5th Serbian Conference on Spectral Line Shapes in Astrophysics

Vršac, 6-10 June 2005

PROGRAM AND ABSTRACTS

eds. Milan S. Dimitrijević and Luka Č. Popović

Prirodnjačko društvo "Gea" Vršac

Vršac 2005

Izdavač
Prirodnjačko društvo "Gea",
Dom omladine Vršac,
Dvorska 28, 26300 Vršac
email: geapdvs@hemo.net

Za izdavača
Dejan Maksimović

Kompjuterski slog
Tatjana Milovanov Milenković

Naslovna strana
Zoran Simić

Štampa
"Tuli" štamparija
Vršac, Beogradska bb

Tiraž
100

V Serbian Conference on Spectral Line Shapes in Astrophysics (V SCSLSA)
6-10 June 2005, Vršac, Serbia

Organized by Belgrade Astronomical Observatory and
Naturalists Society "Gea" Vršac

Scientific Organizing Committee:

Milan S. Dimitrijević (Co-chairman, Astronomical Observatory, Belgrade, Serbia)
Luka Č. Popović (Co-chairman, Astronomical Observatory, Belgrade, Serbia)

John Danziger (Osservatorio Astronomico di Trieste, Italy)
Emanuel Danezis (University of Athens, Greece)
Darko Jevremović (Astronomical Observatory, Belgrade, Serbia)
Evencio Mediavilla (Instituto de Astrofsica de Canarias, Spain)
Anatolij A. Mihajlov (Institute of Physics, Zemun, Serbia)
Vladimir Milosavljević (Faculty of Physics, Belgrade, Serbia)
Jagoš Purić (Faculty of Physics, Belgrade, Serbia)
Tanya Ryabchikova (Institute of Astronomy, Russian Academy of Sciences, Russia)
Myakzyum Kh. Salakhov (Kazan State University, Russia)
Aleksandar F. Zakharov (Institute of Theoretical and Experimental Physics, Moscow, Russia)

Local Organizing Committee:

Milan S. Dimitrijević (Chairman, Astronomical Observatory, Belgrade, Serbia)
Dragana Ilić (Secretary, Faculty of Mathematics, Belgrade, Serbia)

Edi Bon (Astronomical Observatory, Belgrade, Serbia)
Vesna Borka (Astronomical Observatory, Belgrade, Serbia)
Miodrag Dačić (Astronomical Observatory, Belgrade, Serbia)
Predrag Jovanović (Astronomical Observatory, Belgrade, Serbia)
Dejan Maksimović (Naturalists Society "GEA", Vršac, Serbia)
Tanja Milovanov (Astronomical Observatory, Belgrade, Serbia)
Nenad Milovanović (Astronomical Observatory, Belgrade, Serbia)
Zoran Simić (Astronomical Observatory, Belgrade, Serbia)

CONTENTS

INVITED LECTURES

LIST OF POSTERS

INVITED LECTURES

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Invited lecture

INFLUENCE OF GRAVITATIONAL MICROLENSING ON BROAD EMISSION LINES OF QUASARS

CRISTINA ABAJAS[1], EVENCIO MEDIAVILLA[1] and LUKA Č. POPOVIĆ[2]

[1]*Instituto de Astrofísica de Canarias, Vía Láctea s/n, 38200 La Laguna, Tenerife, Spain*
[2]*Astronomical Observatory, Volgina 7, 11160 Belgrade, Serbia*
E–mail: abajas@iac.es

The change in the continuum flux of quasars by stars or compact object in intervening galaxies (gravitational microlensing) is a well-established observational phenomenon. X-Ray and Optical observational evidences about microlensing on broad emission lines (BEL) have very recently appeared. Using different kinematic and geometrical models for the broad line and the continuum regions we study the effects of microlensing on the light curves of the continuum and BEL of quasars at high optical depth in several known lens system. We also study the correlation between the BEL and continuum amplification according to these models.

Invited lecture

THE IMPORTANCE OF ALKALI LINE BROADENING IN BROWN DWARF ATMOSPHERES

F. ALLARD[1], N.F. ALLARD[2], D. HOMEIER[3], P.H. HAUSCHILDT[4] and M.J. McCAUGHREAN[5]

[1]*École Normale Supérieur CRAL, 46 Allé d'Italie, F-69364 Lyon Cedex 7, France*
[2]*Institut d'Astrophysique de Paris, CNRS, 98bis boulevard Arago, 75014 Paris, France*
[3]*Institut für Astrophysik, Georg-August-Universität*
Friedrich-Hund-Platz 1, D-37077 Göttingen, Germany
[4]*Hamburger Sternwarte, Gojenbergsweg 112, D-2 1029 Hamburg, Germany*
[5]*Astrophysikalisches Institute Potsdam, An der sternwarte 16, D14482 Potsdam, Germany*
E–mail: fallard@ens-lyon.fr

We present theoretical calculations of absorption profiles of sodium and potassium perturbed by helium and molecular hydrogen. The profiles have been included in model atmospheres of brown dwarfs to predict synthetic spectra which have been compared to previous calculations based upon Lorentz profiles and the classic van der Waals approximation. We find that the unified profiles provide increased opacities in the optical spectra of methane brown dwarfs, in agreement with previously reported missing opacities in the models. Moreover, we find that the satellite of the interaction between the potassium doublet at 0.77 μm and H_2 produces a spectral feature around 0.69μm which might have been observed in the composite spectrum of the T-type brown dwarf binary system Eps Indi B.

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Invited lecture

SPECTROSCOPIC STUDY OF PLASMA FLOWS CREATED BY A MAGNETOPLASMA COMPRESSOR

V.M. ASTASHYNSKI[1], M.M. KURAICA[2,3], I.P. DOJČINOVIĆ[2] and J. PURIĆ[2,3]
[1] *Institute of Molecular and Atomic Physics, National Academy of Sciences of Belarus, F. Scaryna Ave. 70, 220072 Minsk, Belarus*
[2] *Faculty of Physics, University of Belgrade, P.O. Box 368, 11001 Belgrade, Serbia*
[3] *Center for Science and Technology Development, Obilićev Venac 26, Belgrade, Serbia*
E–mail: ast@imaph.bas-net.by

The results of spectroscopic investigations of compression plasma flows generated by gas-discharge and erosive magnetoplasma compressors are presented. The spatially- and time-resolved measurements of temperature and electron concentration of compression plasma flows in such quasi-stationary plasma accelerators (plasma guns) are considered. To characterize the quasi- stationary plasma flow, the special dynamic coefficients were introduced. These coefficients are calculated on the basis of the obtained temporal evolution of the electron density and temperature in plasma.

Invited lecture

OVERVIEW OF SUPERNOVA MODELING WITH PHOENIX

EDWARD BARON
Dept. of Physics & Astronomy, University of Oklahoma
440 W. Brooks, Rm 131, Norman, OK 73019-2061 USA
E–mail: baron@nhn.ou.edu

I describe the use of the generalized stellar atmosphere code PHOENIX to model both Type Ia and Type II supernovae and present results that shows that both types of supernovae can play an important role in our understanding of cosmology.

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Invited lecture

INTERACTION POTENTIALS FOR SPECTRAL LINE SHAPES IN PLASMA

NÉBIL BEN NESSIB

Groupe de Recherche en Physique Atomique et Astrophysique,
Faculté des Sciences de Bizerte, 7021 Zarzouna, Tunisia
E–mail: nebilbennessib@planet.tn

In the standard formalism of Stark impact broadening of spectral lines and of cross sections, the electrostatic Coulomb potential is used to describe the interaction between the perturbing electrons and the emitting atom. Electronic correlations (screening effects) are usually taken into account by introducing a cut-off in the interaction when the electron-atom distance exceeds the Debye radius. A more consistent treatment to describe collective effects is the Debye-Hückel potential where the two-particle Coulomb field is shielded by the ensemble of the surrounding electrons. This is a good approximation only for high temperature and low density plasmas (weakly non ideal plasmas), while for strongly non ideal plasmas, the Coulomb cut-off potential or the ion sphere potential are more appropriate. These potentials, which can be written as the Coulomb potential with one or two correcting terms, are used for Stark impact broadening. New semi-classical collisional functions are derived for both the transition probability and the cross section, using the classical path approximation.

The Coulomb potential is expanded in multipolar components and only the long range part is retained in the perturbation theory and in addition only the dipole term is retained for the calculation of the cross-sections between the levels that are dipolar electric transitions.

Using the parametrization of the straight path trajectory in the collision frame, the semi-classical collisional functions for isolated neutral lines $A(z)$ and $a(z)$ are expressed in terms of the modified Bessel functions $K_0(z)$ and $K_1(z)$, these functions are revised when using the cutoff or ion sphere potential.

We have compared the effects of the Coulomb, cut-off and ion sphere potentials on the different collisional functions. The numerical results show that the increase in the screening leads to a decrease in these functions, especially for the lower values of the impact parameter.

We investigate also a full quantum model based on quasiparticles treatment to describe the electron ion interaction in a non ideal plasma. We developed this simplified quantum formalism of the emission which take into account the interaction between particles such that it becomes applicable to a weakly non ideal plasma. We give analytic expression of the line width and explain the non linearity of the width via the density observed in some experiments.

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Invited lecture

SPECTROSCOPY OF THE DISCHARGES CREATED AND MAINTAINED BY A SURFACE-WAVE

DOLORES CALZADA-CANALEJO

Grupo de Espectroscopía de Plasmas, Dpto. de Física, Edificio C-2, Campus de Rabanales. Universidad de Córdoba, 14071 Córdoba, Spain
E–mail: fa1cazal@uco.es

The discharges created and maintained by a surface-wave (SWD) are of a special type of microwave discharge, characterized by having dimensions higher than the wavelength of the electromagnetic field that is maintaining them, and the coupler device of the microwave energy. From an experimental point of view, the surface wave discharge has several characteristics that make it especially useful in the research of basic plasma physics, and can also be applied in different fields of science and technology. These characteristics are a) the wide range of pressure (mTorr-some atmospheres) and frequency (MHz-GHz), b)the use of different atomic (Ar, He, Kr, Xe) and molecular (N_2 and O_2) gases and their mixtures, with flows lower than 0.5 l/min against several l/min that another plasma type such as the ICP ($\sim$ 10l/min), c) the discharge extension outside the exciter device and, in this way, long plasma columns, and d) also, to point out, the absence of the significant fluctuations and instabilities and a very good reproducibility.

In recent years, SWDs are used in an increasing number of applications, such as surface treatment (formation and deposition of thin material films in the manufacturing of, for example, electronic devices), light sources, emission of laser radiation, sterilization and spectrochemical analyses. Knowing the processes (internal kinetics) which take place in the plasmas is essential if we want correctly to carry out these applications. The processes in the plasma depend on the parameter values of the plasma such as temperatures and densities. For measuring these parameters, we can use techniques of passive spectroscopy, because the wide range and intensity of the spectral lines emitted by the atoms and ions into the discharge. Starting from intensities, broadenings and shifts of the spectral lines we obtain information about the basic parameters of the plasma, such as electron density (n_e) and temperature (T_e), gas temperature (T_g) and the densities of excited atoms ($n(p)$) of the discharge such as the metastable atoms.

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Invited lecture

THE HIDDEN NATURE OF NARROW-LINE SEYFERT 1 GALAXIES

S. CIROI, V. BOTTE, P. RAFANELLI, F. DI MILLE and A. ROMANO

Department of Astronomy, Padova university,
Vicolo dell'osservatorio 2, I-35122 Padova, Italy
E–mail: ciroi@pd.astro.it

Narrow-Line Seyfert 1 (NLS1) galaxies are relatively rare objects among type 1 nearby Active Galactic Nuclei (AGN), and after almost two decades since their first classification, they are still a matter of debate. Their peculiar properties, like narrow permitted emission lines (FWHM(H_beta)<2000 km/s), steep slopes and rapid variability in the soft X-ray domain, and the optical/UV Big Blue Bump shifted towards higher energy, are currently interpreted as active nuclei younger than "classical" Seyfert 1 (S1) galaxies, powered by smaller supermassive Black-Holes ($M_BH\ 10^6 - 10^7\ M_sun$), and accreting at higher rates. To date this paradigma is not yet proved. Other possible scenarios were proposed and several authors challenged this topic from different points of view. I will present a short review about the optical spectroscopic properties of NLS1s and recent results obtained within our group in investigating the BH-bulge relation of AGNs as a test for the NLS1-paradigma.

