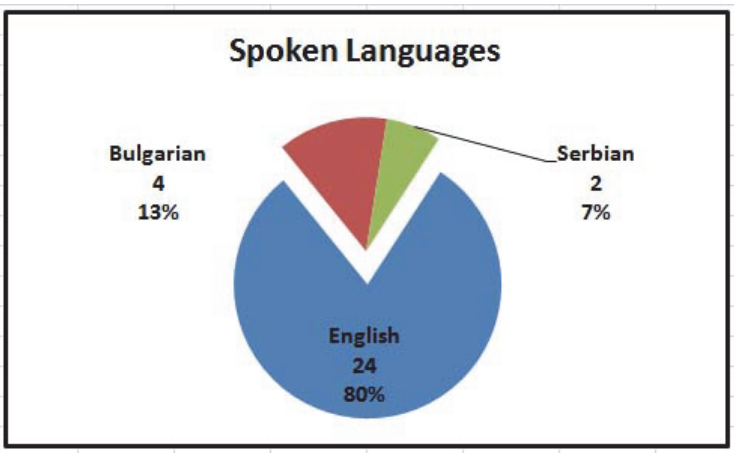

Figure 2: Distribution of the spoken languages in the IX BSACAstroinformatics.

As conference highlight in the sense of what is done can be considered the invited lectureof D. Jevremovic *Astroinformatics in Serbia* devoted to the **development of Astroinformatics in Serbia**, and expectations in connection with the Large Synoptic Survey Telescope (LSST) project in which the Serbian astronomers participate. The Serbian Virtual Observatory (SerVO, servo.aob.rs) concept was presented with the main goals now: digitization and publishing the

photographic plates from the collection of AOB and maintenance and development of the existed data bases. The STARK Bdatabase was presented by M. S. Dimitrijevic as invited lecture titled *Stark-B Database for Stark Broadening for Astrophysical Plasma Analysis and Modeling*, as well as in the contributed talks of Z. Simic et al. (*Atomic Data and Stark Broadening of Nb III)* and Z. Majlinger et al. (presented by Z. Simic) *On the Stark Broadening of Zr IV in the Spectra of DB White Dwarfs*). A special report of J. Aleksic was devoted to the Serbian contribution to the LSST project (*Alert Simulator - System for Simulating Detection of Transient Events on LSST*).

Such informative character also had the invited lecture of O. Kounchev, D. Jevremovic and D. Vinković who presented the **Cost Action TD1403 - Big Data in Sky and Earth Observations**, wherein some participants of this conference (D. Jevremovic, O. Kounchev, M. Tsvetkov, N. Kirov, J. Aleksic) were involved.

The work on the **development of Astroinformatics in Bulgaria** was presented by the invited lectures and contributed talks devoted to the main subject providing data – the Wide-Field Plate Database (WFPDB). Here can be referred the invited lecture *Wide-Field Plate Database: Software for Time and Coordinates Conversions* of N. Kirov et al. concerning the data reduction to the accepted standards, the invited lecture *Astroweb Astroinformatics Project and Comparisons of the Web-GIS Protocol Standards* of A. Kolev, contributed talks *WFPDB Upgrading Catalogue of Wide-Field Plate Archives* of D. Kalaglarsky et al. and S*ome Wavelet Processing for Scanned Astronomical Images* of V. Kolev. Here it has to be referred also the poster of O. Stanchev et al. titled *Extraction of Physical Quantities from Numerical Data Cubes by Use of the yt Package.*

The list of topics, separated according to the considered object of investigation, includes:

- **Variable stars in our Galaxy and in the Local Group of Galaxies** (invited lecture of A. Zubareva et al. *Variable Stars near B Cas Discovered on Scanned Photoplates at Sternberg Astronomical Institute*, contributed talk *UV Ceti Type Variable Stars Presented in the General Catalogue of Variable Stars* of K. Tsvetkova, and invited lecture *Structural Functions Analysis of Luminous Blue Variables in the Local Group* of G. Ganchev et al.;
- **Double stars** (contributed talk of Z. Cvetkovic et al.*Determination of Nature for Eleven Double Stars*, presented by S. Ninkovic);
- **Galaxies** – as M31 (invited lecture S*igns of Density Wave in M31 Galaxy: Luminosity, Age and Extinction Gradient across the Spiral Arm S4*of P. Nedjalkov et al., poster of N.Taneva et al. *A Search for Coherent Sites of Star Formation in M31 Galaxy*);
- **Active Galactic Nuclei** (invited lectures of D. Ilic *Use of Emission Lines Databases in AGN Research,* and A. Kovachevic *Time Series Analysis of AGNs*);
- **Quasi-Stellar Objects** (invited lecture of S. Simic et al. *Broad Spectral Line and Continuum Variabilities in QSO Spectra Induced by Microlensing: Methods of Computation*);

