6th SREAC Meeting

ASTROPHYSICS AND ASTRODYNAMICS IN BALKAN COUNTRIES IN THE INTERNATIONAL YEAR OF ASTRONOMY

September 28 – 30, Belgrade, Serbia

Program & Abstract Book

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Program

September 28, Monday

08:00 Registration
09:00 Opening

Section 1: **Astrodynamics**

09:30 **C. Efthymiopoulos** – *Invariant manifolds and chaotic spiral arms in galaxies (invited)*
10:00 **V. Mioc** – *Equilibria of Seeliger's problem: analytic approach*
10:20 **S. Ninković** – *Binary 15 Mon and star cluster NGC 2264*
10:40 Coffee break

11:10 **Z. Knežević** – *Dynamical and physical characteristics of Hungaria asteroids (invited)*
11:30 **G. Damljanović** – *A better reference frame by using improved proper motions of single and double stars*
11:50 **V. Pashkevich** – *On the geodetic rotation of the major planets, Pluto, the Moon and the Sun*
12:10 **B. Borisov** – *Variation of heliocentric coordinates of asteroid 108 Hecuba*
12:30 Lunch

Section 2: **Galaxies & Cosmology**

14:30 **D. Kirilova** – *Neutrino in cosmology (invited)*
15:00 **M. Hafizi** – *A review on temporal lag estimation in GRBs*
15:20 **A. Lalović** – *Measurement of velocity dispersions of nearby galaxies*
15:40 **O. Vince** – *Dust attenuation of starburst galaxies*
16:00 Coffee break

16:30 **M. Ćirković** – *The galactic habitable zone and Fermi's paradox (invited)*
17:00 **B. Vukotić** – *Cellular automation of GHZ*
17:40 **V. Golev** – *Homogeneous UBVRI photometry of the cluster candidates in M33*
18:00 **S. Samurović** – *The problem of stellar anisotropies in nearby galaxies*

September 29, Tuesday

Poster session: from 12:00 to 16:00

Section 3: **Stellar & Solar Physics**

09:00 **H. Rovithis-Livaniou** – *Latest news from the field of exoplanets (invited)*
09:30 **U. D. Goker** – *An examination of x-ray binaries in Hertzsprung-Russell diagram*
09:50 **T. Borkovits** – *Interferometric observations of the hierarchical triple system Algol*
10:10 **S. Tsantilas** – *Inversed semi-detached binaries (ISDB)*
10:30 Coffee break

11:00 **I. Iliev** – *Challenges of Modern Astrophysics: Doppler Imaging and Doppler Tomography (invited)*
11:30 **B. I. Bíró** – *Nonradial pulsations in eclipsing binaries: methods of mode identification*
11:50 **A. Antonova** – *Investigating magnetic field strengths and topologies for pulsing ultracool dwarfs*
12:10 **V. Čadež** – *Instabilities in stratified magnetized stellar atmospheres*
12:30 Lunch

14:00 **SREAC Meeting**

Section 4: **Amateur Astronomers Meeting**

15:00 – 18:00

20:00 Conference dinner

September 30, Wednesday

Section 3: **Stellar & Solar Physics**

09:00 **C. Dumitrache** – *Filaments evolution(invited)*
09:30 **L. Dumitru** – *A case of filament – active region interaction*
09:50 **M. Jovanović** – *A new calibration method for water vapor blending of solar lines*
10:10 **U. D. Goker** – *Slow shocks in a current sheet with multi-fluid plasma*
10:30 **V Mioc** – *Coronal mass ejections: a different mathematical approach*
10:50 Coffee break

11:10 **O. Demircan** – *Stellar rotation: theory and observation (invited)*
11:40 **O. Kuzmanovska-Barandovska** – *Iteration factors method for multilevel radiative transfer: convergence properties*
12:00 **R. Konstantinova-Antova** – *Are the M giants magnetically active?*
12:20 **M. Zboril** – *Stars suspicious of bright spots*
12:40 **F. Ekmekçi** – *Summarizing the results of photometric analyses of long-term BV observations of UX Arietis*
13:00 Lunch

15:00 **N. Markova** – *Quantitative spectroscopy of OB stars: theory and observations (invited)*
15:30 **E. Antonopoulou** – *V1038 Her and V1051 Her: BVRI photometry, color indices estimation and modeling*
15:50 **I. Voloshina** – *Photometric study of selected SU UMa-type dwarf novae*
16:10 **I. Akkaya** – *CCD UBVRI photometry of the galactic open clusters: Be89, Ru135 and Be10*
16:30 **H. Markov** – *Spectroscopic observations of UU Cas: preliminary results*
16:50 Coffee break

17:10 **T. Bonev** – *Recent upgrades of the 2-meter telescope at NAO Rozhen*
17:30 **M. Dennefeld** – *Observing facilities in Europe, for research and teaching*

18:00 Closing

Monday, September 28

Section 1: **Astrodynamics**
Time: September 28, Monday, 09:30 – 10:00
Invited talk

INVARIANT MANIFOLDS AND CHAOTIC SPIRAL ARMS IN GALAXIES

C. Efthymiopoulos
Research Center for Astronomy, Academy of Athens, Hellenic Republic

A recent theoretical development regarding the theory of spiral structure will be reviewed, according to which in barred galaxies the spiral structure is supported by chaotic orbits along the unstable invariant manifolds of unstable periodic orbits in the corotation region. Applications in models as well as in real galaxies will be discussed.

Section 1: **Astrodynamics**
Time: September 28, Monday, 10:00 – 10:20
Contributed talk

EQUILIBRIA OF SEELIGER'S PROBLEM: ANALYTIC APPROACH

E. Popescu[1], D. Pasca[2], **V. Mioc**[1], N. Antonia Popescu[1]
[1]*Astronomical Institute of the Romanian Academy, Romania*
[2]*University of Oradea, Romania*

We offer a deeper insight into Seeliger's problem, associated to an exponential potential. We search for equilibria for the whole interplay among the parameters of the field and the integration constants. We find and locate the equilibria for each situation. The positions of equilibria depend only on the integration constants.

Section 1: **Astrodynamics**
Time: September 28, Monday, 10:20 – 10:40
Contributed talk

BINARY 15 MON AND STAR CLUSTER NGC 2264

S. Ninković, Z. Cvetković, I. Vince
Astronomical Observatory Belgrade, Republic of Serbia

Analyzing the curve of the line-of-sight velocity the authors obtain the motion of the mass centre from their best fit. The resulting residual value or, more precisely, the velocity of the binary mass centre with respect to the centre of the open cluster NGC 2264 (the binary is expected to be its member) along the line of sight is almost 10 km/s. This value is pretty large; hence the membership of the binary seems doubtful. The distances to the cluster and to the binary, independently determined, agree rather well, though the error is large. The binary is a pair consisting of two early-type stars, which indicates their low age. The cluster itself is well known as extremely young. Is this a complex of very young stars containing an open cluster as its main part?

Section 1: **Astrodynamics**
Time: September 28, Monday, 11:00 – 11:30
Invited talk

DYNAMICAL AND PHYSICAL CHARACTERISTICS OF HUNGARIA ASTEROIDS

Z. Knežević
Astronomical Observatory Belgrade, Republic of Serbia

Due to the favourable observing conditions, the Hungaria asteroids may soon become the best known asteroid subgroup of the asteroid population. We have built a large catalog of accurate synthetic proper elements in order to study the dynamical boundaries and the internal structure of the Hungaria region, both within a purely gravitational model and also analyzing the non-gravitational effects. A complex interaction has been found between secular resonances, mean motion resonances, chaotic behavior and Yarkovsky-driven drift in semimajor axis, as well as a rare large scale instabilities leading to escape from the region. We suggest there is a collisional family in the region, including most Hungarias, but not all. There are also finer structures, the most significant being close couples with extremely similar proper elements, some of which could have had a very close approaches with low relative velocities, in the comparatively recent past.