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Invited lecture

A NEW MODELING APPROACH FOR DACs AND SACs REGIONS IN THE ATMOSPHERES OF HOT EMISSION STARS

E. DANEZIS[1], D. NIKOLAIDIS[1], E. LYRATZI[1], L.Č. POPOVIĆ[2],
M.S. DIMITRIJEVIĆ[2], E. THEODOSSIOU[1] and A. ANTONIOU[1]

[1] *University of Athens, School of Physics, Department of Astrophysics, Astronomy and Mechanics, Panepistimiopolis, Zografos 157 84, Athens – Greece*
[2] *Astronomical Observatory, Volgina 7, 11160 Belgrade, Serbia*
E–mail: edanezis@cc.uoa.gr

The presence of Discrete Absorption Components (DACs) or Satellite Absorption Components (SACs) is a very common phenomenon in the atmospheres of hot emission stars (see Danezis et al. 2003, Lyratzi & Danezis 2004) and result to the complex line profiles of these stars. The shapes of these lines are interpreted by the existence of two or more independent layers of matter nearby a star. These structures are responsible for the formation of a series of satellite components for each spectral line. Here we will present a model reproducing the complex profile of the spectral lines of Oe and Be stars with DACs and SACs (Danezis et al. 2003, Lyratzi & Danezis 2004). In general, this model has a line function for the complex structure of the spectral lines with DACs or SACs and include a function L that considers the kinematic (geometry) of an independent region. In the calculation of the function L we have considered the rotational velocities of the independent regions, as well as the random velocities within them. This means that the new function of L is a synthesis of the rotational distribution and a physical Gaussian. Finally, we calculate the optical depth (τ) and the column density (d) of each independent density region.

References

Danezis, E., Nikolaidis, D., Lyratzi, V., Stathopoulou, M., Theodossiou, E., Kosionidis, A., Drakopoulos, C., Christou G. & Koutsouris, P.: 2003, *Ap&SS*, **284**, 1119.

Lyratzi, E. and Danezis, E. 2004, AIP Conference Proceedings 740, pp. 458-473 [THE PHYSICS OF IONIZED GASES: 22nd Summer School and International Symposium on the Physics of Ionized Gases, Bajina Bašta, 23-27 August 2004, eds. Lj. Hadzijevski, T. Grozdanov, N. Bibić].

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Invited lecture

THE ROLE OF LINE PROFILES IN ANALYZING SPECTRA OF SUPERNOVAE

JOHN DANZIGER
Osservatorio Astronomico di Trieste, Italy
E–mail: danziger@ts.astro.it

It is intended to show how the measurement of absorption and emission line profiles from supernova envelopes can be used as diagnostic tools. In various ways they allow one to draw quantitative conclusions about physical conditions in the expanding envelope and in the surrounding gas. Various applications have given information on: dust formation and its distribution in the envelopes; on shock interaction with the circum-stellar material in which both forward and reverse shocks may be present; on stratification of material and particular elements in the expanding envelopes; on the distribution of material surrounding supernovae.

Invited lecture

WHISTLER WAVE – PARTICLE INTERACTION IN A TEMPERATE IONOSPHERE-LIKE PLASMA

ALBERT ELLINGBOE
Dublin City University, School of Physics
Plasma Research Laboratory,
Collins Avenue, Glasnevin, Dublin, Ireland
E–mail: be@physics.dcu.ie

Whistler waves are produced when beam electrons, produced by a lightning strike near one of earths magnetic poles, approach the opposite pole and the associated increase in magnetic field. Bound whistlers, called 'helicon waves', have been used to produce high-density, large-area plasmas. The nature of the wave-plasma interaction has received considerable investigation. Particularly contentious has been experimental verification of production of beams of hot electrons in an opposite-analogous method to the formation of whistlers. Measurements of the plasma-wave-fields and rf-phase-resolved optical emission spectroscopy has been used to demonstrate that bunched electrons are produced, and that the electrons propagate axially resonant with the propagating EM wave.

Invited lecture

EFFECTS OF LINE PROFILES IN T DWARFS

PETER HAUSCHILDT

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Invited lecture

PROCESSES OF ATOM – ATOM (n – n')-MIXING INFLUENCE ON HYDROGEN ATOM RYDBERG STATES POPULATIONS IN STELLAR ATMOSPHERES

LJUBINKO M. IGNJATOVIĆ[1], ANATOLIJ A. MIHAJLOV[1] and
MILAN S. DIMITRIJEVIĆ[2]
[1] *Institute of Physics, P. O. Box 57, 11001 Belgrade, Serbia and Montenegro*
[2] *Astronomical Observatory, Volgina 7, 11160 Belgrade 74, Serbia and Montenegro*
E–mail: ljuba@phy.bg.ac.yu

The $(n - n')$-mixing processes in $H^*(n) - -H(1s)$ collisions, have been considered from the aspect of their influence on of the $H^*(n >> 1)$ atom states in the weakly ionized layers of stellar atmospheres. These processes have been treated by the mechanism of the resonant energy exchange within the electron component of the considered collisional system. It was shown that these processes must have significant influence in comparison with corresponding electron-atom collision processes, on the populations of hydrogen Rydberg atoms in Solar photosphere and lower chromosphere (ionization degree of the order of 10^{-4}). From obtained results follows that the examinated $(n - n')$ mixing processes have to be included in the modelisation of Solar and cooler stars atmospheric plasma.

Invited lecture

RADIO SPECTROSCOPY OF ACTIVE GALACTIC NUCLEI

ANDREI LOBANOV
Max-Planck-Institut für Radioastronomie, Auf dem Hügel 69, 53121 Bonn, Germany
E–mail: alobanov@mpifr-bonn.mpg.de

Radio spectroscopy offers a number of tools for studying a large variety of astrophysical phenomena, ranging from stars and their environment to interstellar and intergalactic medium, active galactic nuclei (AGN) and distant quasars. Main targets of extragalactic radio spectroscopy are molecular and dust material in galaxies, HII regions, and maser emission originating in the dense, circumnuclear regions. These studies cover all galactic types and span an impressive range of angular scales and distances. Molecular emission, hydrogen absorption and maser lines have become the tools of choice for making an assessment of physical conditions in the nuclear regions of galaxies. In this contribution, some of the recent advances in the aforementioned fields will be reviewed and discussed in connection with future radio astronomical facilities.

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Invited lecture

A NEW APPROACH FOR THE STRUCTURE OF Hα REGIONS IN 120 Be STARS

E. LYRATZI[1], E. DANEZIS[1], D. NIKOLAIDIS[1], L.Č. POPOVIĆ[2],
M.S. DIMITRIJEVIĆ[2], E. THEODOSSIOU[1] and A. ANTONIOU[1]
[1] *University of Athens, School of Physics, Department of Astrophysics, Astronomy and Mechanics, Panepistimiopolis, Zografos 157 84, Athens – Greece*
[2] *Astronomical Observatory, Volgina 7, 11160 Belgrade, Serbia*
E–mail: elyran@cc.uca.gr

The spectra of a fraction of Oe and Be stars have Discrete Absorption Components (DACs) or Satellite Absorption Components (SACs) which create complex line profiles of these stars. The shapes of these lines are interpreted by the existence of two or more independent layers of matter nearby a star. These structures are responsible for the formation of a series of satellite components for each spectral line. First, here we will shortly present a model reproducing the complex profile of the spectral lines of Oe and Be stars with DACs and SACs (Danezis et al. 2003, Lyratzi & Danezis 2004). In general, this model has a line function for the complex structure of the spectral lines with DACs or SACs and include a function L that considers the kinematic (geometry) of an independent region. We have developed the model considering random velocities in the calculation of the function L. With this modification, the model can explain the complex structure of all line forming independent regions, until the regions where the Mg II lines are created. However, with this model it is not possible to explain the structure of the Hα forming region, i.e. the model cannot appropriate fit the complex Hα line profiles of Be stars. Here we will present a new approach of the model which is able to explain the complex structure of Hα regions. The new approach of the model is based on a synthesis of Hα lines using the fact that sub-regions have random, radial and rotation velocities, but also that some atomic (collisional) processes can contribute to the line wings (it brings a Voigt profile). Moreover, we study Hα lines of a sample of 120 Be stars and we obtained the radial and rotational velocities of the independent regions in which the satellite components are created. Finally, we calculate the optical depth (τ) and the column density (d) of each independent density region and we discuss the correlations between obtained parameters of sub-regions in the sample.

References

Danezis, E., Nikolaidis, D., Lyratzi, V., Stathopoulou, M., Theodossiou, E., Kosionidis, A., Drakopoulos, C., Christou G. and Koutsouris, P.: 2003, *Ap&SS*, **284**, 1119.

Lyratzi, E. and Danezis, E. 2004, AIP Conference Proceedings 740, pp. 458-473 [THE PHYSICS OF IONIZED GASES: 22nd Summer School and International Symposium on the Physics of Ionized Gases, Bajina Bašta, 23-27 August 2004, eds. Lj. Hadzijevski, T. Grozdanov, N. Bibić].

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Invited lecture

GLOBULAR CLUSTERS OF THE MILKY WAY: THEIR FATE AND CHEMICAL COMPOSITION

SLOBODAN NINKOVIĆ
Astronomical Observatory, Volgina 7, 11160 Belgrade, Serbia
E–mail: sninkovic@aob.bg.ac.yu

It is very well known that in the framework of the Milky Way there are about 150 globular clusters. In this review one presents and discusses the basic data on them. A special attention is paid to their chemical composition.

Invited lecture

LINE SHAPES FOR THE SPECTRA OF BROWN DWARFS

GILLIAN PEACH[1], D'ARCY F.T. MULLAMPHY[2], VANESSA VENTURI[2] and IAN B. WHITTINGHAM[2]
[1]*Department of Physics and Astronomy, University College London, London WC1E 6BT, United Kingdom*
[2]*School of Mathematical and Physical Sciences, James Cook University, Townsville, Australia, 4811*
E–mail: g.peach@ucl.ac.uk

Accurate pressure broadened profiles of alkali resonance doublets perturbed by H_2 and He are of crucial importance for the modelling of atmospheres of late M, L and T type brown dwarfs and for generating their synthetic spectra in the region 600 - 900 nm. The dominant lines are the Na I 589.0/589.6 nm and K I 766.5/769.9 nm doublets but there can also be significant contributions from less abundant alkalis such as Li, Rb and Cs, and from subordinate doublets such as Na I 818.3/819.5 nm. The non-Lorentzian profiles of the strongly broadened Na I and K I doublets have been recently studied by Burrows and Volobuyev and Allard *et al*, with the emphasis on approximate or unified semiclassical models that can describe the far wings of the profiles. However highly accurate calculations of the central Lorentzian cores are needed (Pavlenko, private communication) in order to estimate the effects of dust in brown dwarf atmospheres. We will report results for the Lorentzian alkali line profiles broadened by helium perturbers. They are based on a fully quantum-mechanical close-coupling description of the colliding atoms, the Baranger theory of lineshapes and new *ab initio* potentials for the alkali-rare gas interaction.

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Invited lecture

ANOMALOUS DOPPLER BROADENING OF HYDROGEN LINES DUE TO EXCITATION BY FAST NEUTRALS IN LOW PRESSURE TOWNSEND DISCHARGES

ZORAN PETROVIĆ
Institute of Physics, P.O.Box 57, 11001 Belgrade, Serbia
E–mail: zoran@phy.bg.ac.yu

For many years weak Doppler boradened wings were observed on hydrogen lines emitted from low pressure discharges. Explanations were usually related to dissociative processes or excitation by ions. Petrovic and Phelps were the first to perform the measurements in Townsend discharges and by observing the emission along the axis of the discharge two groups of fast particles were observed one going towards the cathode and away from the cathode. Current dependence ruled out excitation by electrons of the fast atoms produced in dissociative charge transfer collisions. Thus the results could only be explained by excitation by fast neutrals produced either in charge transfer collisions or by neutralization and reflection of ions at the surface. The energies of up to the total available energy (potential fall) were found, though the reflected component had typically 3 times smaller energy. Even more pronounced effects were found at lower E/N in mixtures of hydrogen and argon and methane and argon, though similar effects were observed with other light rare gases. These effects as found in Grimm discharges were studies in great detail by Konjevic and coworkers. In additions some implications for cold fusion were recently analyzed in the literature. we shall, however, discuss the implications of this process in plasma etching of integrated circuits.