- **Supernova remnants** (invited lecture *Optical Detection of Supernova Remnants in the Nearby Galaxy IC342* of M. Vučetić et al. presented by D. Urošević);
- **Solar system bodies** (poster of V. Protic-Benishek et al. *Twenty Years of CCD Observations of Solar System Bodies from the Belgrade Astronomical Observatory*;
- **Solar Physics:** presented in the invited lecture *Multiwavelenght Observations of an Eruptive Prominence on 7 August 2010* of M. Dechev et al., and S. Vidojevic et al. *Simulations of an Instrumental Effect on Wind Observations,* as well as in the poster of Boris Komitov et al. *The Relation between Solar Proton Flares and the Background Concentrations of Nitric Oxides in the Troposphere*.

Theoretical Astrophysics was presented in the contributed talk of K. Yankova *Relationships in the System Corona-Disk*, as well as in the poster of D. Boneva *Fluctuations in the Flow and Development of Flare-ups in Compact Binary Stars*.

Astrometry was treated in the poster of G. Damljanović et al. *Observations at the 60 cm ASV Telescope and the Link Future Gaia CRF –ICRF*, presented the joint results of Serbian and Bulgarian astronomers. The invited lecture *Differences in Detection of D-Region Perturbations Induced by UV, X and Gamma Radiation from Outer Space Using VLF Signals* of A. Nina et al. treated an **interdisciplinary topic**. Two contributed talks were dedicated to the **legacy of famous astronomers** as MilutinMilanković (N. Pejović et al. *Milutin Milankovic Digital Legacy*) and Simon Marius (K. Tsvetkova et al. *The Mathematician and the Astronomer Simon Marius 1573 – 1624)*. The **activity of the society of astronomers of Serbia** was presented in the contributed talk of M. S. Dimitrijević *Society of Astronomers of Serbia, 2012-2014*. M. Christova presented through poster titled *On the Education in Physics and Astrophysics* her opinion about the present situation in the **education in Physics and Astrophysics**.

4. SCIENTIFIC COLLABORATIONS

Some of the presented reports and posters separated by different topics were done in the frames of certain bilateral cooperation and contain the results of them. Here we list such running projects showing the new ideas of the bilateral cooperation, enlarging the topics of the joint cooperation and experience exchange, effective usage of the technical potential - existing facilities and data sets in both countries, as well as prospects and future planned facilities.

4.1. BILATERAL ASTRONOMICAL COOPERATIONS

There are 4 running projects: ***Astroinformatics: way to future astronomy*** (IMI-BAS and AOB, with principal investigators Prof. Dr. Ognyan Kounchev and Dr. Darko Jevremovic); ***Optical search for supernova remnants and H II regions in nearby galaxies (M 81 and IC 342 groups of galaxies*** (DAFMBU and IA and NAO, BAS, with principal investigators Dr. Nikola Petrov and Dr. Dejan

Urosevic); ***Observations of ICRF (International Celestial Reference Frame) radio-sources visible in optical domain*** (IA and NAO, BAS and AOB with principal investigators Dr. Svetlana Boeva and Dr. Goran Damljanovic); and ***Investigation of visual double and multiple stars*** (IA and NAO, BAS and AOB with principal investigators Dr. Svetlana Boeva and Dr. Zorica Cvetkovic).

4.2. OTHER INTERNATIONAL PROJECTS

The results reported in the invited lecturesby D. Jevremović (***Astroinformatics in Serbia***), D. Jevremović and O. Kounchev (***COST Action TD1403 Big Data Era in Sky and Earth Observations, 2014 – 2018***), C. Ron et al. (***Atmospheric, Oceanic and Geomagnetic Excitation of Nutation)***, Y. Chapanov et al. **(*Rotation Excited by Insolation Variations Due to Orbital Harmonics)***, and M. S. Dimitrijevic et al. (***Stark-B Database for Stark Broadening for Astrophysical Plasma Analysis and Modelling),*** as well as in the contributed talk of C. Yubero et al. ***A Method for Electron Density Measurement in Non-Thermal Plasmas from Optical Emission Spectroscopy*** (presented by M. S. Dimitrijevic), were received in the frames of other projects showing well the European integration of Bulgarian and Serbian astronomy.

5. SOME PROBLEMS

Some problems deserve to be mentioned here because they are problems not especially for this conference but they refer to science in general.