Section 1: **Astrodynamics**
Time: September 28, Monday, 11:30 – 11:50
Contributed talk

A BETTER REFERENCE FRAME BY USING IMPROVED PROPER MOTIONS OF SINGLE AND DOUBLE STARS

G. Damljanović[1], N. Pejović[2]
[1]*Astronomical Observatory Belgrade, Republic of Serbia*
[2]*University of Belgrade, Republic of Serbia*

As the input data, we used Hipparcos observations and the observations made during the last century of latitude variations. The ground-based data were obtained with 26 instruments of observatories located all over the world, and the observed stars were included in programs used for the Earth's rotation study. The goal of our investigations was to improve the proper motions in declination of ground-based observations of stars from the Hipparcos Catalogue, and thus to improve the reference frame, because the Hipparcos Catalogue is the optical counterpart of the International Celestial Reference Frame (ICRF). There is a large number of ground-based observations per year of each of the stars in this Catalogue. Also, the observation intervals for these stars are usually much longer than Hipparcos opservations (the satellite mission lasted less than four years). So, it is possible to correct the Hipparcos proper motions. Our basic method (the linear fit for single stars) is adapted (the sinusoidal fit for double and multiple stars) and some results are presented here.

Section 1: **Astrodynamics**
Time: September 28, Monday, 12:10 – 12:30
Contributed talk

ON THE GEODETIC ROTATION OF THE MAJOR PLANETS, PLUTO, THE MOON AND THE SUN

V. Pashkevich, G. I. Eroshkin
Pulkovo Astronomical Observatory, The Russian Federation

The problem of the geodetic (relativistic) rotation of the major planets, Pluto, the Moon and the Sun (Eroshkin G. I., Pashkevich V. V., 2007) is studied by using DE404/LE404 ephemeris, with respect to the proper coordinate systems of the bodies (Seidelmann P. K. et al., 2005). For each body the files of the Euler angles of the geodetic rotation are determined over the time span from AD1000 to AD3000 with one day spacing. The most essential terms of the geodetic rotation are found by means of the least squares method and spectral analysis methods.

Section 1: **Astrodynamics**
Time: September 28, Monday, 12:10 – 12:30
Contributed talk

VARIATION OF HELIOCENTRIC COORDINATES OF ASTEROID 108 HECUBA

B. Borisov[1], V. Shkodrov[2]
[1]*Shumen University, Republic of Bulgaria*
[2]*Institute of Astronomy of the Bulgarian Academy of Sciences, Republic of Bulgaria*

The determination of Hecuba's coordinates is a special case of the three-body problem. Hecuba's mean motion is approximately two times bigger than that of Jupiter. This article is a continuation of our previous work "Variation of orbital elements of asteroid 108 Hecuba". The changes of the orbital elements, presented graphically there, were calculated according to the theoretical model developed by Kiril Popov in his doctor's dissertation. We improved this method including terms up to the fourth order of Hecuba's eccentricity in the perturbation function. Availability of observational data enables us to take the date 18. 08. 2005 for the epoch. Differential equations are solved approximately using the Maclaurin series expansion up to the second order about the Jupiter's mass expressed in solar masses. Using these results, we obtain the variations of Hecuba's heliocentric coordinates and the projections of Hecuba's trajectory on the main planes. Analyzing the change of Hecuba's radius-distance, we decided to find the variations of the quantities and that correspond to the minimum and maximum distances in the two-body problem. Finally an animation of the motion of the Jupiter's and Hecuba's projections on the ecliptic is made in the form of PowerPoint presentation.

Section 2: **Galaxies & Cosmology**
Time: September 28, Monday, 14:30 – 15:00
Invited talk

NEUTRINO IN COSMOLOGY

D. Kirilova
Institute of Astronomy of the Bulgarian Academy of Sciences, Republic of Bulgaria

The relic neutrinos from the Big Bang or the Cosmic Neutrino Background (CNB) neutrinos are expected to be the most abundant particles in our Universe after the relic photons of the Cosmic Microwave Background (CMB). They carry precious information from the early epoch when our Universe was only 1 sec old. Although not yet directly detected, CNB may be revealed indirectly through cosmological observations due to their important cosmological influence.

I review the cosmological role of neutrinos and the present cosmological constraints on neutrino characteristics. Namely, I discuss the impact of neutrinos in the cosmic expansion, neutrino decoupling, the role of neutrinos in the primordial production of light elements, their effect on CMB anisotropies, LSS formation, the possible neutrino contribution to the Dark Matter in the Universe, leptogenesis, etc. Due to the considerable cosmological influence of neutrinos, there are cosmological bounds on neutrino properties from observational data. I review the cosmological constraints on the neutrino characteristics, such as the effective number of neutrino species, neutrino mass and mixing parameters, lepton number of the Universe, gravitational clustering of neutrinos, presence of sterile neutrino, etc.

Section 2: **Galaxies & Cosmology**
Time: September 28, Monday, 15:00 – 15:20
Contributed talk

A REVIEW ON TEMPORAL LAG CORRELATIONS IN GRBS

M. Hafizi, S. Boçi
Tirana University, Republic of Albania

The temporal lag between two bands of observation is considered an important parameter for Gamma Ray Bursts. Here we present an analysis of up to date results and give some arguments available for improvement.

Section 2: **Galaxies & Cosmology**
Time: September 28, Monday, 15:20 – 15:40
Contributed talk

MEASUREMENT OF VELOCITY DISPERSIONS OF NEARBY GALAXIES

A. Lalović
Astronomical Observatory Belgrade, Republic of Serbia

We discuss the dependence of the velocity dispersion measurements on different stellar libraries used as stellar templates. Apart from the well known blue part of the spectrum, we have also tested the red spectrum around the Ca+Fe feature at 6500 A, following the prescription of Ho et al. 2009. We have measured the velocity dispersions of a sample of nearby galaxies of various Hubble types taken from the Sloan Digital Sky Survey (SDSS) and we discuss the obtained results.

Section 2: **Galaxies & Cosmology**
Time: September 28, Monday, 15:40 – 16:00
Contributed talk

DUST ATTENUATION OF STARBURST GALAXIES

O. Vince
Astronomical Observatory Belgrade, Republic of Serbia

The dust attenuation law for galaxies with different physical properties is determined using two different methods. While one of the methods utilizes optical spectra from the SDSS catalog, the other uses optical-to-infrared photometrical data from the SDSS and 2MASS catalogs. Although the methods are different in nature and use differently defined samples of starburst galaxies, they provide similar results. The samples, methods and the results will be presented and interpreted in this work.

Section 2: **Galaxies & Cosmology**
Time: September 28, Monday, 16:30 – 17:00
Invited talk

THE GALACTIC HABITABLE ZONE AND FERMI'S PARADOX

M. Ćirković, B. Vukotić
Astronomical Observatory Belgrade, Republic of Serbia

Can astrophysics explain Fermi's paradox? If available, such explanation would be advantageous over most of those suggested in literature which rely on unverifiable cultural and/or sociological assumptions. We suggest, instead, a general astrobiological paradigm which might offer a physical and empirically testable paradox resolution. Based on the idea of J. Annis, we develop a model of an astrobiological phase transition of the Milky Way, based on the concept of the global regulation mechanism(s). The dominant regulation mechanisms, arguably, are gamma-ray bursts, whose properties and cosmological evolution are becoming well-understood. Secular evolution of regulation mechanisms leads to the brief epoch of phase transition: from an essentially dead place, with pockets of low-complexity life restricted to planetary surfaces, it will, on a short (Fermi-Hart) timescale, become filled with high-complexity life. An observation selection effect explains why we are not, in spite of the very small prior probability, to be surprised at being located in that brief phase of disequilibrium. Some of the unequivocal and testable predictions of our model include the decrease of extinction risk in the history of terrestrial life, the absence of any traces of Galactic societies significantly older than human society, complete lack of any extragalactic intelligent signals or phenomena, and the presence of ubiquitous low-complexity life in the Milky Way.