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Invited lecture

3D SPECTROSCOPY OF EMISSION LINE SPECTRA OF PLANETARY NEBULAE: DIAGNOSTIC TOOLS FROM THE MILKY WAY TO NEARBY GALAXIES AND BEYOND

M.M. ROTH, D. SCHOENBERNER and M. STEFFEN
Astrophysikalisches Institut Potsdam, An der Sternwarte 16 D-14482 Potsdam, Germany
E–mail: mmroth@aip.de

Planetary nebulae (PN) have been introduced to study stellar populations and the chemical evolution of galaxies based on individual objects, rather than on integrated light properties of a galaxy under study. The comparison of predicted spectra from photoionization models with observed PN spectra allows us to derive physical parameters and the chemical composition of the nebula. The high emission line luminosity at the post-AGB stage is practically the only way to access individual intermediate mass stars spectroscopically at the distance of local group galaxies and beyond, e.g. the intracluster medium of the Virgo cluster. We discuss an ongoing programme to test the validity of extragalactic planetary nebulae as tracers of intermediate mass stellar populations, using modern observing techniques like integral field ("3D") spectroscopy, and theoretical tests with time-dependent radiation-hydrodynamical simulations, and the effects of departure from the assumption of spherical symmetry, constant density, and thermal and ionization equilibrium on the conventional PN diagnostics.

Invited lecture

PULSATIONS IN THE ATMOSPHERES OF Ap STARS

M. SACHKOV and T. RYABCHIKOVA
Institute of astronomy RAS, 48 Pyatnitskaya str., 119017 Moscow Russia
E–mail: msachkov@inasan.ru

We present recent results of the observational study of rapidly oscillating Ap (roAp) stars. Spectacular progress in this field has been achieved by considering high time resolution spectroscopy in addition to the classical high-speed photometric measurements. Spectroscopic observations of roAp pulsations led to the discovery of a multitude of unexpected phenomena, generally pointing to an extreme vertical chemical nonuniformity of the atmospheres of magnetic CP stars. Detailed analysis of spectroscopic pulsational behaviour allows us to establish relashionship between pulsations and vertical stratification of chemical elements.

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Invited lecture

ATMOSPHERES OF CP STARS: MAGNETIC FIELD EFFECTS

DENIS SHULYAK[1], GENADY VALYAVIN[2,3], OLEG KOCHUKHOV[4],
SERGEY KHAN[1] and VADIM TSYMBAL[1]

[1] *Tavrian National University, Yaltinskaya 4, 95007 Simferopol, Crimea, Ukraine*
[2] *Korea Astronomy Observatory, 61-1, Whaam-Dong, Youseong-Gu, Taejeon, 305-348, Korea*
[3] *Special Astrophysical Observatory, Russian Academy of Science, Nizhnii Arkhyz, Karachai Cherkess Republic, 369167, Russia*
[4] *Department of Astronomy and Space Physics, Uppsala University, Box 515, SE-751 20, Uppsala, Sweden*
E–mail: shulyak_denis@fastmail.fm

We present the resent calculations of magnetic field effects in atmospheres of CP stars. The calculations are based on *LLmodels* stellar model atmosphere code which implements direct treatment of the opacities due to the bound-bound transitions and ensures an accurate and detailed description of the line absorption. In these studies we focus on two general problems: the calculations of anomalous Zeeman splitting and the effects of Lorentz force in stellar atmospheres. First, we investigate the influence of the enhanced line blanketing due to the Zeeman effect on model structure, energy distribution, photometric colors, metallic line spectra and the hydrogen Balmer line profiles. The results are discussed with respect to those of non-magnetic models. As a next step we modelled the Lorentz force results from the interaction between the stellar magnetic field and the electric currents induced by time evolution of global dipolar-like field. This additional force may modify the pressure-temperature structure influences the formation of absorption spectral features, especially the Balmer line profiles. The results of this study are investigated using resent observations of A0p star θ Aur obtained with BOES echelle spectrograpth of the 1.8 m telescope of the Korean Astronomy Observatory.

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Invited lecture

QUASAR ABSORPTION LINES AND THE INTERGALACTIC MEDIUM

LUTZ WISOTZKI

Astrophysikalisches Institut Potsdam, An der Sternwarte 16, D-14482 Potsdam, Germany
E–mail: lwisotzki@aip.de

The space between galaxies and clusters is anything but empty, as evidenced by the many absorption lines in the spectra of quasars at cosmological distances. There is a variety of astrophysical phenomena associated with these absorption lines, ranging from bareley detectable density fluctuations of neutral hydrogen in the true intergalactic medium to the rich absorption spectra of (proto-)galactic disks.

I will start with a brief introduction into the phenomenology and basic diagnostics of quasar absorption lines, leading to identify some of the most acute current astrophysical problems connected to IGM research. I will then highlight some of the work currently done in our group, which includes the measurement of the transverse proximity effect and the search for the counterparts of damped Lyman alpha absorbers.

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Invited lecture

BLACK HOLES: THEORY VERSUS OBSERVATIONS – ANALYSIS OF THE Fe K_α LINES AND PRECISE ASTROMETRICAL OBSERVATIONS

A.F. ZAKHAROV, S.V. REPIN, A.A. NUCITA, F. DePAOLIS, G. INGROSSO
State Scientific Center - Institute of Theoretical and Experimental Physics,B. Cheremushkinskaya, 25, Moscow, 117259, Russia
E–mail: zakharov@itep.ru

Recent X-ray observations of microquasars and Seyfert galaxies reveal broad emission lines in their spectra, which can arise in the innermost parts of accretion disks. Simulations indicate that at low inclination angle the line is measured by a distant observer as characteristic two-peak profile. However, at high inclination angles ($> 85^0$) two additional peaks arise. This phenomenon was discovered by Matt et al. (1993) using the Schwarzschild black hole metric to analyze such effect. They assumed that the effect is applicable to a Kerr metric far beyond the range of parameters that they exploited. We check and confirm their hypothesis about such a structure of the spectral line shape for the Kerr metric case. We use no astrophysical assumptions about the physical structure of the emission region except the assumption that the region should be narrow enough. Positions and heights of these extra peaks drastically depend on both the radial coordinate of the emitting region (annuli) and the inclination angle. It was found that these extra peaks arise due to gravitational lens effect in the strong gravitational field, namely they are formed by photons with some number of revolutions around black hole. This conclusion is based only on relativistic calculations without any assumption about physical parameters of the accretion disc like X-ray surface emissivity etc. We discuss how analysis of the iron spectral line shapes could give an information about an upper limit of magnetic field near black hole horizon. Based on results of numerical simulations we discussed origins of double peaked and double horned profiles and clarified the Müller and Camenzind hypothesis (2003).

Recently Holz & Wheeler (2002) considered a very attracting possibility to detect retro-MACHOs, i.e. retro-images of the Sun by a Schwarzschild black hole. In this paper we discuss glories (mirages) formed near rapidly rotating Kerr black hole horizons and propose a procedure to measure masses and rotation parameters analyzing these forms of mirages. In some sense that is a manifestation of gravitational lens effect in the strong gravitational field near black hole horizon and a generalization of the retro-gravitational lens phenomenon. We analyze the case of a Kerr black hole rotating at arbitrary speed for some selected positions of a distant observer with respect to the equatorial plane of a Kerr black hole. Some time ago Falcke (2000) suggested to search shadows at the Galactic Center. We also propose to use future radio interferometer RADIOASTRON facilities (and future X-ray interferometer MAXIM) to measure shapes of mirages (glories) and to evaluate the black hole spin as a function of the position angle of a distant observer.

SHORT TALKS

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Short talk

SOLUTION OF NLTE LINE TRANSFER PROBLEM BY USE OF A FORTH-AND-BACK IMPLICIT Λ ITERATION

OLGA ATANACKOVIĆ-VUKMANOVIĆ
Dept. of Astronomy, Faculty of Mathematics, Belgrade
Studentski trg 16, 11000 Belgrade, Serbia and Montenegro
E–mail: olga@matf.bg.ac.yu

Here we present the basic idea and the properties of a very fast convergent iterative method to solve NLTE line transfer problem. Forth-and-back implicit Λ-iteration dramatically accelerates the convergence of the classical Λ iteration (while retaining its straightforwardness) by use of forth-and-back approach together with an implicit representation of the source function in the computation of the radiation field intensities. The fact that no matrix operation is required and that the memory storage grows only linearly with the dimension of the problem makes this method very promising for more complicated radiative transfer problems.

Short talk

KINEMATICS AND VARIABILITY OF III Zw 2 BROAD LINE EMISSION REGION

EDI BON
Astronomical Observatory, Volgina 7, 11160 Belgrade, Serbia
E–mail: ebon@aob.bg.ac.yu

In order to study emission line profiles of Lyα, Hβ, Hα, and Mg II λ2798 lines of the Seyfert 1 galaxy III Zw 2, the two-component model of broad-line region (BLR) has been proposed. The proposed two-component model, consisting of an inner Keplerian relativistic disk and an outer structure surrounding the disk, could be fitted well into the emission profiles. The fitting results of these four broad emission lines (BELs) came out higly consistent in both the inner and outer component parameters. Adopting a mass of $\sim$2$\times$108Msolar for the central object, we found that the outer radius of the disk is approximately equal for the four considered lines ($\sim$0.01 pc), and the results for the inner radius of the disk are: 0.0018 pc for Lyα, 0.0027 pc for Mg II, and 0.0038 pc for the Balmer lines. Also, the narrow [O III] lines, indicated existance of at least two kinematicaly different emission-line regions. Flux variations of Hβ, with respect to the [O III] lines, have been also presented here, using long-term Hβ observations (1972-1990, 1998).

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Short talk

MULTI-WAVELENGTH SURVEYS OF OBSCURED AGN

ELENI CHATZICHRISTOU LOWERCASEAND MANOS DANEZIS
National Observatory of Athens, Kallidromiou 55, 10681, Athens, Greece
E–mail: elenichatz@tellas.gr

Several key goals require measuring the number of all AGN in the Universe, and the evolution of the ratio of obscured to unobscured AGN with redshift. This reflects the structure of AGN and thus the development in the heart of all galaxies. Hard X-rays can penetrate most obscuring dust columns to reveal the AGN that remains hidden in all other wavelengths. Mid-IR surveys probe the thermal dust emission, that is, the continuum light from the central source after it is reprocessed by dust, and this emission dominates the bolometric luminosities of dusty high-redshift galaxies. Thus, combining deep mid-IR and hard X-ray surveys can provide us with accurate demographics of AGN especially at high redshifts. Multi-wavelength surveys aim to address these science goals by exploiting the unprecedented combination of great observatories such as HST, Chandra and SIRTF to survey the distant universe to the faintest flux limits across the broadest range of wavelengths. I will present and discuss some of the results coming from multi-wavelength surveys placing particular focus on the systematic study of obscured AGN.

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Short talk

STARK BROADENING OF Ar I SPECTRAL LINES EMITTED IN SURFACE WAVE SUSTAINED DISCHARGES

M. CHRISTOVA[1], M.S. DIMITRIJEVIĆ[2] and S. SAHAL-BRÉCHOT[3]

[1] *Department of Applied Physics, Technical University of Sofia, 1000 Sofia, Bulgaria*
[2] *Astronomical Observatory, Volgina 7, 11160 Belgrade, Serbia*
[3] *Observatoire de Paris, LERMA-Meudon, F-92195 Meudon Cedex, France*
E–mail: mchristo@tu-sofia.bg
E–mail: mdimitrijevic@aob.bg.ac.yu
E–mail: Sylvie.Sahal-Brechot@obspm.fr

The Stark parameters (the widths and shift) of six Ar I spectral lines in pure argon: 522.1, 549.6, 603.2, 518.8, 560.7 nm ($nd \rightarrow 4p$, for $n = 7 \div 5$) and 696.5 nm ($4p' \rightarrow 4s$) have been calculated within the semi-classical perturbation approach [1-3].

Surface wave's discharges (SWDs) have been successfully employed in various fields of science and technology, including materials processing, elemental analysis, abatement of harmful gases, and more recently, sterilization of medical devices. Operating at atmospheric pressure we have used emission spectroscopy to determine the electron density of SWDs from the Stark broadening of the emitted argon lines [4].

