

**ACTIVITIES OF THE GROUP FOR
ASTROPHYSICAL SPECTROSCOPY 2005-2008**

M. S. DIMITRIJEVIĆ¹, L. Č. POPOVIĆ¹, D. JEVREMOVIĆ¹, M. DAČIĆ¹,
P. JOVANOVIĆ¹, A. KOVAČEVIĆ², S. SIMIĆ³, Z. SIMIĆ¹, D. ILIĆ², E. BON¹,
N. GAVRILOVIĆ¹, J. KOVAČEVIĆ¹, N. MILOVANOVIĆ¹, D. TANKOSIĆ¹
and M. STALEVSKI¹

¹*Astronomical Observatory, Volgina 7, 11060 Belgrade 38, Serbia*
E-mails: mdimitrijevic@aob.bg.ac.yu, lpopovic@aob.bg.ac.yu, darko@aob.bg.ac.yu,
mdacic@aob.bg.ac.yu, pjovanovic@aob.bg.ac.yu, zsimic@aob.bg.ac.yu,
ebon@aob.bg.ac.yu, ngavrilovic@aob.bg.ac.yu, jkovacevic@aob.bg.ac.yu,
nmilovanovic@aob.bg.ac.yu, dtankosic@yahoo.com, marko.stalevski@gmail.com

²*Department of Astronomy, Faculty of Mathematics,*
Studentski trg 16, 11000 Belgrade, Serbia
E-mails: andjelka@matf.bg.ac.yu, dilic@matf.bg.ac.yu

³*Department of Physics, Faculty of Sciences,*
Radoja Domanovića 12, 34000 Kragujevac, Serbia
E-mail: ssimic@kg.ac.yu

Abstract. Results of activities of the fellows of the Group for Astrophysical Spectroscopy in the period 2005-2008 (between two conferences of Serbian astronomers) are reported.

1. GROUP FOR ASTROPHYSICAL SPECTROSCOPY 2005-2008

Fellows of the Group for Astrophysical Spectroscopy (GAS) are participants of projects "Influence of collisions with charged particles on astrophysical plasma spectra", "Spectroscopy of extragalactic objects" and "Serbian Virtual Observatory", working together on the spectroscopy of cosmical plasmas in different celestial objects like Active Galactic Nuclei and stellar atmospheres. The projects are supported by Ministry of Science and Technological Development of Serbia, first two as projects from fundamental sciences, and third as a technological project. Within the 2005-2008 period fellows of the Group published 41 papers in the international journals on the Science Citation Index (SCI) list (38 within the projects subjects and five monographic books). In other international journals 14 papers were published, while 13 papers were published in the national journals, such as "Serbian Astronomical Journal". Additionally, 16 invited lectures were published as well as 92 papers in conference proceedings and 87 abstracts, in total 268 bibliographic items.

We have also international collaboration with France, Greece, Italy, Russia, Germany, Tunisia, Spain, USA, Italy, Mexico, United Kingdom and Bulgaria and within the considered period we had almost one hundred visits of foreign scientists and students.

In the considered period we have investigated the following: physics and kinematics of the central part of AGN (in the X-ray, UV and optical part, and their connection with the radio emission); spectroscopy of lensed quasars and influence of microlensing effects on quasar spectra; connection between stellar population and activity in galaxies; gamma ray burst (as violent processes in the Universe); Stark broadening in astrophysical plasmas; collisional processes in cosmic plasmas and their influence on spectral characteristics. Also, papers devoted to the history and philosophy of astronomy were published.

The main observational activities were: - Performed radio observation with VLBI network; - Performed spectroscopical observation (in optical band) with the 6 m telescope Special Astrophysical Observatory (Nizhniy Arkhiz, Russia) and 2m telescope at Rozhen Observatory (Bulgaria).

Within the period 2005-2008, within the frame of the GAS activity (the activity of the three mentioned projects) 5 PhD and 4 MSc theses were defended. Here we give their lists, as well as lists of monographs, papers published in the journals from SCI list and conferences organized by GAS.

2. DEFENDED PhD THESES

1. Predrag Jovanović, 2005, THE INFLUENCE OF GRAVITATIONAL MICROLENSING ON THE X-RAY RADIATION OF THE ACCRETION DISK IN ACTIVE GALAXIES, Faculty of Mathematics, University of Belgrade (Mentor Luka Č. Popović).

2. Magdalena Christova, 2007, DIAGNOSTICS OF THE DISCHARGE IN THE FIELD OF SURFACE WAVES, USING THE EMITTED SPECTRAL LINES, University of Sofia, Sofia (Mentor Milan S. Dimitrijević).

3. Saša Simić, 2008, VARIATION OF LIGHT CURVES OF GAMMA BURSTS: MODIFICATION OF THE MODEL OF SHOCK WAVES, Faculty of Sciences, University of Kragujevac (Mentor Luka Č. Popović).

4. Zoran Simić, 2008, INFLUENCE OF THE COLLISIONS WITH CHARGED PARTICLES ON PROFILES OF SPECTRAL LINES OF HEAVY METALS IN SPECTRA OF A-TYPE STARS AND WHITE DWARFS, Faculty of Mathematics, University of Belgrade (Mentor Milan S. Dimitrijević).

5. Dragana Ilić, 2008, PLASMA DIAGNOSTICS IN THE BROAD LINE REGION OF ACTIVE GALAXIES USING EMISSION LINES (Mentor Luka Č. Popović).