Section 2: **Galaxies & Cosmology**
Time: September 28, Monday, 17:00 – 17:20
Contributed talk

CELLULAR AUTOMATION OF GHZ

B. Vukotić, M. Ćirković
Astronomical Observatory Belgrade, Republic of Serbia

We present the preliminary results of our Galactic Habitable Zone (GHZ) 2D probabilistic cellular automation models. The relevant timescales (emergence of life, its diversification and evolution influenced by the global risk function) are modeled as the probability matrix elements and are chosen to be the representatives of the Earth's fossil record. With Fermi's paradox as a main boundary condition, the resulting histories of astrobiological landscape are discussed.

Section 2: **Galaxies & Cosmology**
Time: September 28, Monday, 17:20 – 17:40
Contributed talk

HOMOGENEOUS UBVRI PHOTOMETRY OF THE CLUSTER CANDIDATES IN M33

V. Golev[1], N. Kaltcheva[2], E. Ovcharov[1], M. Kontizas[3]
[1]*St. Kliment Ohridski University of Sofia, Republic of Bulgaria*
[2]*University of Wisconsin Oshkosh, United States of America*
[3]*University of Athens, Hellenic Republic*

The study of the star-cluster systems in the Local Group provides important information about the integral properties of their stellar population and overall structural and chemical evolution. Since for these studies the completeness of the sample of detected clusters is critical, many extensive surveys have been recently initiated both from space and ground. The M33 galaxy is the only late-type spiral in the Local Group, and thus of particular interest. The most comprehensive catalogues available to date of confirmed genuine star-clusters in M33 are presented by Park & Lee (2007) and Sarajedini & Mancone (2007). The catalogues incorporate several recent studies based on HST/WFPC2 (Chandar et al. 2001) and HST/ACS (Bedin et al., 2005, Sarajedini et al., 2007, and more) archive images. Most recently Zloczewski and Kaluzny (2008) detected 91 new clusters, while 115 previously uncataloged clusters were reported also by San Roman et al.(2009). Here we utilize a multicolor broad-band photometry using CFHT and KPNO Megacams archive images to produce a homogeneous UBVRI dataset for as much as possible clusters in order to cast light on the nature of these objects.

Section 2: **Galaxies & Cosmology**
Time: September 28, Monday, 17:40 – 18:00
Contributed talk

THE PROBLEM OF STELLAR ANISOTROPIES IN NEARBY GALAXIES

S. Samurović
Astronomical Observatory Belgrade, Republic of Serbia

In this contribution I discuss the problem of stellar anisotropies in galaxies in the nearby Universe and its importance for solving some issues pertaining to galactic dynamics. First, I present a necessary theoretical background using long-slit spectra of nearby early-type galaxies. Then using these spectra I show how anisotropies might affect the estimates of the total mass of a given galaxy. I also discuss the sample of nearby galaxies (consisting of both early- and late-type galaxies) extracted from the Sloan Digital Sky Survey (SDSS). This is the largest sample of galaxies obtained to date which contains full kinematic profile of the objects (velocity, velocity dispersion and Gauss-Hermite h3 and h4 anisotropy parameters). Finally, I discuss the influence of anisotropies in the stellar motions on the determination of the Lick indices.

Tuesday, September 29

Section 3: **Stellar & Solar Physics**
Time: September 29, Tuesday, 09:00 – 09:30
Invited talk

LATEST NEWS FROM THE FIELD OF EXOPLANETS

E. Rovithis-Livaniou
University of Athens, Hellenic Republic

A review and a general discussion of the up to date knowledge regarding the exoplanets will be given, including the results of theoretical modeling as well as the results from observations.

Section 3: **Stellar & Solar Physics**
Time: September 29, Tuesday, 09:30 – 09:50
Contributed talk

AN EXAMINATION OF X-RAY BINARIES IN HERTZSPRUNG-RUSSELL DIAGRAM

U. D. Goker
Ege University, Republic of Turkey

The author examines XRBC (METU) catalogue of observational data of X-ray binary stars by settling the data into the Hertzsprung-Russel diagram, with the axes of color to color. The results show that HMXBs (high mass X-ray binaries) are nearer to the main sequence and contain greater amounts of blue stars than LMXBs (low mass X-ray binaries). Furthermore, LMXBs are discovered to be located in the supergiants region of the HR diagram. HMXBs show a pattern stretching into the galaxy plane, which implies that they contain a younger population of stars. Moreover, LMXBs are situated nearer to the center of the galaxy plane, which implies that they mostly contain old stars.

Section 3: **Stellar & Solar Physics**
Time: September 29, Tuesday, 09:50 – 10:10
Contributed talk

INTERFEROMETRIC OBSERVATIONS OF THE HIERARCHICAL TRIPLE SYSTEM ALGOL

Sz. Csizmadia[1], **T. Borkovits**[2], Zs. Paragi[3]
[1]*Institute of Planetary Research, German Aerospace Center, Federal Republic of Germany*
[2]*Baja Astronomical Observatory, Republic of Hungary*
[3]*Joint Institute for VLBI in Europe, Kingdom of the Netherlands &*
MTA Research Group for Physical Geodesy and Geodynamics, Republic of Hungary

We determined the spatial orientation of the Algol's close pair orbital plane using the CHARA Array, a six-element optical/IR interferometer located on Mount Wilson, and state-of-the-art e-EVN interferometric techniques. We found the longitude of the line of nodes for the close pair is Ω_1=48°±2° and the mutual inclination of the orbital planes of the close and the wide pairs is 95°±3°. This latter value differs by 5° from the formerly known 100°, which would imply a very fast inclination variation of the system, not borne out by the photometric observations. We also investigated the dynamics of the system with numerical integration of the equations of motions using our result as an initial condition. We found large variations in the inclination of the close pair (its amplitude ~170°) with a period of about 20 millennia. This result is in good agreement with the photometrically observed change of amplitude in Algol's primary minimum.

Section 3: **Stellar & Solar Physics**
Time: September 29, Tuesday, 10:10 – 10:30
Contributed talk

INVERSED SEMI-DETACHED BINARIES (ISDB)

S. Tsantilas, E. Rovithis-Livaniou
University of Athens, Hellenic Republic

The inclusion of the radiation pressure effect in the classical Roche model can lead to a number of different geometrical configurations. It has also been shown that this is a possible situation in a binary system that contains at least one component of early spectral type where the effect is stronger.

Here, we focus on the case of the outer contact configuration at the Lagrangian point L_2. This corresponds to a new type of binaries, which we call Inversed Semi-Detached (ISD) binaries, in contrast to the classical S-D systems with contact at L_1.

Furthermore, we present the implications of the action of radiation pressure to the system from geometrical, dynamical and evolutional point of view. We also present and analyze a sample of possible candidates for this new type of binary systems.

Section 3: **Stellar & Solar Physics**
Time: September 29, Tuesday, 11:00 – 11:30
Invited talk

CHALLENGES OF MODERN ASTROPHYSICS: DOPPLER IMAGING AND DOPPLER TOMOGRAPHY

I. Iliev
Institute of Astronomy of the Bulgarian Academy of Sciences, Republic of Bulgaria

Basics of the two modern indirect imaging techniques – Doppler imaging and Doppler tomography are reviewed. They benefited the studies of stellar surface inhomogeneities and flattened disc-like structures during the last decades. The foundations of Doppler imaging lay in the fact that spottedness is the main reason for stellar variability due to rotation. Stellar rotation modulates both photometric and spectroscopic characteristics of the objects we observe, giving the possibility to reconstruct the spatial distribution of the temperature or the concentration of chemical elements over the stellar surface. Patchy surfaces are typical for many early and late type variable stars, and it is generally thought that starspots have a close connection with the stellar magnetic field geometry. Polarimetric measurements allow this geometry to be successfully reconstructed via Zeeman-Doppler method.

The other modern technique, Doppler tomography, is based primarily on the strong atomic line emission, e.g. in hydrogen Balmer lines, generated by accretion discs. It transforms line profiles observed at different orbital phases of a binary star into characteristics of the emission regions over the disc or over the surface of primary component.

Observational constraints of Doppler imaging and Doppler tomography are discussed in brief.