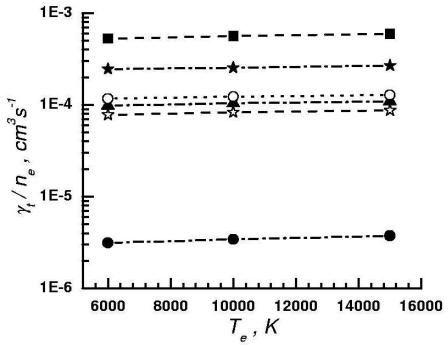

Fig. 1. *The ratio of the total width to the electron density (n_e = $10^{14} cm^{-3}$) as a function of the electron temperature T_e for the studied Ar I lines (■ 522.1, * 549.6, ○518.6, ▲603.2, *560.7, ●696.6 nm)*

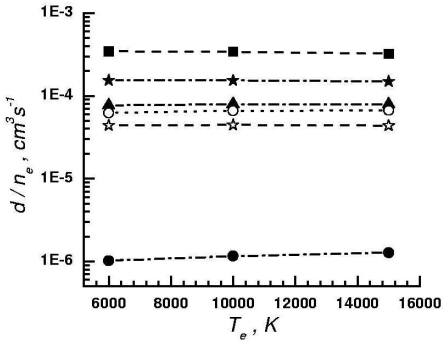

Fig. 2. *The ratio of the shift to the electron density (n_e = $10^{14} cm^{-3}$) as a function of the electron temperature T_e for the studied Ar I lines (■ 522.1, * 549.6, ▲518.6, ○ 603.2, *560.7, ●696.6 nm)*

References

[1] Sahal-Bréchot, S.: 1969, *Astron. Astrophys.*, **1**, 91.
[2] Sahal-Bréchot, S.: 1969, *Astron. Astrophys.*, **2**, 322.
[3] Sahal-Bréchot, S.: 1974, *Astron. Astrophys.*, **35**, 321.
[4] Christova, M., Castanos-Martines, E., Calzada, M.D., Kabouzi, Y., Luque, J.M. and Moisan, M.: 2004, *Appl. Spectr.*, **58**, 1032.

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Short talk

ELECTRON IMPACT BROADENING OF MULTICHARGED NEON SPECTRAL LINES

HAYKEL ELABIDI[1], NÉBIL BEN NESSIB[1] and MILAN S. DIMITRIJEVIĆ[2]

[1] *Groupe de Recherche en Physique Atomique et Astrophysique, Faculté des Sciences de Bizerte, 7021 Zarzouna, Tunisia*
[2] *Astronomical Observatory, Volgina 7, 11160 Belgrade, Serbia*
E–mail: haykel.elabidi@edunet.tn
E–mail: haykel_e@yahoo.fr

Stellar and laboratory plasma diagnostic, atomic abundances, opacity calculations, all have led to a need for knowledge about Stark broadening of multicharged ion spectral lines. Sophisticated quantum-mechanical and semiclassical methods (Griem 1974) exist, but they often require a considerable labor even for the evaluation of a single line width. Moreover, when quick estimate is needed, the approximate approaches may be very useful.

One such approximate method is the modified (Dimitrijević and Konjević 1980, 1981) semi-empirical (Griem 1968) formula suitable for singly as well as for multiply charged ion lines, based on the Gaunt factor approximation for inelastic cross sections (Griem 1968). Since the Gaunt factor is proportional to the collision strength, it is of interest to use the collision strength data in the modified semi-empirical formula (Dimitrijević and Konjević 1980) in order to obtain more accurate results.

In this work, instead of the semi-empirical Gaunt factor used in Dimitrijević and Konjević (1980, 1981), more accurate electron impact excitation collision strengths, obtained in the distorted wave approximation in LS coupling, were used. We note also that we take into account the elastic collision contribution to the width by calculating the collision strengths at the threshold energy and extrapolating them below the threshold as in Griem (1968) and, Dimitrijević and Konjević (1980). It has been shown that the elastic contribution to the line width becomes less important with the increase in temperature (Ralchenko et al. 1999).

We have applied this method to the calculation of Stark line widths of two ions, Ne VII and Ne VIII. The comparison with experiments and other theoretical approaches indicates that this method can be used successfully for Stark line width calculations.

References

Dimitrijević, M.S., Konjević N.: 1980, *J. Quant. Spectrosc. Radiat. Transfer*, **24**, 451.
Dimitrijević, M.S., Konjević N.: 1981, International Conference on Spectral Line Shapes, ed. B. Wende, de Gruyter, Berlin, New York, p. 211.
Griem, H.R.: 1968, *Phys. Rev.*, **165**, 258.
Griem, H.R.: 1974, Spectral Line Broadening by Plasmas, McGraw-Hill, New York.
Ralchenko, Yu.V., Griem, H.R., Bray, I.: 2003, *J. Quant. Spectrosc. Radiat. Transfer*, **81**, 371.

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Short talk

MOLECULAR LINE WIDTHS AT STELLAR ATMOSPHERE CONDITIONS

DEREK HOMEIER

Institut für Astrophysik, Georg-August-Universität
Friedrich-Hund-Platz 1, D-37077 Göttingen, Germany
E–mail: derek@astro.physik.uni-goe.de

Molecules are the dominant opacity source in the atmospheres of cool stars, brown dwarfs and planets. As with rapidly decreasing electron pressure at the temperatures of the lowest-mass stars almost no true continuum opacity sources remain, the pseudo-continuum of molecular bands obtains a decisive impact on radiative transfer, and thus thermal structure of the atmosphere. To correctly include molecular opacities in stellar atmosphere calculations, therefore both complete and reasonably accurate lists of line strengths and positions, and correct treatment of line broadening is required. Clearly the classical recipes for calculating Van der Waals broadening e.g. by Unsöld, and their extension to non-hydrogenic atoms, can at best give a crude estimate of molecular interactions. For a realistic treatment of collisional damping therefore measured widths or more sophisticated theoretical broadening constants of molecular lines are required.

In this contribution, an overview of the experimental and theoretical status of line widths for the most important species in ultracool atmospheres, H_2O, CH_4, CO and NH_3, is given. The main difficulty in finding realistic line widths for brown dwarf or stellar models is the paucity of measurements both for the temperature conditions, and for collisions with the dominant perturber in these atmospheres, H_2. Also, theoretical models still struggle to explain observed variations of the width with rotational and vibratonal quantum numbers. The effect of the uncertainty in the resulting Voigt profile widths is studied in model atmospheres computed with the `PHOENIX` code.

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Short talk

THE STRUCTURE OF THE BLR AND NLR IN AGN Mrk 817

DRAGANA ILIĆ[1], EDI BON[2] and LUKA Č. POPOVIĆ[2]
[1] *Department of Astronomy, Faculty of Mathematics, University of Belgrade, Studentski trg 16, 11000 Belgrade, Serbia and Montenegro*
[2] *Astronomical Observatory, Volgina 7, 11160 Belgrade 74, Serbia and Montenegro*
E–mail: dilic@matf.bg.ac.yu
E–mail: ebon@aob.aob.bg.ac.yu
E–mail: lpopovic@aob.aob.bg.ac.yu

Mrk 817 is a Seyfert 1 galaxy that shows very stratified line emission region. Emission lines of the galaxy, both Narrow (NELs) and Broad Emission Lines (BELs), are very complex and present evidence of the stratified NLR and BLR, indicating different kinematical properties in different part of the BLR and NLR.

Here we present a study of the spectra of Mrk 817 using four sets of spectroscopic observation in order to investigate the emission line region. We found that:

(i) The BLR is kinematically stratified and consists of at least two components - Very Broad Line Region (VBLR) with $V \sim 5000$ km/s and Intermediate Line Region (ILR) with $V \sim 1000$ km/s. We apply the two-component model, where one component is a disk or disk-like region and another one is a spherical emission region with isotropic velocity distribution. The model can well fit the broad line profiles, indicating that there is a disk (or disk-like) emission;

(ii) The NLR also show a complex structure, and we can clearly see at least two NLR regions: a) the NLR1, which has an internal random velocity of 510 km s^{-1}, and relative approaching velocity of -300 km s^{-1} with respect to the systemic redshift of the observed galaxy; and b) the NLR2 which has an internal random velocity of 150 km s^{-1}, and a redshift equal to the systemic one of the corresponding object.

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Short talk

^{6}Li IN THE ATMOSPHERES OF ACTIVE COOL STARS

D. JEVREMOVIĆ[1,2], D.J. CHRISTIAN[3,4], M. MATHIOUDAKIS[3,4] and E. BARON[1]

[1] *Department of Physics and Astronomy, University of Oklahoma, 440 W. Brooks NH 131, Norman 73019, USA*
[2] *Astronomical Observatory, Volgina 7, 11160 Belgrade, Serbia and Montenegro*
[3] *Department of Pure and Applied Physics, Queen's University Belfast, Belfast, BT7 1NN, Northern Ireland, U.K.*
[4] *Hamburger Sternwarte, Gojenbergsweg 112, 21029 Hamburg, Germany*

^{6}Li enhancement has been shown for energetic solar events, one chromospherically active binary, and several dwarf halo stars. We present high resolution VLT UVES observations of the active dwarfs GJ 117, EUVE J1145−53.5 and GJ182.

Our analysis of high resolution observations includes detailed modeling of theline formation in the 6808 Åregion using the general stellar atmosphere code PHOENIX. We examine the contribution of other lines in the Li profile including Ti I lines which were proposed as an alternative explanation for the ^{6}Li enhancement.

Our principal results are:

i) detection of ^6Li on GJ117 with $\frac{^6Li}{^7Li} = 0.030 \pm 0.007$

ii) detection of ^6Li on dK2e star EUVE J1145−53.5 with $\frac{^6Li}{^7Li} = 0.10 \pm 0.01$,

iii) constraint of the ratio $\frac{^6Li}{^7Li}$ to be ≤ 0.03 for dM0 GJ 182.

We discuss the possibility for ^{6}Li production by spallation and find it to be consistent with the activity of these objects.

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Short talk

MICROLENSING EFFECT ON Fe Kα LINE AND X-RAY CONTINUUM IN THE CASE OF THREE GRAVITATIONALLY LENSED QUASARS: MG J0414+0534, QSO 2237+0305 AND H1413+117

PREDRAG JOVANOVIĆ[1] and LUKA Č. POPOVIĆ[1,2]
[1] *Astronomical Observatory, Volgina 7, 11160 Belgrade 74, Serbia*
[2] *AvH Fellow, Astrophysikalisches Institut Potsdam, An der Sternwarte 16, 14482 Potsdam, Germany*
E–mail: pjovanovic@aob.bg.ac.yu

The observed enhancements of Fe Kα line in three gravitationally lensed QSOs: MG J0414+0534, QSO 2237+0305 and H1413+117 is interpreted in terms of microlensing, even if an equivalent X-ray continuum amplification is not observed. To understand these observations we have studied the effects of microlensing on the quasar spectra produced by the crossing of a straight fold caustic across a standard relativistic accretion disk. More realistic case of amplification by a caustic magnification pattern has been studied, also. To describe the disk emission we used a ray tracing method considering both metrics, Schwarzschild and Kerr. Our results show that Fe Kα line is probably emitted from the innermost part of the accretion disk, while the continuum is emitted from some larger region.

Short talk

FRACTIONAL OSCILLATOR AND ANOMALOUS BROWNIAN MOTION IN THE THEORY OF SPECTRAL LINE BROADENING AND SHIFT

S.S. KHARINTSEV and M.Kh. SALAKHOV
Kazan State University, Kremlevskaya str., 16, Kazan, Russia, 420008
E–mail: red@ksu.ru

In the paper the fractional oscillator model for the motion of radiating particles in a perturbed gas is suggested. The connection between the fractional oscillator model and anomalous Brownian motion in the Doppler regime is considered. The general formula for the distribution function of the radiating particles in the fractional oscillator model and a new correlation function in the impact approximation are derived. It is shown that the self-similar collision mechanism in the Doppler regime leads to the additional spectral line narrowing and shift. Kinetic equations reconstruction scheme on experimental data is developed on the basis of higher order statistics.

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Short talk

HINSA AS A TOOL FOR STUDYING DARK CLOUDS AND STAR FORMATION

MARKO KRČO[1], PAUL F. GOLDSMITH[1] and DI LI[2]
[1]*Cornell University, Ithaca, NY 14853, USA*
[2]*Smithsonian Astrophysical Observatory, Cambridge, Mass. 02138 USA*
E–mail: marko@astro.cornell.edu

Traditionally it has been difficult to obtain estimates of the HI content of molecular clouds due to the sheer complexity of the galactic background HI line. However, with the use of the recently discovered HINSA (HI Narrow Self-Absorption) features we are for the first time able to make direct measurements of the HI column density in cold molecular clouds with high extinction. This allows us to study a variety of properties in these clouds including the molecular to atomic hydrogen ratio. Measurements and understanding of this ratio can give us estimates of the chemical ages of these clouds, in turn providing us with constraints on star formation. More specifically we are able to place some constraints on the timescale over which a molecular cloud collapses from a diffuse ($A_v < 1$) to a compact star- forming state. Such constraints would have considerable impact on several disputed areas of star formation theory including the role of magnetic fields and ambipolar diffusion.

With new observations at the Green Bank Telescope we have greatly increased the amount of available HINSA data previously obtained using the Arecibo telescope, and though our analysis is still very much preliminary, we are beginning to see that HINSA and its correlations with molecular, IR, and optical data may prove to be a more useful tool in studying dark molecular clouds and other objects than previously anticipated.