5.1. USED ABBREVIATIONS AND ACRONYMS

The problem of the used abbreviations and acronyms is a general problem in our fast-paced world. Very often one and the same abbreviation or acronym is used for different things and in different areas. One example from http://slang.org/ shows that “MTR” as abbreviation or as acronym is applicable for many things including the following: Metro (mtr); Meter (mtr); Meteor (mtr); Motor (mtr); Mountain Top Removal (MTR); Mass Transit Railway (MTR); Ministry of Tourism (MTR); Montreal (MTR), etc. In such cases one has to obey the relevant constraints of the communicative situation, i.e. the context. Otherwise the solution may be in AAAAA, which stands for American Association Against Acronym Abuse. The same is valid for the abbreviations and acronyms used in Astronomy. During this astronomical conference the usage of such acronyms as HPC (High-Performance Computing) or CEP (Complex Event Processing) out of the context has leaded to difficulties to follow the author’s thought especially for astronomers who are not so familiar with computer terminology. The acronym BLR (standing for Broad Line Region) is very common for spectroscopists, but has to be used with attention to wider auditory.

5.2. TRANSLATIONS OF ENGLISH TERMINOLOGY

To speak in your native language during your first astronomical conferences, which you attend, is a good educational initiative. But it contains also a threat of inadequate translation of common astronomical terms. Some examples from this conference confirm this possibility. A Bulgarian speaker (even experienced one) translated the term *Passband*as *Lenta na propuskane* in Bulgarian instead of the better one *Ivitsa na propuskane.* A Serbian speaker had difficulty in finding the equivalent of the term *Cut off* in Serbian. It is a general problem - sometimes the translation of the word is not accepted because it is literal, while the adoption of foreign words retains the nuances in its use. Such is the case of the astronomical term *Bremsstrahlung*, which has a German origin, but continues to be used in the English astronomical terminology. Another quite recent example from our everyday life is the word *Selfie,* prepared for inclusion in the online version of the Oxford English Dictionary in 2013. *Selfie* will enter into a new version of the Dictionary of the Bulgarian language in 2014.

The problem of inadequate translation of common astronomical terms in Serbian language is about to be solved by the new ADICT – English-Serbian Astronomical Dictionary, prepared as a collaboration of astronomer and philologist (B. Arbutina and D. Momic, see these Proceedings).

6. ASTRONOMY/ASTRONOMER AND ART

The cartoons of Sydney Harris, distinctive with insight and humor, are on many scientific subjects, including astronomy too. During the conference the speakers used twice his cartoons:

- Darko Jevremovic illustrated his presentation *Astroinformatics in Serbia* with the cartoon *Astronomers at work,* where the boss is saying to three astronomers “Let’s dispel some common beliefs”. The first astronomer says “I never use a telescope”. The second adds “I never go near a telescope.” The third finishes “I never even look up.”
- Zoran Simic illustrated the situation in cosmology with his T-shirt with the cartoon *Cosmology marches on,* consisting of two pictures - in the first picture the caveman looking at the stars says “Where did it all come from?” In the second picture the modern astronomer, sitting in the office, again puts the same question “Where did it all come from?”

During the conference the astronomer and poet PetkoNedjalkov spread his Bulgarian translation of one of the most favorite hit songs of the singer Miroslav Ilic in Serbia “Voleo sam devojku iz grada” with text by Dobrica Eric and music by Obren Pjevovic.

7. CONCLUSIONS

The IX Bulgarian-Serbian Astronomical Conference Astroinformatics showed that despite of the limited size of the conference and respectively of the number of Bulgarian and Serbian astronomers and astroinformaticians the topics discussed cover completely the area of Astroinformatics developed in Bulgaria and Serbia, as well as they give good imagination for astronomy in the both countries. For the period of 16 years the progress made in achieving the conference goals is significant – full knowledge about the Bulgarian and respectively Serbian astronomical achievements; joint use of the 2m Ritchey-Chretien-Coude telescope at Rozhen Observatory, as well as the 60cm telescope of the Astronomical Station Vidojevica of the Belgrade Astronomical Observatory; shared information for integration into international projects; developed collaboration in the area of Astroinformatics.

All conference proceedings, including the last ones, are done in the context of improving the visibility of our astronomical achievements after reviewing by SOC and the editorial board. The number of pages has been never strictly limited. Since 2012 the conference proceedings are indexed by the largest abstract and citation database of peer-reviewed scientific journals, books and conference proceedings – Scopus. What concerns the prospects of the future bilateral conferences – the next SBAC will take place in Serbia in 2016. The future BSAC will be held in 2018 in Varna (Bulgaria).