Section 3: **Stellar & Solar Physics**
Time: September 29, Tuesday, 11:30 – 11:50
Contributed talk

NONRADIAL PULSATIONS IN ECLIPSING BINARIES: METHODS OF MODE IDENTIFICATION

B. I. Bíró
Baja Astronomical Observatory, Republic of Hungary

Eclipsing binaries containing non-radially pulsating stars offer a unique opportunity for asteroseismology: the possibility of mode identification using the eclipse phenomenon. The talk presents and discusses purely photometric methods of this kind.

Section 3: **Stellar & Solar Physics**
Time: September 29, Tuesday, 11:50 – 12:10
Contributed talk

INVESTIGATING MAGNETIC FIELD STRENGTHS AND TOPOLOGIES FOR PULSING ULTRACOOL DWARFS

A. Antonova[1], G. Hallinan[2], J. G. Doyle[3], A. Golden[2]
[1]*St. Kliment Ohridski University of Sofia, Republic of Bulgaria*
[2]*National University of Ireland, Ireland*
[3]*Armagh Observatory, United Kingdom of Great Britain and Northern Ireland*

The detection of both quiescent and flaring nonthermal radio emissions from a number of late M and L type dwarfs indicates the presence of magnetic activity in the ultrcool dwarf domain. Moreover, four of those dwarfs show periodic, highly circularly polarized pulsing signatures consistent with electron cyclotron maser emission. The pulsing emission can be used as a powerful diagnostic of magnetic field strengths and topologies of very low-mass stars and brown dwarfs.

Here we present our results from multi-epoch VLA observations of the M9 dwarf TVLM 513-46546 which provide evidence of the presence of stable large-scale magnetic fields with kilogauss strengths, as well as broadband dynamic spectra of the individual pulses in the emission of the dwarf obtained using the Arecibo Observatory. We discuss how such observations can be used for mapping the radio coronae of UCDs.

Section 3: **Stellar & Solar Physics**
Time: September 29, Tuesday, 12:10 – 12:30
Contributed talk

INSTABILITIES IN STRATIFIED MAGNETIZED STELLAR ATMOSPHERES

V. Čadež
Astronomical Observatory Belgrade, Republic of Serbia

Magnetic field plays a noticeable role in statics of magnetized stellar atmospheres. Depending on its profile, a magnetic field can either stabilize or destabilize a fluid in a gravitational field. In this contribution, we present some analytical instability criteria and discuss their applicability to a stellar/solar atmosphere.

Wednesday, September 30

Section 3: **Stellar & Solar Physics**
Time: September 30, Wednesday, 09:00 – 09:30
Invited talk

FILAMENTS EVOLUTION

C. Dumitrache
Astronomical Institute of the Romanian Academy, Romania

We present an overview of solar filaments evolution and destabilization in the light of their dynamical parameters: differential rotation, tilt angle on the solar parallel and length. Different types of evolution are discussed. A tentative computation of filaments helicity is linked to the CMEs occurrence.

Section 3: **Stellar & Solar Physics**
Time: September 30, Wednesday, 09:30 – 09:50
Contributed talk

A CASE OF FILAMENT – ACTIVE REGION INTERACTION

L. Dumitru, C. Dumitrache
Astronomical Institute of the Romanian Academy, Romania

We analyze a huge filament observed between September 5 and 19, 2001. In its evolution, it is linked to the active region 9612, observed between September 7 and 16, 2001. The filament has a strange morphology and dynamics: starting as two parallel components (A and B), it becomes a double sigmoid filament when a third component (C) appears linking the other two. An unusual magnetic topology characterizes this evolution: the active region is located between the parallel components. When the third component becomes observable, it links the ones bellow the active region. After a spectacular plasma movement registered in filament (A), it becomes linked to (B) above the active region. In spite of these dramatic changes of the magnetic topology and filament – active region switch, no CME is observed. Only few flares occurring in AR9612 are registered and these could be seen in the dynamics of the filament as an expression of large scale magnetic reconnections.

Section 3: **Stellar & Solar Physics**
Time: September 30, Wednesday, 09:50 – 10:10
Contributed talk

A NEW CALIBRATION METHOD FOR WATER VAPOR BLENDING OF SOLAR LINES

M. Jovanović[1], I. Vince[2]
[1]*University of Belgrade, Republic of Serbia*
[2]*Astronomical Observatory Belgrade, Republic of Serbia*

For precise spectrophotometric observations of solar spectral lines, it is necessary to remove the systematical errors caused by telluric line blending. Calibration methods are usually applied for removing these errors. Calibration in the case of telluric lines that originate from water vapor is more complicated than in the case of molecular oxygen lines, since the amount of water vapor in Earth atmosphere is unpredictable. We present here a new calibration method for water vapor line blending, based on the measured ratio of water vapor and molecular oxygen spectral line parameters.

Section 3: **Stellar & Solar Physics**
Time: September 30, Wednesday, 10:10 – 10:30
Contributed talk

SLOW SHOCKS IN A CURRENT SHEET WITH MULTI-FLUID PLASMA

U. D. Goker
Ege University, Republic of Turkey

The author examines multi-fluid structure in the current sheet in solar corona by comparing it with one-fluid and two-fluid structures. A model of slow shock due to one fluid medium is formed, then it is extended to two-fluid and multi-fluid structures. An analytical solution for the MHD equations is obtained. A numerical simulation using Lagrangian Remap Code (Lare Xd) and 4th order Runge-Kutta method is performed.

Section 3: **Stellar & Solar Physics**
Time: September 30, Wednesday, 10:30 – 10:50
Contributed talk

CORONAL MASS EJECTIONS: A DIFFERENT MATHEMATICAL APPROACH

V. Mioc, C. Dumitrache
Astronomical Institute of the Romanian Academy, Bucharest, Romania

Coronal mass ejections represent a major challenge in models of solar phenomena. The basic picture is that a CME represents the catastrophic disruption of the force balance between the upward magnetic pressure of the highly sheared filament channel magnetic field and the downward tension of overlying quasi-potential field. Three general types of reconnection models for CME initiation have been proposed, differing primarily in magnetic topology and in location of the reconnection. The breakout model postulates that reconnections occur out of the filament channel, between the quasi-potential overlying flux and neighboring flux systems (Antiochos et al., 1999). MacNeice et al. (2004) performed a numerical experiment of a complete CME breakout. They found that this CME model produces fast CMEs with velocities of the Alfven speed order and these velocities are not sensitive on the refinement of computations. We propose an investigation based on the idea already used by Mioc and Dumitrache 2007, which is to regard the magnetic field lines that rule the plasma motion as phase curves in a phase space. Using the tools of the theory of dynamical systems, this allows sketching the portrait of the field at any instant, with the corresponding motions. We use the scenario with four flux systems and the portraits projected onto the $\varphi=0$ plane. In our phase plane, the initial instant presents only bounded trajectories and a saddle. As time goes by, a second saddle appears which generates a homoclinic curve. This one includes a centre surrounded by quasiperiodic and periodic trajectories. Further, another zone of quasiperiodic and periodic orbits (with another center) appears, separated from the first one by a double homoclinic loop. At the same time, the saddles multiply. Moreover, there appear escape trajectories.

Our contribution intends to add some mathematical methods to the solar research focused on the understanding of CMEs. To point out critical points (stable or unstable), exotic motions, possibility of chaotic motion, this can contribute to the knowledge of the most spectacular manifestations of solar activity.

Section 3: **Stellar & Solar Physics**
Time: September 30, Wednesday, 11:10 – 11:40
Invited talk

STELLAR ROTATION: THEORY AND OBSERVATION

O. Demircan
Canakkale University Observatory, Republic of Turkey

The evolution of stellar rotation through angular momentum loss, driven by the stellar wind in single stars and in binary star components will be reviewed with the emphasis on observational results.