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Short talk

SEMI-CLASSICAL AND MODIFIED SEMI-EMPIRICAL IMPACT STARK BROADENING CALCULATIONS OF SINGLY-IONIZED CARBON AND OXYGEN SPECTRAL LINES

WALID MAHMOUDI[1], NÉBIL BEN NESSIB[1], MILAN S. DIMITRIJEVIĆ[2]
and SYLVIE SAHAL-BRÉCHOT[3]

[1] *Groupe de Recherche en Physique Atomique et Astrophysique, Faculté des Sciences de Bizerte, 7021 Zarzouna, Tunisia*
[2] *Astronomical Observatory, Volgina 7, 11160 Belgrade, Serbia and Montenegro*
[3] *Laboratoire d'Etude du Rayonnement et de la Matière en Astrophysique, Observatoire de Paris, Section de Meudon, UMR CNRS 8112, Batiment 18, 5 Place Jules Janssen, F-92195 Meudon Cedex, France*
E–mail: walidfoued@yahoo.fr

Using the semi-classical impact perturbation theory including both dipole and quadrupole terms in the expression of electrostatic interaction between the optical electron and the perturber, we calculated widths and shifts of singly ionized carbon and oxygen spectral lines and compared with experimental results and those calculated by Griem. Energy levels and oscillator strengths have been taken from TOPbase. Mean radius and mean square radius have been calculated within hydrogenic approximation using the effective quantum numbers n_i^* obtained from TOPbase.

The impact approximation was checked for each case using the appropriate condition of validity (the collision volume must be very small compared to the inverse of the perturber density).

The species of ionic perturbers depends on the plasma composition in a particular experiment but since in stellar plasma the hydrogen is the most abundant element, we provided also the proton-impact Stark widths for possible astrophysical applications.

We also calculated modified semi-empirical widths using the formalism of Dimitrijević and Konjević, where the mean square radius is expressed in terms of the oscillator strengths for the contribution of the collisional transitions with $\Delta n = 0$ and hydrogenic approximation is used for $\Delta n \neq 0$.

Inside the same multiplet, widths and shifts of particular spectral lines in existing experimental data are determined by scaling multiplet values.

The agreement found between experimental and semi-classical values demonstrates that the method can be used for C II and O II Stark width calculations, especially when more sophisticated methods are not applicable in an adequate way.

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Short talk

MEASURED STARK SHIFTS OF Kr I LINE PROFILES IN THE 5s-5p AND 5s-5p' TRANSITIONS

VLADIMIR MILOSAVLJEVIĆ
Faculty of Physics, University of Belgrade, P.O. Box 368, Belgrade, Serbia
Dublin City University, School of Physics, Plasma Research Laboratory,
Collins Avenue, Glasnevin, Dublin 9, Ireland
E–mail: vladimir@physics.dcu.ie
E–mail: vladimir@ff.bg.ac.yu

On the basis of the precisely recorded 10 neutral krypton (Kr I) line shapes in the 5s–5p and 5s–5p' transitions, it has been obtained the Stark shift (d) of the neutral krypton (Kr I) spectral lines. These lines have been studied in a linear, low–pressure, optically thin pulsed arc discharge operated in pure krypton. The line shapes are measured at 17 000 K electron temperature (T) and at 16.5x10^{22} m^{-3} electron density (N). The mentioned plasma parameters have been measured using independent experimental diagnostics techniques, as well as from the line deconvolution procedure. The separate electron and ion contributions from the total Stark shift (d_t), i.e. d_e and d_i have been obtained and represent the first experimental data in this field.

On the basis of the observed asymmetry of the Stark broadened line profile it has been deduced the ion broadening parameters which describe the influence of the ion static (A) and the ion–dynamical effect on the shift (E) of these 10 Kr I line shapes. The ion–dynamical parameters of the measured Kr I line shape are the first data in this field, too.

Short talk

THE STARK BROADENING EFFECT IN HOT STAR ATMOSPHERES: Tl II

NENAD MILOVANOVIĆ, MILAN S. DIMITRIJEVIĆ and LUKA Č. POPOVIĆ
Astronomical Observatory, Volgina 7, 11160 Belgrade, Serbia
E–mail: nmilovanovic@aob.bg.ac.yu

Electron-impact broadening is the main pressure broadening mechanism in the hot star atmospheres. Satellite ultraviolet spectral lines observations made by e.g. International Ultraviolet Explorer (IUE) and Goddard High Resolution Spectrograph (GHSR) installed at Hubble Space Telescope provided much better possibilities for the investigations of the trace elements spectral line in stellar atmospheres. Consequently, Stark broadening parameters data for such lines become of interest for stellar spectra interpretation, analysis and modelling as well as for abundance determination.

In order to provide the needed spectroscopic data for singly ionized Thallium spectral lines we present Stark broadening parameters for Tl II spectral lines calculated within the modified semiempirical approach. Calculations were performed within temperature range 5000K-50000K and for an electron density of $10^{23}m^{-3}$.

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Short talk

SCANNING FABRY-PEROT INTERFEROMETER IN THE EXTRAGALACTIC RESEARCHES

A.V. MOISEEV and V.L. AFANASIEV

Special Astrophysical Observatory, Russian Academy of Sciences (SAO RAS)
Nizhnij Arkhyz, Zelenchukskaya, Karachaevo-Cherkesia, Russia 369167
E–mail: moisav@sao.ru

The scanning Fabry-Perot interferometer (IFP) is a powerful tool for investigation of kinematics of extended objects by the method of panoramic spectroscopy. IFP allows to obtain a spectral information simultaneously in a large field of view. In this review a main idea of this technique and history of its applications in the astronomy are considered. The opportunities of the IFP are illustrated by the modern observational data from the 6m Russian telescope (SAO RAS). We show some results concerning objects with complex ionized gas kinematics: AGN, barred and spiral galaxies, polar-ring objects etc.

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Short talk

THE EXTERNAL MAGNETIC FIELD INFLUENCE ON THE HYDROGEN BALMER LINES PROFILES IN ELECTRIC DISCHARGES

B.M. OBRADOVIĆ, M.M. KURAICA and J. PURIĆ
Faclty of Physics, University of Belgrade, Studentski trg 12-16, 11000 Belgrade, Serbia
E–mail: obrat@ff.bg.ac.yu

A surview is given of the results obtained in a study of external magnetic field influence on the shapes of spectral lines from hydrogen Balmer series in abnormal glow discharges under various experimental conditions.

Short talk

THE APPLICATION OF THE CUT-OFF COULOMB POTENTIAL FOR THE CALCULATION OF A CONTINUOUS SPECTRA OF DENSE HYDROGEN PLASMA

N.M. SAKAN, V.A. SREĆKOVIĆ and A.A. MIHAJLOV
Institute of Physics, P.O. Box 57, 11001 Belgrade, Serbia and Montenegro
E–mail: nsakan@phy.bg.ac.yu

The continuous optical spectrum of dense hydrogen plasma is modeled with the complete quantum mechanical model based on the cut-off Coulomb potential. Here are presented the results of calculation of a continuous optical spectra of dense hydrogen plasma compared with the experimental results obtained in "Laboratory for dense plasma" at the Pierre et Marie Curie University in Paris. The cut-off Coulomb potential gives the opportunity to model the most significant effects in dense plasma. The additional effects, including some of time dependent, which influences the spectral characteristics, could be easily added. This work is a continuation of previous works on conductivity of dense plasma based on cut-off Coulomb potential.

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Short talk

DETECTION OF DARK MATTER IN EARLY-TYPE GALAXIES WITH X-RAY HALOES USING ABSORPTION SPECTRAL LINES

SRDJAN SAMUROVIĆ

Astronomical Observatory, Volgina 7, 11160 Belgrade, Serbia
Dipartimento di Astronomia, Trieste, via Tiepolo 11, 34131 Trieste, Italy
E–mail: srdjan@ts.astro.it

In this contribution I discuss the existence of dark matter in the early-type galaxies with and without X-ray haloes. I show that using high quality long-slit integrated stellar spectra obtained from various sources related to the field, binary, group and cluster galaxies there is no strong evidence for dark matter out to three effective (half-light) radii.

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Short talk

INFLUENCE OF IMPACTS WITH CHARGED PARTICLES ON Cd I AND F III SPECTRAL LINES IN STELLAR PLASMA (MSc Thesis)

ZORAN SIMIĆ
Astronomical Observatory, Volgina 7, 11160 Belgrade, Serbia
E–mail: zsimic@aob.bg.ac.yu

Data on the Stark broadening of neutral cadmium and doubly ionized fluorine are of interest not only for laboratory but also for astrophysical plasma research as e.g. for stellar spectra analysis and synthesis, for cadmium and fluorine abudance determination and opacity calculations. Abudance analysis for A type stars showed the presence of neutral cadmium in stellar spectra of e.g. 68 Tauri, χ Lupi and V816 Centauri, in distinction from fluorine which cosmic abudance is smaller.

We have calculated within the semiclassical perturbation approach the Stark broadening parameters of 11 Cd I singlets and 13 triplets in ultra-violet and visible, and 24 Cd I triplets in infra red spectral ranges, for temperatures between 2500 K and 50000 K, and for perturber density of 10^{16} cm^{-3}. Also, we have calculated within the same approach such parameters for F III $2p^3$ $^4S^o$ - $3s$ ^4P resonant line. Moreover, for 10 F III multiplets, line widths have been obtained within the modified semiempirical approach, for temperatures between 10000 K and 300000 K, and for perturber density of 10^{17}cm^{-3}.

We compared our results for Cd I $5p$ $^3P^o$ - $6s$ $^3S^o$ multiplet with existing experimental data. Also, for the same multiplet there are theoretical results obtained within GBKO approach.

In the case when there are no reliable data for Stark broadening, investigation of regularities and systematic trends can provide fast estimate of missing values, especially if it is no necessary to have the high accuracy for each particular line, and a good average accuracy for large number of lines is sufficient. We investigated here the regularity within a spectral series of Cd I $5s^2$ ^1S - np $^1P^o$ and we confirmed such behavior.

We have analyzed the influence of Stark broadening mechanism of neutral cadmium and doubly ionized fluorine in comparison to the Doppler one for A type star atmosphere (T_{eff}=10000 K, log g= 4), close to the conditions for 68 Tauri (T_{eff}=9025 K, log g=3.95). Our results show that Stark broadening data for neutral cadmium and doubly ionized fluorine lines are needed for an adequate description of stellar spectra and plasma modelisation.

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Short talk

HEIGHTS OF FORMATION OF Mn I SPECTRAL LINES BROADENED BY HYPERFINE STRUCTURE

NIKOLA VITAS
Dept. of Astronomy, Faculty of Mathematics, Belgrade
Studentski trg 16, 11000 Belgrade, Serbia and Montenegro
E–mail: nikola@matf.bg.ac.yu

This paper considers the influence of hyperfine broadening on heights of formation of some Mn I spectral lines in Solar spectrum. The comprehensive model atom of neutral manganese is constructed with 64 bound energy levels and continuum and 161 bound-bound transitions. Results of spectrum synthesis for this model and atmospheric models for quiet Sun and plage (Fontenla et al, 1999) are obtained by using program MULTI (Carlsson, 1986). It is shown that pronounced hyperfine structure decreases the height of formation and narrows down the line formation region.

References

Carlsson, M.: 1986, A Computer Program for Solving Multi-Level Non-LTE Radiative Transfer Problems in Moving or Static Atmospheres, Report No. 33, Uppsala Astronomical Observatory.

Fontenla, J.M., White, O.R., Fox, P.A., Avrett, E.H. and Kurucz, R.L.: 1999, *ApJ*, **519**, 480.

Short talk

HELIUM LINE SHAPE ANALYSIS IN B TYPE STARS

MILAN ZBORIL
Astronomical Institute, Tatranska Lomnica, 059 60, Slovakia
E–mail: zboril@astro.sk

A number of He-rich stars and (vsini) standards were observed aiming at disentangling the rotational velocities, helium abundance and its age dependence. The line shape analysis and search for vertical helium stratification in the stellar atmosphere are presented.

POSTER PAPERS

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Poster paper

CALCULATIONS OF THE COLLISIONAL NEUTRAL LINE WIDTHS OF SEVERAL Ar I LINES

M. CHRISTOVA[1], V. GAGOV[2] and I. KOLEVA[2]

[1] *Department of Applied Physics, Technical University of Sofia, 1000 Sofia, Bulgaria*
[2] *Faculty of Physics, Sofia University "Kliment Ohridski", BG-1164 Sofia, Bulgaria*
E–mail: mchristo@tu-sofia.bg
E–mail: koleva@phys.uni-sofia.bg

The interactions between the emitter atoms and neutral atoms in the ground state in pure argon have been examined. The Van der Waals, Lennard-Jones [1] and Kaulakys [2] potentials have been used. The calculated widths have been performed in the framework of the impact theory. The 522.1, 549.6, 603.2, 518.8, 591.2, 560.7, and 737.2 nm ($nd \rightarrow 4p$, for $n = 7 \div 4$); 641.6 nm ($6s \rightarrow 4p$; and 696.5 nm ($4p \rightarrow 4s$) argon lines have been studied.