Section 3: **Stellar & Solar Physics**
Time: September 30, Wednesday, 11:40 – 12:00
Contributed talk

ITERATION FACTORS METHOD FOR MULTILEVEL RADIATIVE TRANSFER: CONVERGENCE PROPERTIES

O. Kuzmanovska-Barandovska[1], O. Atanacković[2]
[1]*University of Skopje, The Former Yugoslav Republic of Macedonia*
[2]*University of Belgrade, Republic of Serbia*

We present the convergence properties of the Iteration Factors (IF) method generalized to the solution of the multilevel line formation problem. We consider two families of iteration factors used to close the system of coupled RT equation moments and statistical equilibrium (SE) equations, and two ways to solve this non-linear coupling (linearization and the modification of the SE equations). The accuracy of the IF method is tested and its convergence behavior is analyzed by solving a three-level hydrogen atom benchmark problem of Avrett and Loeser (1987). Its convergence rate, total computational work as well as the computation time per iteration are compared with the corresponding properties of other methods (FBILI and MALI), and the dependence of these properties on the spatial grid resolution is examined.

Section 3: **Stellar & Solar Physics**
Time: September 30, Wednesday, 12:00 – 12:20
Contributed talk

ARE THE M GIANTS MAGNETICALLY ACTIVE?

R. Konstantinova-Antova[1], M. Auriere[2] et al.
[1] *Institute of Astronomy, Bulgarian Academy of Sciences, Republic of Bulgaria*
[2]*Universit´e de Toulouse, French Republic*

We studied 8 single M giants for magnetic activity using the spectropolarimeter NARVAL at the 2m telescope, Pic du Midi, France. Magnetic field and its variability is detected in EK Boo, and in one other M giant we have a possible detection. The field strength is of the order of few Gauss.

Section 3: **Stellar & Solar Physics**
Time: September 30, Wednesday, 12:20 – 12:40
Contributed talk

STARS SUSPICIOUS OF BRIGHT SPOTS

M. Zboril
Astronomical Institute, Slovak Republic

Dark spots studies have progressed since mid 80s and now we pay attention to stars suspected of bright active regions. We discuss this phenomenon across HR diagram and present a first version of a catalogue of such stars.

Section 3: **Stellar & Solar Physics**
Time: September 30, Wednesday, 12:40 – 13:00
Contributed talk

SUMMARIZING THE RESULTS OF PHOTOMETRIC ANALYSES OF LONG-TERM BV OBSERVATIONS OF UX ARIETIS

F. Ekmekçi
Ankara University, Republic of Turkey

Including the BV data obtained during 1991-1994 period at the Ankara University Observatory (AUG), a review of long-term light curve analyses of the chromospherically active binary system, UX Ari, is presented. The spot distributions for UX Ari were investigated by using Wilson-Devinney (WD) code, and the results are summarized in this study. Large and cool spots located on the primary (K0 IV) component are mainly responsible for the light curve variations but the most convenient results of spot distributions in UX Ari are obtained by adding other two spots located on the secondary (G5 V) component of the system. The comparison of achieved results with the previously published results showed that a good fit to the observational light curves could also be achieved without any flares and/or facular areas but with two other spots located on secondary component of the system.

Section 3: **Stellar & Solar Physics**
Time: September 30, Wednesday, 15:00 – 15:30
Invited talk

QUANTITATIVE SPECTROSCOPY OF OB STARS: THEORY AND OBSERVATIONS

N. Markova
Institute of Astronomy of the Bulgarian Academy of Sciences, Republic of Bulgaria

In this review I focus on recent developments in the study of hot massive stars with special emphasis on the winds from OB stars. Major results of large international surveys of mass-loss from these stars are outlined and compared to predictions from the standard radiation driven wind theory. Prominent challenges to our present day understanding of mass-loss from OB stars are summarized and different ways to approach these problems are discussed.

Section 3: **Stellar & Solar Physics**
Time: September 30, Wednesday, 15:30 – 15:50
Contributed talk

V1038 HER AND V1051 HER: BVRI PHOTOMETRY, COLOR INDICES ESTIMATION AND MODELING

N. Nanouris, I. Kontogiannis, A. Liakos, **E. Antonopoulou**
University of Athens, Hellenic Republic

In this work, we present B, V, R, I photometric observations of two short-period eclipsing binaries discovered by the ROTSE-1 robotic survey. V1038 Her and V1051 Her were observed at the Kryonerion Astronomical Observatory and the Observatory of the University of Athens during the summer of 2005, 2007 and 2009 thus allowing us to achieve full coverage of their light curves and determination of many times of minima, leading to the construction of accurate ephemerides. Due to the lack of photometric and spectroscopic elements we performed absolute photometry in order to approximately estimate their color indices and the temperatures of the systems. To compensate for the relatively small number of standard stars used in this approach, we applied a more thorough statistical re-sampling method aiming to a more reliable error estimation compared to the typical least squares approach. We then used the Wilson-Devinney program to model the systems and our results clearly suggest that the two binaries are typical representatives of the W UMa group.

Section 3: **Stellar & Solar Physics**
Time: September 30, Wednesday, 15:50 – 16:10
Contributed talk

PHOTOMETRIC STUDY OF SELECTED SU UMA-TYPE DWARF NOVAE

I. Voloshina, V. Metlov
Sternberg Astronomical Instutite, Moscow, The Russian Federation

SU Uma-type dwarf novae are a subclass of dwarf novae which from time to time show long bright outbursts named superoutbursts besides the normal ones. During the superoutbursts, superhumps appear in the light curves of these dwarf novae. In this work, we present time-resolved CCD photometry of a few poorly studied SU UMa dwarf novae during superoutbursts. The observations were made using 60-cm telescope of Sternberg Astronomical Institute in Crimea in October-November 2008 and May-June 2009. Superhumps were found in the light curves of all novae. We also calculated superhump periods and amplitudes and followed up the evolution of superhumps for all systems.

Section 3: **Stellar & Solar Physics**
Time: September 30, Wednesday, 16:10 – 16:30
Contributed talk

CCD UBVRI PHOTOMETRY OF THE GALACTIC OPEN CLUSTERS: BE89, RU135 AND BE10

I. Akkaya[1], W. J. Schuster[2], R. Michel[2], C. Chavarria[2], Y. Karataş[3]
[1]*Erciyes University, Republic of Turkey*
[2]*Observatorio Astronomico Nacional, United Mexican States*
[3]*Istanbul University, Republic of Turkey*

The fundamental parameters of reddening, metallicity, age and distance modulus of three poorly studied Galactic open clusters, Be89, Ru135, and Be10, are obtained using CCD UBVRI photometry within the framework of the San Pedro Martir open cluster survey. By shifting the colors of Schmidt-Kaler in the (U–B, B–V) two–color diagram along the appropriate reddening vector, the values of interstellar reddening have been derived as E(B–V)= 0. 50 mag for Be89, 0.62 mag for Ru135, and 0.80 mag for Be10. The photometric metallicity and heavy element abundances of the three clusters have been obtained by estimating the ultraviolet excess for the F-type stars in this same two-color (U–B, B–V) diagram, resulting in ([Fe/H], Z) = (-0.13 dex, +0.014) for Be89, (-0.19 dex, +0.012) for Ru135, and (-0.25 dex, +0.011) for Be10.

By fitting isochrones to the observed sequences of these three clusters in the color-magnitude diagrams of five different color indices, (B–V, R–I, V–I, V–R,and B–R) the weighted averages of distance moduli and heliocentric distances ((V-Mv)o, d(pc)) are the following: (11.74 mag, 2228) for Be89, (9.93 mag, 972) for Ru135,and (11.20 mag, 1775) for Be 10, and the weighted averages of the inferred best ages (log(A), A(Gyr)) are (9.59, 3.89) for Be89, (9.26, 1.82) for Ru135, and (8.94, 0.87) for Be10.

Section 3: **Stellar & Solar Physics**
Time: September 30, Wednesday, 16:30 – 16:50
Contributed talk

SPECTROSCOPIC OBSERVATIONS OF UU CAS: PRELIMINARY RESULTS

H. Markov[1], I. Vince[2], N. Markova[1] et al.
[1]*Institute of Astronomy of the Bulgarian Academy of Sciences, Republic of Bulgaria,*
[2]*Astronomical Observatory Belgrade, Republic of Serbia*

We present preliminary results of spectroscopic observations of the EBS star UUCas. Spectra were taken in two spectral regions centered on 580 nm and H alpha, with the COUDE spectrograph of the 2m telescope of NAO Rozhen, Bulgaria. Lines belonging to the two components are clearly resolved.