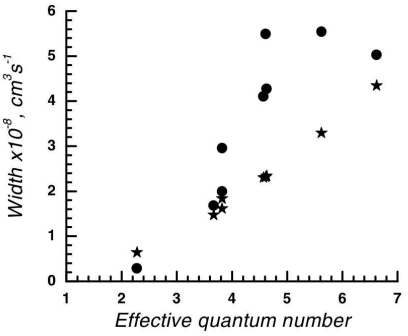

Fig.1 Neutral widths of Ar I lines at gas temperature 1600 K and pressure 1 atm as a function of the effective quantum number of the upper state (★Van der Waals potential and ●Kaulakys potential)

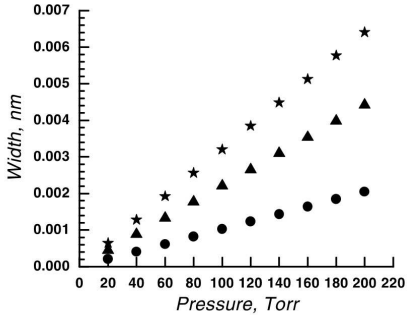

Fig.2 Neutral width for Ar I 696,5 nm at gas temperature 300 K as a function of the gas pressure (●Van der Waals potential, ▲Lennard-Jones potential,★Kaulakys potential)

References

[1] W. Hindmarsh and J. Farr: 1972, Progress in Quantum Electronics, edited by J.H. Sanders, S. Stenholm (Pergamon, Oxford).
[2] B. Kaulakys: 1984, *J. Phys. B: At. Mol. Phys.*, **17**, 4485-4497.

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Poster paper

SPECTROPHOTOMETRIC STUDY OF NEARBY SEYFERT NUCLEI

F. DI MILLE, P. RAFANELLI, S. CIROI, V.L. AFANASIEV and S.N. DODONOV
Department of Astronomy, Padova University, Vicolo Osservatorio 2, 35122, Padova, Italy
E–mail: dimille@pd.astro.it

We present new results about the spectrophotometric study of the nuclear regions in nearby ($z<0.03$) Seyfert galaxies. The observations were carried out using the Multi Pupil Fiber Spectrograph (MPFS), the integral field unit mounted at the 6-m telescope of the Special Astrophysical Obsevatory (Russia). The main purpose of this work is to test the Unified Model in nearby AGNs through the investigation of the the gaseous/stellar environment close the active nucleus. In particular, we show emission line ratio maps, included excitation maps ([O III]/H_α), which allowed us to trace the regions with different degrees of ionization, to identify ionization cones and/or circum-nuclear star forming regions, and to study in detail their physical properties.

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Poster paper

ON THE INFLURENCE OF STARK BROADENING OF Cr I LINES IN THE Cr-RICH Ap STAR β CrB ATMOSPHERES

MILAN S. DIMITRIJEVIĆ[1], TANYA RYABCHIKOVA[2,3], LUKA Č. POPOVIĆ[1,4], DENIS SHULYAK[5] and SERGEY KHAN[5]

[1] *Astronomical Observatory, Volgina 7, 11160 Belgrade, Serbia and Montenegro*
[2] *Institute of Astronomy, Russian Academy of Science, Pyatnitskaya 48, 119017 Moscow, Russia*
[3] *Institute for Astronomy, University of Vienna, Türkenschanzstrasse 17, A-1180 Vienna, Austria*
[4] *Astrophysikalisches Institut Potsdam, An der Sternwarte 16, 14482 Potsdam, Germany*
[5] *Tavrian National University, Yaltinskaya 4, 330000 Simferopol, Crimea, Ukraine*
E–mail: mdimitrijevic@aob.bg.ac.yu

Chromium is one of the most anomalous elements in Ap stars. It was shown to be concentrated in the deeper atmospheric layers in Ap stars β CrB and in γ Equ, where electron density is high enough to favor the Stark broadening mechanism, the most significant pressure broadening mechanism for A and B stars. Most Cr I, and Cr II, lines in the optical spectral region have rather small Stark damping constants so no measurable Stark wings appeared. However, Cr I, lines from $4p - 4d$ transitions are known to have fairly large Stark damping constants according to calculations made by Kurucz.

We present here new calculations of Cr I Stark line widths and shifts based on the semiclassical perturbation approach of Sylvie Sahal-Bréchot. Electron-, proton-, and ionized helium-impact line widths and shifts for nine Cr I spectral lines from the $4p^7P^0 - 4d^7D$ multiplet, were calculated for a perturber density of 10^{14} cm^{-3} and for temperatures T = 2,500 − 50,000 K.

The results were used to investigate the influence of Stark broadening effect on Cr I line shapes in the atmosphere of the Cr-rich Ap star β CrB. In spite of the rather large Stark damping constants, the effect is not observable in stars with solar Cr abundance. In hot stars where electron and proton densities are high, the Cr I, lines considered here are generally very weak, while in cooler stars (solar type) other broadening effects are more significant where these lines are strong enough. The only chance to look at Stark effect is in stratified atmosphere of a Cr-rich Ap star, such as the well known magnetic star β CrB.

Our analysis of the Cr-rich Ap star β CrB line shapes was based on its spectrum obtained in February 1998 with the MuSiCoS spectropolarimeter mounted on the 2 m telescope at Pic du Midi observatory (R=35000).It was found (Dimitrijević et al, 2005) that the contribution of proton and He ii collisions to the line width and shift is significant and comparable, and is sometimes even larger than electron-impact contribution depending of the electron temperature. Moreover, not only the Stark line width, but also the Stark shift may contribute to the blue as well as to the red asymmetry of the same line depending on the electron-, proton-, and He ii density in stellar atmosphere. The results were used to investigate the influence of Stark broadening effect on Cr i line shapes in the atmosphere of the Cr-rich Ap star β CrB.

References

Dimitrijević, M.S., Ryabchikova, T., Popović, L.Č., Shulyak, D., Tsymbal, V.: 2005, *Astron. Astrophys.*, in press.

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Poster paper

A STUDY OF CLOSE BINARY SYSTEM EE CET

G. DJURAŠEVIĆ[1], D. DIMITROV, B. ARBUTINA, B. ALBAYRAK and S.O. SELAM
[1] *Astronomical Observatory, Volgina 7, 11160 Belgrade, Serbia*
E–mail: gdjurasevic@aob.bg.ac.yu

Variability of the combined light of close binary EE Cet in the visual/spectroscopic triple system ADS 2163 was discovered by the Hipparcos satellite. New photoelectric BV light curves of EE Cet were obtained at the Rozhen National Astronomical Observatory, Bulgaria. We have combined this photometric with earlier spectroscopic observations to derive the physical parameters of the system. Due to the proximity of the visual companion, the light curves were contaminated by the third light. Spectroscopic observations, which were able to separate EE Cet from its companion, found that spectral type of the system is F8 V (T = 6095K) and mass ratio is $q = \mathcal{M}_2/\mathcal{M}_1 = 0.315$. Our analysis show that EE Cet is a high-overcontact system ($f_{\rm over} \sim 32\%$), with orbital inclination $i \approx 79^\circ$, component masses $\mathcal{M}_1 = 1.37$, $\mathcal{M}_2 = 0.43\ \mathcal{M}_\odot$ and mean radii $\mathcal{R}_1 = 1.35$, $\mathcal{R}_2 = 0.82\ \mathcal{R}_\odot$. Future photometric observations, able to separate EE Cet from its companion, would put even more tight constraints on properties and parameters of this close binary system.

Poster paper

LINE-DRIVEN WINDS NEAR BHs

ANTON DORODNITSYN[1] and IGOR NOVIKOV
[1] *Space Research Institute, Profsoyuznaya st. 84/32, Moscow, Russia*
[2] *Niels Bohr Institute, Copenhagen*
E–mail: dora@mx.iki.rssi.ru

We propose a general physical mechanism which could contribute to the formation of fast line-driven outflows at the vicinity of strong gravitational field sources (BH's, NS's). We argue that the gradient of the gravitational potential plays the same role as the velocity gradient plays in Sobolev approximation. Both Doppler effect and gravitational redshifting are taken into account in Sobolev approximation. The radiation force becomes a function of the local velocity gradient and the gradient of the gravitational potential. The derived equation of motion has a critical point that is different from that of Castor, Abbott and Klein 1975 theory. A comparison with CAK theory is presented. It is shown that the developed theory predicts terminal velocities which can be as 50CAK theory. The developed theory can have an important contribution to the formation of radiation-driven jets/winds near compact objects.

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Poster paper

INVESTIGATION OF ROTATIONAL VELOCITY OF E-PERSEI (EPSILON-PERSEI)

N. GAVRILOVIĆ[1], S. JANKOV[1], P. MATHIAS[2] and P. De CAT[3]
[1] *Astronomical Observatory, Volgina 7, 11160 Belgrade, Serbia*
[2] *Opservatoire de la Cote d'Azur, Departement Fresnel, U.M.R. 6528, B.P. 4229, 06304 Nice Cedex 04, France*
[3] *Instituut voor Sterrenkunde, Katholieke Universiteit Leuven, Celestijnenlaan 200 B, 3001 Heverlee, Belgium*
E–mail: ngavrilovic@aob.bg.ac.yu

We present the analysis of spectral line profiles of the Si III triplet at 455,3 nm, 456,8 nm and 457,4 nm of a variable star ϵ-Persei, and we investigate the vsin(i) value of the star using Fourier transform technique. Since the star is a strong non-radial pulsator the spectra averaged over several pulsational cycles have been used.

The derived average value using all lines is vsin(i)=134 km/s.

Poster paper

ELECTRIC DIPOLE TRANSITION PROBABILITIES IN Al IV AND Al V IONS

RAFIK HAMDI and NÉBIL BEN NESSIB
Groupe de Recherche en Physique Atomique et Astrophysique, Faculté des Sciences de Bizerte, 7021 Zarzouna, Tunisia
E–mail: hamdi_rafik12003@yahoo.fr

Electric dipole transition probabilities in triply and four times ionized aluminium have been calculated in intermediate coupling.

The present calculations were carried out with the general purpose atomic-structure program SUPERSTRUCTURE (Eissner et al.1974), as modified by Nussbaumer and Story (1978). The wavefunctions are of the type $\psi = \sum_i \phi_i C_i$, where the basis functions ϕ_i are constructed using one-electron orbitals ψ. The latter are calculated with a scaled Thomas-Fermi statistical model potential (Eissner and Nussbaumer 1969) or obtained from the Coulomb potential (Nussbaumer and Storey 1978).

The relativestic corrections to the non-relativestic Hamiltonian are taken into account through the Breit-Pauli approximation.

We have also introduced a semi-empirical correction (TEC) for the calculation of the energy-levels

The adopted atomic model for Al IV includes 12 configurations corresponding to 103 fine structure levels. For Al V the model includes 25 configurations corresponding to 434 fine structure levels.

Poster paper

EMERGENT LINE PROFILES FROM RAPIDLY ROTATING STARS

DANIELA KORCAKOVA and JIRI KUBAT
Astronomical Institute AV CR, Fricova 298, 25165 Ondrejov, Czech Republic
E–mail: kor@sunstel.asu.cas.cz

We present theoretical line profiles emerging from rapidly rotating stars calculated using our multidimensional radiative transfer code. The radiative transfer equation is solved in axial symmetry and the velocity field in the whole photosphere is taken into account. Comparison with the commonly used convolution method gives significant differences especially for extended photospheres.

Poster paper

THE REDUCTION OF ECLIPSING BINARY STARS SPECTRA OBSERVED AT ROZHEN OBSERVATORY

ANA LALOVIĆ and IŠTVAN VINCE
Astronomical Observatory, Volgina 7, 11160 Belgrade, Serbia
E–mail: alalovic@aob.bg.ac.yu

Several binary stars of Algol type were observed at Rozhen Observatory with 2m telescope using coude spectrograph. Observations were made from 2001 to 2004. We present the preliminary results of reduction of these spectra.

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Poster paper

GAS TEMPERATURE FROM LINE BROADENING IN A NEON MICROWAVE PLASMA AT ATMOSPHERIC PRESSURE

A. SÁINZ, M.D. CALZADA, M.C. GARCÍA
Grupo de Espectroscopía de Plasmas, Dpto. de Física, Edificio C-2, Campus de Rabanales. Universidad de Córdoba, 14071 Córdoba, Spain
E–mail: fa1gamam@uco.es

We have used the collisional broadening of neutral neon lines to determine the gas temperature of a microwave discharge at atmospheric pressure. The gas temperature can be obtained from the van der Waals broadening, provided that the Stark broadening is negligible. Thus, the variation of the Stark broadening of the H_β, H_α, H_γ lines has been compared with the Lorentzian width of several prominent neutral neon lines from low-lying levels (close to the ground state). The values of gas temperature obtained have been compared with those provided by OH radicals with an excellent agreement.

Poster paper

SELF-ABSORPTION EFFECTS IN THE EQUIVALENT WIDTH OF THE SPECTRAL LINES IN A NEON MICROWAVE PLASMA AT ATMOSPHERIC PRESSURE

A. SÁINZ, I. SANTIAGO, M.C. GARCÍA and M.D. CALZADA
Grupo de Espectroscopía de Plasmas, Dpto. de Física, Edificio C-2, Campus de Rabanales. Universidad de Córdoba, 14071 Córdoba, Spain

Atomic metastable Ne($^3P_0$) and resonant Ne($^3P_1$) levels atom concentrations have been determined from the ratio of the total intensities of two partially *self-absorbed* lines, one of them being more strongly absorbed than the other. The ratio of the intensities is related to the *equivalent width*, W, of the spectral lines, whose shape is approximated to a Voigt function resulting from the convolution of a Lorentzian (Stark and Van der Waals effects) and a Gaussian (Doppler effect and optical broadening) profiles. Thus, we have study W in different plasma column lengths and its influence on the value of the metastable and resonant level populations. Under the operative conditions investigated, the concentrations of these levels were $\sim 10^{11}\mathrm{cm}^{-3}$

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Poster paper

VOIGT DAMPING PARAMETER OF THE SPECTRAL LINES EMITTED BY A PLASMA FLAME AND A PLASMA COLUMN GENERATED BY MICROWAVE AT ATMOSPHERIC PRESSURE

I. SANTIAGO, M. PINEDA, M.C. GARCÍA and M.D. CALZADA

Grupo de Espectroscopía de Plasmas, Dpto. de Física, Edificio C-2, Campus de Rabanales. Universidad de Córdoba, 14071 Córdoba, Spain

Atomic emission spectroscopy (AES) is a non-disruptive method to perform plasma physics diagnosis, by collecting and analyzing the radiation, registered as spectral lines, emitted by the plasma. The spectral line parameters (intensity, width) allow the values of the plasma species temperatures and populations to be determined, and in this way obtaining information about the thermodynamic equilibrium state of the discharge.

Under high pressure conditions, line profiles are adequately fitted by a Voigt function, which is the convolution of a Gaussian and a Lorentzian function. One of the parameter which characterizes this spectral lines is the *damping* or *Voigt-a* parameter, which is equal to $\Delta\lambda_L\sqrt{\ln(2)}/\Delta\lambda_D$, being $\Delta\lambda_L$ the Lorentzian broadening of the spectral line (Stark and van der Waals) and $\Delta\lambda_D$ the Gaussian broadening (Doppler effect). Its value, an indication of the relative importance of each components, supply information regarding the quantity of the local collision interactions which take place in the plasma compared to the other processes, and which must be taken into account when doing a complete description of the radiation source. In this study a simple method to experimentally obtain the *Voigt-a* parameter value of the spectral lines emitted by two kind of SWDs, a column and a flame, is presented. The Lorentzian contribution has been obtained by deconvolution of the spectral profiles and the Doppler width from the temperature of the gas; this temperature was measured using the rotation-vibration spectrums of the OH specie, which is present as impurity in the discharge.

The a-parameter values found are within interval values registered in the literature. It has observed that the modification of the discharge parameters affects the a-parameter value, which indicates that the state of the plasma and its inhomogeneity significantly influences the shape of the spectral lines and therefore also influence their parameter values. In addition, the variation shown is not the same for all the spectral lines, but it depends on the level they come from. For example, for the spectral lines involving high-lying levels the a-parameter is more sensitive to the changes of the electron density than for the lines from the internal levels. It has been observed that the a-parameter value is higher for the lines emitted from the plasma flame than from the plasma column. This is a reflection of the increase of the electronic temperature and density, and therefore of the collision and excitation capacity of the flame in relation to the column.

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Poster paper

ON THE STARK BROADENING PARAMETERS FOR Cu III AND Zn III LINES IN A TYPE STAR ATMOSPHERES

ZORAN SIMIĆ, LUKA Č. POPOVIĆ, MILAN S. DIMITRIJEVIĆ
and MIODRAG D. DAČIĆ
Astronomical Observatory, Volgina 7, 11160, Belgrade, Serbia
E–mail: lpopovic@aob.bg.ac.yu

Stark broadening of ion and atom lines is of interest in the investigation of laboratory and astrophysical plasma. With the development of space-born spectroscopy, observations of spectral lines of trace elements like copper and zinc, become available. From the analysis of 11 Hg-Mn star spectra (Jacobs and Dworetsky, 1981) for example, it follows that copper is clearly overabundant in 10 of investigated stars. Zinc spectral lines are present as well in stellar spectra (see e.g. Adelman 1994, Cowley et al. 2000, Ryabchikova et al. 2000).

The knowledge of Stark broadening parameters is also of interest for the investigation of laboratory and technological plasmas. For example, Spectral lines of Cu III and Cu IV are of particular interest for the diagnostic and modelling of plasma created in electromagnetic macro particle accelerators where in experimental work, the plasma is usually created by Cu or Al foil evaporation. Also, doubly charged zinc ion is a member of the nickel isoelectronic sequence, known to include possible candidates for development of ultraviolet lasers.

Here we present Stark widths for six transitions of Cu III and six transitions of Zn III calaculated by using the modified semiempirical approach (Dimitrijevi and Konjevi 1980). Obtained theoretical results are used to consider the influence of Stark broadening for A type star atmospheres conditions.

Obtained results demonstrate that in A type star atmospheres exist layers where the influence of Stark broadening on Cu III and Zn III line shapes is important in comparison with Doppler broadening. The obtained Stark broadening parameters contribute also to the creation of a set of such data for as large as possible number of spectral lines, of significance for a number of problems in laboratory, technological and astrophysical plasma research.

References

Jacobs, J.M., Dworetsky, M.M.: 1981, Proc. 23d Liege Ap. Colloquium, Star Main Sequence Cp Stars, Liege, p. 153.
Dimitrijević, M.S., Konjević, N.: 1980, *J. Quant. Spectrosc. Radiat. Transfer*, **24**, 451.
Adelman, S.J.: 1994, *Mon. Not. R. Astron. Soc.*, **271**, 355.
Cowley, C. R., Ryabchikova, T., Kupka, F., Bord, D.J., Mathys, G., Bidelman, W.P.: 2000, *Mon. Not. R. Astron. Soc.*, **317**, 299.
Ryabchikova, T.A., Savanov, I.S., Hatzes, A.P., Weiss, W.W., Handler, G.: 2000, *Astron. Astrophys.*, **357**, 981.

Poster paper

STUDYING OF SOME SEYFERT GALAXIES BY THE METHODS OF PANORAMIC SPECTROSCOPY

A.A. SMIRNOVA, A.V. MOISEEV and V.L. AFANASIEV
Special Astrophysical Observatory, Russian Academy of Sciences (SAO RAS)
Nizhnij Arkhyz, Zelenchukskaya, Karachaevo-Cherkesia, Russia 369167
E–mail: alexiya@sao.ru

We have studied some galaxies with active nuclei using method of panoramic spectroscopy. The results of panoramic spectroscopy obtained with Russian 6m telescope are presented: the circumnuclear region were observed with integral-field spectrograph MPFS, the large-scale velocity fields of the ionized gas were constructed from observations with scanning interferometer Fabry-Perot. We have constructed intensity maps and velocity fields as in different lines of ionizing gas as in stars. Also diagnostics diagramms have been made in order to define what is a source of ionization (active nuclei, hot young stars or shock waves).

Poster paper

ANALYTICAL CURVES REDUCTION BY USING FRACTIONAL DERIVATIVE SPECTROMETRY

A.Yu. VOROBYEV, S.S. KHARINTSEV and M.Kh. SALAKHOV
Department of Physics, Kazan State University
Kremlevskaya str. 16, Kazan 420008, Russia
E–mail: scriptlance@rambler.ru

A new fitting method that is useful in the fitting procedure has been discovered. Several positive effects of a fractional derivative connected with the behavior of its zero-crossing and maximal amplitude allow one to fit experimental data into well-known profiles such as Gaussian, Lorentz ant Tsaliss, to estimate their spectral parameters. This method is based on the ordinary least squares approach, but fractional derivatives help one to avoid possible problems of least squares method approach. In this paper described method is demonstrated on model files and on experimental too. In this paper we utilize this method using Lorentz-Gaussian model for decomposition of overlapping peaks with a fractal noise.

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Poster paper

COMPUTER-SIMULATED BALMER-ALPHA LINE PROFILE FOR CALCULATING THE ELECTRON NUMBER DENSITIES

C. YUBERO, M.D. CALZADA and M.C. GARCÍA

Grupo de Espectroscopía de Plasmas, Dpto. de Física, Edificio C-2, Campus de Rabanales. Universidad de Córdoba, 14071 Córdoba, Spain

E–mail: fa1gamam@uco.es

In general, the profile of the spectral lines observed in cold plasmas with a low density and at pressures of over 100 Torr, can be approximated well enough by means of Voigt type functions. This function is the result of the convolution of a gaussian function with a lorentzian function. In this way, by using a model permitting us to fit the Voigt function and intermediate theories, it is possible to obtain fundamental parameters characterizing the plasma (electron density and temperature, gas temperature, etc.)

In the present work, we have fitted the experimental profiles of the Hydrogen Balmer serie lines to a simulated profile obtained from the theoretical Stark profiles given by Gigosos *et al*[M.A. Gigosos, M.A. Gonzlez and V. Cardeoso: Spectrochim. Acta B **58** (2003) 1489.]. by means of the Model Microfield Method. For this treatment it is necessary to find out the most important effects causing the line broadening in our "low density plasmas": Van der Waals, Doppler, instrumental and Stark broadening.

This study was carried out for the first Hydrogen Balmer series line (H_α), this being the most problematic line because it depends heavily on the electron temperature and has a strong broadening by ion dynamics. This method permits the inclusion of ion dynamics effects and also to take into account the difference between T_e and T_g existing in the plasma, by means of the reduced mass, μ. (In our Ar-H plasma with $T_e = 6500$K y $T_g = 1400$K, μ is approximately 4). The best simulated profile corresponded to the convolution between a Van der Waals profile for a gas temperature of 1400 K (≈ 0.035), a Gaussian profile (Doppler+Instrumental) of approximately 0.02 nm and a Stark profile for a μ equal to 4 and an electron density of $\approx 4 - 5 \cdot 10^{14}\mathrm{cm}^{-3}$, with a 95% approximation to the experimental profile.

V Serb. Conf. on Spectral Line Shapes in Astrophysics
Vršac, 6-10. June, 2005.
Program and Abstracts

Poster paper

TEMPERATURE DEPENDENCE OF NON HYDROGENIC ATOM-LINES STARK WIDTHS

BESMA ZMERLI[1], NÉBIL BEN NESSIB[1] and MILAN S. DIMITRIJEVIĆ[2]
[1] *Groupe de Recherche en Physique Atomique et Astrophysique, Faculté des Sciences de Bizerte, 7021 Zarzouna, Tunisia*
[2] *Astronomical Observatory, Volgina 7, 11160 Belgrade, Serbia and Montenegro*
E–mail: besmaest@yahoo.fr

We investigate in the present work the temperature dependence of Stark widths for neutral atom spectral lines in order to find a more precise method for scaling with temperature than sometimes used dependence $T^{-1/2}$, which is often inadequate particularly for Stark broadening of neutral emitter lines.

We propose here a method which provides better possibilities for scaling with temperature. In order to demonstrate the applicability of this scaling, we have applied it to Stark line widths of He I, Mg I, and Ar I. The present results concerns the data at a perturber density $10^{16} cm^{-3}$ and (temperature = 2.510^3 - 5.010^4 K).

In order to obtain a better method for the scaling of Stark broadening parameters with temperature we have used formulae for estimating Stark widths of neutral atom lines based on the simple method of Freudenstein and Cooper and its generalization (i) for the cases where there are more than one important perturber level and (ii) for the shifts, by Dimitrijević and Konjević.

We present results for temperature scalings of Stark half-halfwidths with the proposed method, which are compared with width calculations according to the semiclassical perturbation formalism (versions of Sahal-Bréchot and Griem, Baranger, Kolb and Oertel)and with results obtained with symplified methods of Freudenstein and Cooper, and of Dimitrijević and Konjević.