Section 3: **Stellar & Solar Physics**
Time: September 30, Wednesday, 17:10 – 17:30
Contributed talk

RECENT UPGRADES OF THE 2-METER TELESCOPE AT NAO ROZHEN

T. Bonev
Institute of Astronomy of the Bulgarian Academy of Sciences, Republic of Bulgaria

The 2-meter reflector of the National Astronomical Observatory (NAO) Rozhen offers two main modes of observations: imaging in the Ritchey-Chretien (RC) focus and spectroscopy in the Coude focus. In the direct imaging mode a back-illuminated CCD camera VersArray 1330B is used, comprising 1340x1300 px with a spatial scale = 0.25 arcsec/px. A faster alternative for direct imaging is provided by a two-channel focal reducer. This instrument allows observations in the blue and red spectral region simultaneously. It transforms the focal ratio from f/8 to f/2.8 and offers several additional modes of observations: narrow-band imaging, polarimetric imaging, Fabry-Perot imaging, low-dispersion spectroscopy. The Coudé spectrograph allows obtaining high signal-to-noise, high resolution (up to 35000) stellar spectra.

The most recent upgrade of the 2 meter telescope was accomplished in 2008, the main mirror and the first deflecting mirror to Coude were recoated with a new reflective layer. This increased the efficiency of the observations by a factor of two. A running upgrade is the design, manufacturing and installation of a new telescope control system (should be commissioned in September this year). A project started for the design and manufacturing of an echelle spectrograph with parameters similar to FEROS. An improvement of the infrastructure around the telescope is planned for the next year: the Observatory should be connected to the National Research and Educational Network by an optical fiber, thus ensuring faster communication with the rest of the world. These upgrades are funded by the Bulgarian Academy of Sciences and by the National Science Fund under contract DO 02-85.

Section 3: **Stellar & Solar Physics**
Time: September 30, Wednesday, 17:30 – 17:50
Contributed talk

OBSERVING FACILITIES IN EUROPE, FOR RESEARCH AND TEACHING

M. Dennefeld
Institut d'astrophysique de Paris, French Republic

I will emphasize the need to train young researchers in observing techniques, in the era of very large telescopes and describe the basic requirements. I will then review possible schemes, based on previous experience, which could be developed for that purpose. I will finally describe a number of medium-size telescopes in Europe which could be used for training and research, and discuss the way to access them.

Posters

Poster 1:

CCD Observations of a close binary system V1001 Cas in 2009

N. Alan
Ankara University, Republic of Turkey

Photometric observations of a close binary system V1001 Cas were made in this study. System was discovered in 2003 by means of unfiltered observations made by Nakajima, Yoshida, and Ohkura. System's first observations in VRI filters were made in Ankara University Observatory with a 0.4 m Cassegrain Telescope attached to Apogee ALTA U47 CCD camera. First light curves of the system by using these observations were obtained. Also 4 new times of minima were calculated and the light elements were updated. After updating the light elements, a phase shift was also determined. The study is ongoing and the radial velocity curve will be acquired by means of spectral observations. As a result of the study, it is expected that physical parameters of the system will be extracted for the first time.

Poster 2:

Observations of the comet C/2007 N3 (Lulin) with the 2-chanel Focal Reducer Rozhen

G. Borisov
Institute of Astronomy of the Bulgarian Academy of Sciences, Republic of Bulgaria

In this poster the results from the observations of the comet C/2007 N3 (Lulin) were presented. The comet was observed at 23 and 24 February 2009, when it was at its closest approach to the Earth (at geocentric distance Δ=0.411 A.U.). For the observations the 2m Ritchey-Chretien-Coude Telescope at the Bulgarian National Astronomical Observatory Rozhen equipped with 2-channel focal reducer and a set of narrow-band filters and prisms were used. This combination was used for obtaining narrow band images and low dispersion spectra of the comet's coma. The both kind of observations were calibrated to fluxes in units of [erg cm^{-2} s^{-1} A^{-1}] using spectrophotometric standard stars. The dust production rate in terms of Afρ and production rate and scale lengths of parent and daughter molecules of observed neutral coma are calculated. In the neutral coma an inhomogeneous is detected. The images were investigated for jet-like structures with radial image enhancement filter and significant structures were detected.

Poster 3:

CRATER FORMATION: A SIMPLE APPLICATION OF SOLID STATE PHYSICS

V. Čelebonović[1], J.Souchay[2]
[1]*Institute of Physics, Republic of Serbia*
[2]*Observatoire de Paris, French Republic*

Craters of various sizes exist on planets, their satellites and (at least some of) the asteroids. One of the general questions concerning them is what can be concluded when combining data acquired by astronomical observation and results of experimental or theoretical solid state physics. The aim of this contribution is to present a simple calculation that gives the possibility of estimating the speed of the impactor in terms of various material parameters of the target. The physical idea on which the calculation is based is relatively simple: the kinetic energy per unit volume of the impactor is equal to the lattice energy per unit volume of the target.
The resulting expression contains the temperature and density of the target and the speed of the elastic waves in it. This speed is related to the pressure and density of the target. Of course, for any kind of practical application of the expression obtained, one needs either to "put by hand" some value of the speed of the elastic waves, or to introduce a realistic equation of state of the material of the target. As an illustration, we have used the so called Birch-Murnaghan equation of state [2], and one of its later equivalents This calculation is a first step aiming at a combination of solid state physics and material science with pure astronomy.

Poster 4:

OBSERVATIONS WITH SMALL RADIO TELESCOPE

V. Dimitrova, F. Petkova
University of Sofia, Republic of Bulgaria

We estimate the gravitational mass of our galaxy Milky way using 21-cm spectral lines, which were observed with a Small Radio Telescope (SRT). SRT is located at Sofia Observatory. Hydrogen radiation is not impeded by interstellar dust, so these measurements are accurate. We observed the deviation from the Keplerian prediction for the velocity of the hydrogen in a circular orbit. It has turned out that the dark matter in Milky way makes up approximately 56% of the entire mass of the Galaxy on a distance of 8.5 kpc and the visible matter 44% of the mass on the same distance. After 76 years from the discovery of Fritz Zwicky, the problem with the missing mass in galaxies and clusters still exists.

Poster 5:

COMPARING OBSERVED PROMINENCE SPECTRA WITH MODELS COMPUTED USING GHV CODE

I. Milić[1], P. Kotrč[2]
[1]*University of Belgrade, Republic of Serbia*
[2]*Astronomical Institute, Czech Republic*

Emission spectra in seven lines have been computed for 980 prominence models using code originally developed by Gouttebrose, Heinzel and Vial. The prominence is treated as an isothermal, isobaric, 1-D slab, with the input parameters determining the outgoing radiation. Equations have been solved for a 12-level hydrogen atom. Computed emission spectra in H lines have been compared with observations and the found best fits have been discussed.

Poster 6:

GLOBAL PARAMETERS OF 50 ECLIPSING BINARIES WITH CIRCULAR ORBITS IN THE SMALL MAGELLANIC CLOUD

V. Ivanov, D. Kjurkchieva
Shumen University, Republic of Bulgaria

The study of eclipsing binaries is very important for modern astrophysics because these stars are one of the most useful sources of information about the stellar parameters and consequently provide empirical tests of the stellar evolution theory. Moreover, the investigation of eclipsing binaries in large and homogenous samples makes it possible to improve the empirical statistical relations between the stellar parameters. As a part of such an extensive investigation we modeled the light curves of 50 eclipsing binary stars with circular orbits obtained in the framework of the project OGLE. All target stars are located in region of the Small Magellanic Cloud with high star density (5-th field according to the OGLE numeration). The statistical analysis of the obtained global parameters (radii, masses, temperatures, luminosities) of the stellar components leads to some interesting conclusions.