CONFERENCE PROGRAMME

Monday, 06. 06. 2005.

9:00-12:00 *Transportation (from Belgrade to Vršac by bus) and accommodation of participants.*

12:00-12:30 Opening Ceremony

Chairman: *M.S. Dimitrijević*

12:30-13:00 John Danziger: THE ROLE OF LINE PROFILES IN ANALYZING SPECTRA OF SUPERNOVAE

13:00-13:30 Zoran Petrović: ANOMALOUS DOPPLER BROADENING OF HYDROGEN LINES DUE TO EXCITATION BY FAST NEUTRALS IN LOW PRESSURE TOWNSEND DISCHARGES

13:30-15:30 *Lunch*

Chairman: *Z. Petrović*

15:30-16:00 Albert Ellingboe: WHISTLER WAVE - PARTICLE INTERACTION IN A TEMPERATE IONOSPHERE-LIKE PLASMA

16:00-16:30 Nebil Ben Nessib: INTERACTION POTENTIALS FOR SPECTRAL LINE SHAPES IN PLASMA

16:30-16:45 Zoran Simić: INFLUENCE OF IMPACTS WITH CHARGED PARTICLES ON Cd I AND F III SPECTRAL LINES IN STELLAR PLASMA

16:45-17:00 Walid Mahmoudi: SEMI-CLASSICAL AND MODIFIED SEMI-EMPIRICAL IMPACT STARK BROADENING CALCULATIONS OF SINGLY-IONIZED CARBON AND OXYGEN SPECTRAL LINES

17:00-17:15 Vladimir Milosavljević: MEASURED STARK SHIFTS OF Kr I LINE PROFILES IN THE 5s-5p AND 5s-5p' TRANSITIONS

17:15-17:30 Sergey Kharintsev: FRACTIONAL OSCILLATOR AND ANOMALOUS BROWNIAN MOTION IN THE THEORY OF SPECTRAL LINE BROADENING AND SHIFT

17:30-18:00 *Coffee break*

Chairwoman: *D. Calzada-Canalejo*

18:00-18:15 Magdalena Christova: STARK BROADENING OF Ar I SPECTRAL LINES EMITTED IN SURFACE-WAVE SUSTAINED DISCHARGES

18:15-18:30 Haykel Elabidi: ELECTRON IMPACT BROADENING OF MULTICHARGED NEON SPECTRAL LINES

18:30-18:45 Bratislav M. Obradović: THE EXTERNAL MAGNETIC FIELD INFLUENCE ON THE HYDROGEN BALMER LINES PROFILES IN ELECTRIC DISCHARGES

18:45-19:00 Nenad Milovanović: THE STARK BROADENING EFFECT IN HOT STAR ATMOSPHERES: Tl II

19:00-19:30 Welcome cocktail

Tuesday, 07. 06. 2005.

Chairman: *E. Barron*

9:00-9:30 France Allard: THE IMPORTANCE OF ALKALI LINE BROADENING IN BROWN DWARF ATMOSPHERES

9:30-10:00 Gillian Peach: LINE SHAPES FOR THE SPECTRA OF BROWN DWARFS

10:00-10:30 Emanuil Danezis: A NEW MODELING APPROACH FOR DACs AND SACs REGIONS IN THE ATMOSPHERES OF HOT EMISSION STARS

10:30-11:00 Denis Shulyak: ATMOSPHERES OF CP STARS: MAGNETIC FIELD EFFECTS

11:00-11:30 *Coffee break*

Chairman: *A.F. Zakharov*

11:30-12:00 Andrei Lobanov: RADIO SPECTROSCOPY OF ACTIVE GALACTIC NUCLEI

12:00-12:30 Stefano Ciroi: THE HIDDEN NATURE OF NARROW-LINE SEYFERT 1 GALAXIES

12:30-12:45 Dragana Ilić: THE STRUCTURE OF THE BLR AND NLR IN AGN Mrk 817

12:45-13:00 Alexey Moiseev: SCANNING FABRY-PEROT INTERFEROMETER IN THE EXTRAGALACTIC RESEARCHES

13:00-13:15 Edi Bon: KINEMATICS AND VARIABILITY OF III Zw 2 BROAD LINE EMISSION REGION

13:15-13:30 Srdjan Samurović: DETECTION OF DARK MATTER IN EARLY-TYPE GALAXIES WITH X-RAY HALOES USING ABSORPTION SPECTRAL LINES

13:30-15:30 *Lunch*

Chairman: *L. Wisotzki*

15:30-16:00 Alexander F. Zakharov: BLACK HOLES: THEORY VERSUS OBSERVATIONS - ANALYSIS OF THE Fe K_α LINES AND PRECISE ASTROMETRICAL OBSERVATIONS

16:00-16:30 Cristina Abajas: INFLUENCE OF GRAVITATIONAL MICROLENSING ON BROAD EMISSION LINES OF QUASARS

16:30-16:45 Predrag Jovanović: MICROLENSING EFFECT ON Fe Kα LINE AND X-RAY CONTINUUM IN THE CASE OF THREE GRAVITATIONALLY LENSED QUASARS: MG J0414+0534, QSO 2237+0305 and H1413+117

16:45-17:00 Eleni Chatzichristou: MULTI-WAVELENGTH SURVEYS OF OBSCURED AGN

17:00-17:30 *Coffee break*

Chairman: *M. Roth*

17:30-18:00 Lutz Wisotzki: QUASAR ABSORPTION LINES AND THE INTERGALACTIC MEDIUM

18:00-18:15 Marko Krčo: HINSA AS A TOOL FOR STUDYING DARK CLOUDS AND STAR FORMATION

18:30-20:30 Poster presentation (5 min per poster)

Chairman: *N. Ben Nessib*

M. Christova, V. Gagov and I. Koleva: CALCULATIONS OF THE COLLISIONAL NEUTRAL LINE WIDTHS OF SEVERAL Ar I LINES

F. Di Mille, P. Rafanelli, S. Ciroi, V.L. Afanasiev and S.N. Dodonov: SPECTROPHOTOMETRIC STUDY OF NEARBY SEYFERT NUCLEI

Milan S. Dimitrijević, Tanya Ryabchikova, Luka Č. Popović, Denis Shulyak and Sergey Khan: ON THE INFLURENCE OF STARK BROADENING OF Cr I LINES IN THE Cr-RICH Ap STAR β CrB ATMOSPHERES

G. Djurašević, D. Dimitrov, B. Arbutina, B. Albayrak and S.O. Selam: A STUDY OF CLOSE BINARY SYSTEM EE Cet

Anton Dorodnitsyn and Igor Novikov: LINE-DRIVEN WINDS NEAR BHs

N. Gavrilović, S. Jankov, P. Mathias and P. De Cat: INVESTIGATION OF ROTATIONAL VELOCITY OF E-PERSEI (EPSILON-PERSEI)

Rafik Hamdi and Nébil Ben Nessib: ELECTRIC DIPOLE TRANSITION PROBABILITIES IN Al IV AND Al V IONS

Daniela Korcakova and Jiri Kubat: EMERGENT LINE PROFILES FROM RAPIDLY ROTATING STARS

Ana Lalović and Ištvan Vince: THE REDUCTION OF ECLIPSING BINARY STARS SPECTRA OBSERVED AT ROZHEN OBSERVATORY

A. Sáinz, M.D. Calzada, M.C. García: GAS TEMPERATURE FROM LINE BROADENING IN A NEON MICROWAVE PLASMA AT ATMOSPHERIC PRESSURE

A. Sáinz, I. Santiago, M.C. García and M.D. Calzada: SELF-ABSORPTION EFFECTS IN THE EQUIVALENT WIDTH OF THE SPECTRAL LINES IN A NEON MICROWAVE PLASMA AT ATMOSPHERIC PRESSURE

I. Santiago, M. Pineda, M.C. García and M.D. Calzada: VOIGT DAMPING PARAMETER OF THE SPECTRAL LINES EMITTED BY A PLASMA FLAME AND A PLASMA COLUMN GENERATED BY MICROWAVE AT ATMOSPHERIC PRESSURE

Zoran Simić, Luka Č. Popović, Milan S. Dimitrijević and Miodrag D. Dačić: ON THE STARK BROADENING PARAMETERS FOR Cu III AND Zn III LINES IN A TYPE STAR ATMOSPHERES

A.A. Smirnova, A.V. Moiseev and V.L. Afanasiev: STUDYING OF SOME SEYFERT GALAXIES BY THE METHODS OF PANORAMIC SPECTROSCOPY

A.Yu. Vorobyev, S.S. Kharintsev and M.Kh. Salakhov: ANALYTICAL CURVES REDUCTION BY USING FRACTIONAL DERIVATIVE SPECTROMETRY

C. Yubero, M.D. Calzada and M.C. García: COMPUTER-SIMULATED BALMER-ALPHA LINE PROFILE FOR CALCULATING THE ELECTRON NUMBER DENSITIES

Besma Zmerli, Nébil Ben Nessib and Milan S. Dimitrijević: TEMPERATURE DEPENDANCE OF NON HYDROGENIC ATOM-LINES STARK WIDTHS

Wednesday, 08.06.2005.

Chairman: *J. Purić*

10:00-10:30 Valiants M. Astashynski: SPECTROSCOPIC STUDY OF PLASMA FLOWS CREATED BY A MAGNETOPLASMA COMPRESSOR

10:30-11:00 Dolores Calzada-Canalejo: SPECTROSCOPY OF THE DISCHARGES CREATED AND MAINTAINED BY A SURFACE-WAVE

11:00-11:30 Coffee break

Chairman: *J. Danzinger*

11:30-12:00 Martin Roth: 3D SPECTROSCOPY OF EMISSION LINE SPECTRA OF PLANETARY NEBULAE: DIAGNOSTIC TOOLS FROM THE MILKY WAY TO NEARBY GALAXIES AND BEYOND

12:00-12:30 Edward Baron: OVERVIEW OF SUPERNOVA MODELING WITH PHOENIX

12:30-14:00 *Lunch*

14:00-19:00 *Visiting orthodox and catholic churches in Vršac, monastery Mesić, Vršac's Tower (at the top of Vršac's mountains)*

20:00-23:00 *Visiting the wine cellar in the village Gudurica with testing local wines. Conference dinner will be in the wine cellar*

Thursday, 09.06.2005

Chairwoman: *G. Peach*

11:00-11:30 Peter Hauschildt: EFFECTS OF LINE PROFILES IN T DWARFS

11:30-12:00 Mikhail Sachkov: PULSATIONS IN THE ATMOSPHERES OF Ap STARS

12:00-12:15 Olga Atanacković-Vukmanović: SOLUTION OF NLTE LINE TRANSFER PROBLEM BY USE OF A FORTH-AND-BACK IMPLICIT Λ ITERATION

12:15-12:30 Milan Zboril: HELIUM LINE SHAPE ANALYSIS IN B TYPE STARS

12:30-13:45 Darko Jevremović: ^{6}Li IN THE ATMOSPHERES OF ACTIVE COOL STARS

13:45-15:30 *Lunch*

Chairman: *P. Hauschild*

15:30-16:00 Ljubinko M. Ignjatović: PROCESSES OF ATOM-ATOM (n - n') - MIXING INFLUENCE ON HYDROGEN ATOM RYDBERG STATES POPULATIONS IN STELLAR ATMOSPHERES

16:00-16:30 Evagelia Lyratzi: A NEW APPROACH FOR THE STRUCTURE OF Hα REGIONS IN 120 Be STARS

16:30-16:45 Nikola Vitas: HEIGHTS OF FORMATION OF Mn I SPECTRAL LINES BROADENED BY HYPERFINE STRUCTURE

16:45-17:00 Derek Homeier: MOLECULAR LINE WIDTHS AT STELLAR ATMOSPHERE CONDITIONS

17:00-17:30 *Coffee break*

Chairman: *E. Danezis*

17:30-18:00 Slobodan Ninković: GLOBULAR CLUSTERS OF THE MILKY WAY: THEIR FATE AND CHEMICAL COMPOSITION

18:00-18:15 Nenad Sakan: THE APPLICATION OF THE CUT-OFF COULOMB POTENTIAL FOR THE CALCULATION OF A CONTINUOUS SPECTRA OF DENSE HYDROGEN PLASMA

Chairmen: *M. S. Dimitrijević, L. Č. Popović*

18:15-19:00 Discussion about conference, next SCSLSA, all participants are invited to take part.

Friday, 10. 06. 2005.

Excursion: Smederevo Fortress (1420), monastery Manasia (1407), Resava cave, waterfall Lisine

Back to Belgrade around 21:00

AUTHORS' INDEX