Poster 7:

DETERMINATION OF THE ORBITAL PERIOD OF THE CATACLYSMIC STAR ER UMA FROM BR OBSERVATIONS IN 2008

D. Kjurkchieva, D. Marchev
Shumen University, Republic of Bulgaria

We presented BR observations of the cataclysmic star ER UMa covering three consecutive cycles. The light cycles in the two colors are asymmetric – the light decrease is steeper than the light increase. There are some features on the increasing branch of the light curves. The light maxima of the three consecutive cycles showed that the star was at a quiescent state. The levels of the three maxima are almost equal, while the depth of the third light minimum is almost 2 times bigger than that of the first two minima. Thus, the amplitude of the third light curve is around 0.85m that is the biggest value ever observed. The gradual decrease of the B-R index means that the binary become bluer during our observational run. The Fourier analysis of our B and R data showed a well-pronounced period of 0.0607 d. We interpreted it as orbital period of the binary.

Poster 8:

PROPOSITION FOR ESTABLISHMENT OF EDUCATIONAL OFFICE OF SUB-REGIONAL EUROPEAN ASTRONOMICAL COMMITTEE (SREAC)

D. Kjurkchieva[1], D. Marchev[1], B. Borisov[1], V. Radeva[2]
[1]*Shumen University, Republic of Bulgaria*
[2]*Astronomical observatory and Planetarium "Nikolai Kopernik", Republic of Bulgaria*

The main aim of the establishment of Balkan Educational Office in Astronomy (BEOA) in the framework of SREAC is to unite the efforts of the teachers and researchers to raise the student and pupil attention to education in astronomy. This means to create effective links between the school and the research community as well as to realize the Balkan school observatory. This idea may be realized on the base of past and present projects (as educational projects Discovery Space and COSMOS, scientific projects as SMARTNET, etc). The tasks of the BEOA will be: the creation of new educational resources (lessons, practical exercises, presentations, etc.) as a result of the work of teams of researchers and teachers; distribution of observational time of the telescopes

of SMARTNET and other similar equipment; organization and realization of workshops for teachers in astronomy as well as summer schools for pupils and students; coordination of the activities of all educational and scientific institutions for popularization of astronomy; creation of the Balkan astronomical educational portal; publishing of e-information bulletin; efforts for the unification of education in astronomy of the neighbor countries. We propose Shumen University to be the headquarters of BEOA due to its experience in astronomy education and realization of many educational projects.

Poster 9:

BULGARIAN ACTIVITIES IN THE PROJECT COSMOS: AN ADVANCED SCIENTIFIC REPOSITORY FOR SCIENCE TEACHING AND LEARNING

D. Marchev[1], D. Kjurkchieva[1], B. Borisov[1], V. Radeva[2]
[1]Shumen University, Republic of Bulgaria
[2]Astronomical observatory and Planetarium "Nikolai Kopernik", Republic of Bulgaria

One of the main purposes of the European educational project COSMOS (co-funded by the European Commission under the program eContentplus), is to create an experimental laboratory for the school of tomorrow in order to improve the education in astronomy by expanding the resources for teaching and learning in schools and universities and by providing more challenging and authentic learning experiences for students. A large educational database was created as a result of the project activities made by 15 partner institutions. The unusual electronic “library” offers to students and teachers unique educational resources: learning scenarios, images, presentations, videos and animations (most of them are impossible to produce in any scientific laboratory). It is freely accessible to anyone, anywhere, anytime. Our poster presents the contribution of the Shumen university (the only partner from Bulgaria) in the project: uploading more than 12000 astronomical images in the COSMOS portal; creation of 45 learning scenarios; holding 5 teaching workshops at different places for more than 100 Bulgarian teachers to use the possibilities of the COSMOS portal (including creation of their own learning scenarios). Our analyses of the questionnaires filled-in by the participating teachers shows the necessity of such projects and workshops.

Poster 10:

PHOTOMETRIC MONITORING OF GSC 2696-2622 VARIABILITY

N. Nanouris, E. Antonopoulou
University of Athens, Hellenic Republic

The poster deals with the possible variability of GSC 2696-2622. GSC 2696-2622 is located in the vicinity of the eclipsing binary CG Cyg and thus the former has been chosen several times as a comparison star of the latter. Therefore, variability in the brightness of GSC 2696-2622 could lead to incorrect conclusions of the CG Cyg behavior, a fact that renders the clarification of its photometric features highly crucial. Our work focuses on high resolution and precision photometric observations taken by two observatories during July and August of 2008 and 2009. The results, supported by Fourier analyses, confirm that the star is a semi-periodic variable with amplitude that varies on a timescale of hours.

Poster 11:

PROGRESS IN SUPPRESSING SCATTERED LIGHT INTO THE OPTICAL BEAM PATH OF THE NAO ROZHEN 2M TELESCOPE

E. Ovcharov[1], N. Petrov[2], H. Markov[2], T. Bonev[2], Z. Donchev[2],
P. Markishki[3], A. Valcheva[1]
[1]*University of Sofia, Republic of Bulgaria*
[2]*Institute of Astronomy of the Bulgarian Academy of Sciences, Republic of Bulgaria*
[3]*Society of the Astronomers, Republic of Bulgaria*

The spatial dependence of the instrumental magnitudes, derived from direct imaging in the RC focus of the NAO Rozhen 2m telescope is a well known problem, widely discussed in the recent few years. An alert for the possible reason was the unusually curved flat field images taken as a part of the standard CCD calibration procedure. This was the reason to look more thoroughly on the process of light scattering in the optic beam of the telescope. In this poster we present the progress of our efforts in this direction and demonstrate the first results.

Poster 12:

FOUR NOVAE IN M31 - BRIGHTNESS, COLOR DEPENDENCIES AND MMRD

E. Ovcharov[1], A. Valcheva[1], P. Nedialkov[1], T. Trifonov[1], N. Kacharov[1],
R. Bachev[2], T. Georgiev[2]
[1]*University of Sofia, Republic of Bulgaria*
[2]*Institute of Astronomy of the Bulgarian Academy of Sciences, Republic of Bulgaria*

We present photometric and astrometric data for four novae in galaxy M31, discovered in August 2009. The photometric data are mostly in filter R (Cousins) and for part of the novae BV (Johnson) magnitudes are available. The data were obtained with the 50/70cm Schmidt telescope and 60cm Cassegrain telescope at NAO Rozhen and AO Belogradchik observatories, respectively. The observations were carried out in period of 11 nights in the second half of August. The available data (optical and spectroscopic) from other sources are also included. Finding charts, photometry and astrometry tables are presented. Light curves and time dependencies of the colors are displayed. Maximum magnitude - rate of decline (t_2) is estimated.

Poster 13:

A NEW LOOK AT THE MAGELLANIC CLOUD CLUSTER SYSTEM

P. Pessev
Gemini South, Chile

In order to extract the basic stellar parameters we use the asteroseismic inversion method where the observed oscillation frequencies are used to estimate the stellar parameters. The inversion is a process where the best estimated parameters for a given star correspond to the input parameters for the model that shows frequencies most similar to the observed ones. We have computed a wide grid of stellar models and their associated oscillation frequencies and we have designed a tool to evaluate the value of χ^2 on that grid for different possible sets of observational data. Stellar models have been calculated with the CESAM stellar evolution code for values of mass in the range 0.8 - 4.0 solar masses, initial metalicity Z in mass fraction in the range 0.006 - 0.04 and initial helium abundance in the range 0.26 - 0.28, and we considered different values or options for the input physics of the models (microscopic diffusion, mixing - length parameter of convection, overshooting). The oscillation frequencies

have been computed with the LNAWENR non-adiabatic code for modes of degree l=0, 1, 2, 3.

Poster 14:

BLUE STRAGGLERS

B. Petrov
University of Sofia, Republic of Bulgaria

Blue stragglers (BSS) are stars in open or globular clusters that are hotter and bluer than other cluster stars having the same luminosity. Thus, they are separate from the other stars on the cluster's Hertzsprung-Russell diagram. Blue stragglers appear to violate standard theories of stellar evolution, which holds that stars formed at the same time in a cluster should lie along a clearly defined curve in the Hertzsprung-Russell diagram, with their positions on that curve determined solely by their initial mass. Since blue stragglers often lie well off this curve, they may undergo atypical stellar evolution.

Poster 15:

EXPLORATION OF PARAMETER SPACE FOR MODELING COROT AND KEPLER TARGETS WITH CESAM CODE

D. Pricopi, M. D. Suran
Astronomical Institute of the Romanian Academy, Romania

In order to extract the basic stellar parameters we use the asteroseismic inversion method where the observed oscillation frequencies are used to estimate the stellar parameters. The inversion is a process where the best estimated parameters for a given star correspond to the input parameters for the model that shows frequencies most similar to the observed ones. We have computed a wide grid of stellar models and their associated oscillation frequencies and we have designed a tool to evaluate the value of χ^2 on that grid for different possible sets of observational data. Stellar models have been calculated with the CESAM stellar evolution code for values of mass in the range 0.8 - 4.0 solar masses, initial metalicity Z in mass fraction in the range 0.006 - 0.04 and initial helium abundance in the range 0.26 - 0.28, and we considered different values or options for the input physics of the models (microscopic diffusion, mixing - length parameter of convection, overshooting). The oscillation frequencies

have been computed with the LNAWENR non-adiabatic code for modes of degree l=0, 1, 2, 3.

Poster 16:

INTERNATIONAL SUMMER SCHOOLS "ROZHEN" AND THEIR ROLE IN ASTRONOMY EDUCATION FOR STUDENTS AND TEACHERS

V. Radeva
Astronomical observatory and Planetarium "Nikolai Kopernik", Republic of Bulgaria

For the past seven years teachers and students from different European countries have attended the International summer schools at the National Astronomical Observatory "Rozhen", Bulgaria. During the schools there is a cycle of theoretical astronomy education, a series of practical tasks and a rich observational program. In the observational program, whose completion is the primary task of the students, two professional telescopes are used together with astronomers from the National astronomical observatory: a 50/70 cm Schmidt telescope and a 60 cm telescope. During the program, the students become familiar with the work of astronomers, they learn how to work with observational equipment, astronomical software for controlling CCD cameras and for image processing. The students make astrometric observations of comets and asteroids, they observe extrasolar planets, supernovas, star clusters, galaxies and nebulae with the goal to prepare a student Messier catalogue; they observe Saturn, Jupiter and its satellites, and the Moon, with the goal to register short-term lunar phenomena. The intensive training during the international astronomical observing summer schools contributes to the enrichment of the astronomical knowledge of the participants and the development of their skills in working with observing equipment and analytical software. A significant success of the schools is the large percentage of student-participants who continue their careers in the field of astronomy.

Poster 17:

REAL AND VIRTUAL ASTROMETRIC OBSERVATIONS OF COMETS AND ASTEROIDS

V. Radeva
Astronomical observatory and Planetarium "Nikolai Kopernik", Republic of Bulgaria

In this poster we present results from comet and asteroid observations made by students during the Astronomical Summer Schools at the National Astronomical Observatory "Rozhen", Bulgaria. In addition to results from analysis of asteroid observations, we present the discovery of new asteroids in collaboration with the NASA Near Earth Object Observations Program - Killer Asteroid Project, by a team of students from several schools from Varna, Bulgaria.

Poster 18:

OLD COINS RELATED TO ASTRONOMY

E. Rovithis-Livaniou, F. Rovithis
University of Athens, Hellenic Republic

Some interesting old coins, coming from different places and made from various materials are presented. What is common in all these coins is their relation to various astronomical subjects like the stars, comets, the zodiac etc. A general discussion is given, too.

Poster 19:

FULL KINEMATIC PROFILES OF NEARBY GALAXIES

S. Samurović, A. Lalović, O. Vince
Astronomical Observatory Belgrade, Republic of Serbia

We describe our new sample of nearby galaxies extracted from the Sloan Digital Sky Survey (SDSS). It consists of 573 galaxies (244 early-type and 329 late-type galaxies). This is the largest sample obtained to date that contains full kinematic profile (of the inner region) of each galaxy; we have calculated: velocity, velocity dispersion, and Gauss-Hermite parameters h3 and h4, which describe asymmetric and symmetric departures from the Gaussian, respectively.

Poster 20:

SPECTROSCOPIC STUDY OF BETA CEPHEI STARS AT ROZHEN OBSERVATORY

I. Stateva[1], E. Niemczura[2], I. Iliev[1]
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Beta Cephei stars are massive non-supergiant variable stars with spectral types O or B whose light, radial-velocity and/or line-profile variations are caused by low-order pressure- and gravity-mode pulsations. Variability of Beta Cephei stars is driven by the classical kappa-mechanism, operating in the layer of the metal opacity bump induced by the large number of absorption lines of the iron-group elements. Asteroseismology is a promising new method to study the internal structure of pulsating stars through the interpretation of their frequency spectra. This technique allows us to measure the fundamental parameters in a star with high precision and to make a quantitative comparison of data with stellar models. To make a successful seismic model of Beta Cephei stars we need rich frequency spectra (obtained on the basis of photometric and spectroscopic observations) and stellar fundamental parameters like effective temperature, surface gravity, luminosity and abundances of chemical elements. We plan to collect high signal-to-noise, high-resolution, time-resolved spectroscopic observations of a few interesting Beta Cephei stars, in the spectral regions where helium, silicon and oxygen lines are observed. These spectra will be used to determine the pulsational parameters of the stars. At the same time, we plan to get the stellar spectra at the broad range, in order to derive the atmospheric parameters of analyzed objects.

Poster 21:

NOVAE SEARCH IN M31 WITH THE NAO ROZHEN TELESCOPES

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We present a long-term optical search for novae in our neighbor galaxy M31, based on observations with the 2m-RCC telescope and 50/70cm Schmidt telescope at NAO Rozhen, Bulgaria. Our monitoring of the M31 central region yields ~15% of all newly discovered novae during the last five years. The images were inspected manually and the photometry of the candidates is carried out with IRAF.
Here we report coordinates and R-band magnitudes for 16 newly discovered nova candidates. All available data from optical and spectroscopic observations for these novae are also summarized. Finding charts and light curves are presented. For most of the novae the maximum magnitude - rate of decline (t_2) is estimated.

Poster 22:

COSMOLOGICAL DETERMINANTS IN THE WORKS OF BRANISLAV PETRONIJEVIĆ

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Cosmology and its determinants occupy an important place in the philosophy of science, also belonging to the very wide field of interest of Branislav Petronijević, one of the most original and most productive scientists and philosophers in Serbia in the first half of the XX century. In this paper, a presentation of Petronijević's cosmological studies is given and his views in this matter are discussed.

Poster 23:

VSAA: A PROGRAM FOR TIME-FREQUENCY ANALYSIS IN TIME-SERIES

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The VSAA code has been developed to address the problem of tracing a single variable frequency through a given time-series. It is designed to perform accurate TFA analysis in cases of a single variable frequency. VSAA analyzes time-series of any type in the joined time-frequency domain, and thus provides an accurate description of the time variation. This makes the method ideal for tracing single variable periodicities and can

be applied in many scientific fields like Astronomy, Physical Sciences, Medical Sciences, Economics, and Social Sciences.
A graphical user interface has recently been developed for the code, making the use of the program easy, quick and practical. All the parameters of the analysis are easily accessible and the results are given in the form of both diagrams and tables. The program can run under any Windows OS platform and it is freely available through the phys.uoa.gr/VSAA website. On this site one can find the free installer and also more information, tutorials and news about the development of the program.

Poster 24:

MULTICOLOUR FLICKERING OBSERVATIONS OF V425 CAS

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Simultaneous CCD observations from a few nights using all UBVRI bands are presented for the cataclysmic variable V425 Cassiopeia. The flickering amplitude is analyzed from the light curves - there is a correlation with the mean flux raised to a power of about 1.30 using all bands. The value is closer to such a coefficient for the symbiotic star CH Cyg than the coefficient for the cataclysmic variable KR Aur.

Poster 25:

3D MHD SIMULATION OF MAGNETOCONVECTION VS. OBSERVATIONS

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In this contribution we will discuss how a state-of-art 3D MHD simulation of umbral magnetoconvection compares to the most important observational diagnostics. The monochromatic continuum, center-to-limb variation and Stokes profiles of the FeI 6302 lines are computed and compared with up-to-date observational results.

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