3. DEFENDED MSc THESES

1. Dragana Ilić, 2005, KINEMATICAL AND PHYSICAL PROPERTIES OF THE ACTIVE GALAXY Mrk 817, Faculty of Mathematics, University of Belgrade (Mentor Luka Č. Popović).

2. Giovanni La Mura, 2005, BALMER LINES INTENSITIES AS AN INDICATOR OF PHYSICAL PROCESSES IN THE BLR, Diploma thesis at Università degli Studi di Padova, Facoltà di Scienze, Padova (Mentor Luka Č. Popović).

3. Jelena Kovačević, 2008, EMISSION Fe II, [O III] and C IV REGIONS IN ACTIVE GALACTIC NUCLEI, Faculty of Mathematics, University of Belgrade (Mentor Luka Č. Popović).

4. Nataša Gavrilović, 2008, ASSYMMETRY OF EMISSION LINES AT ACTIVE GALAXIES: THE CASE OF Mrk 533 AND Mrk 110, Faculty of Mathematics, University of Belgrade (Mentor Luka Č. Popović).

4. MONOGRAPHS

1. Milan S. Dimitrijević: SRPSKI ASTRONOMI U INDEKSU NAUČNIH CITATA U XX VEKU, SERBIAN ASTRONOMERS IN SCIENCE CITATION INDEX IN THE XX CENTURY, INSPIRATIO, No. 2, Zadužbina Andrejević, Belgrade, 2005.

2. Predrag Jovanović: UTICAJ GRAVITACIONIH SOČIVA NA SPEKTRE KVAZARA (Influence of gravitational lenses on quasar's spectra), DISSERTATIO No. 228, Zadužbina Andrejević, Belgrade, 2005.

3. Zoran Simić: ŠTARKOVO ŠIRENJE SPEKTRALNIH LINIJA Cd I I F III (Stark broadening of the Cd I and F III spectral lines), ACADEMIA 142, Zadužbina Andrejević, Belgrade, 2005.

4. Dragana Ilić: AKTIVNA GALAKSIJA Mrk 817: OSOBINE EMISIONE OBLASTI (Active galaxy Mrk 817: Properties of the emission region), ACADEMIA 173, Zadužbina Andrejević, Belgrade, 2006.

5. Andjelka Kovačević: O ODREDJIVANJU MASA ASTEROIDA (On the determination of asteroid masses), Zadužbina Andrejević, Belgrade, 2008.

5. PUBLICATIONS IN INTERNATIONAL JOURNALS FROM SCI LIST 2005-2008

1. M. S. Dimitrijević, T. Ryabchikova, L. Č. Popović, D. Shulyak, S. Kan: ON THE INFLUENCE OF STARK BROADENING ON Cr I LINES IN STELLAR ATMOSPHERES, *Astronomy and Astrophysics* 435, (2005), 1191-1198.

2. W. F. Mahmoudi, N. Ben Nessib, M. S. Dimitrijević: MODIFIED SEMIEMPIRICAL ELECTRON WIDTH CALCULATIONS OF SINGLY- IONIZED OXYGEN SPECTRAL LINES, *Astronomy and Astrophysics* 434, (2005), 773-778.

3. A. A. Mihajlov, Lj. Ignjatović, M. S. Dimitrijević: PROCESSES OF $(n - n')$ -MIXING IN COLLISIONS OF RYDBERG $H^*(n)$ ATOMS WITH $H(1s)$ IN THE SOLAR ATMOSPHERE *Astronomy and Astrophysics* 437, (2005), 1023-1027.

4. Z. Simić, M. S. Dimitrijević, N. Milovanović, S. Sahal-Bréchet: STARK BROADENING OF Cd I SPECTRAL LINES, *Astronomy and Astrophysics* 441, (2005), 391-393.

5. D. J. Christian, M. Mathioudakis, D. Jevremović, P. H. Hauschildt, E. Baron: ${}^6\text{Li}$ IN THE ATMOSPHERE OF GJ 117, *Astrophysical Journal* 632, (2005), L127-L130.
6. L. Č. Popović, G. Chartas: THE INFLUENCE OF GRAVITATIONAL LENSING ON THE SPECTRA OF LENSED QUASI-STELLAR OBJECTS, *Monthly Notices of the Royal Astronomical Society*, 357 (2005), 135-144.
7. M. A. Jarzembki, D. V. Tankosić: DISCHARGE OF NEGATIVELY CHARGED MICROMETER SIZE PARTICLES IN AN ELECTRODYNAMIC BALANCE DUE TO RADIOACTIVITY, *Journal of Aerosol Science* 36, (2005) 1023-1035.
8. M. M. Abbas, D. Tankosić, P. D. Craven, J. F. Spann, A. Leclair, E. A. West, J. C. Weingartner, A. G. G. M. Tielens, J. A. Nuth, R. P. Camata, P. A. Gerakines: PHOTOELECTRIC EMISSION MEASUREMENTS ON THE ANALOGS OF INDIVIDUAL COSMIC DUST GRAINS, *Astrophysical Journal* 645 (2006), 324-336.
9. L. Č. Popović, P. Jovanović, E. Mediavilla, A. F. Zakharov, C. Abajas, J. A. Muñoz, G. Chartas: A STUDY OF THE CORRELATION BETWEEN THE AMPLIFICATION OF THE FeK ALPHA LINE AND THE X-RAY CONTINUUM OF QUASARS DUE TO MICROLENSING, *Astrophysical Journal*, 637 (2), (2006), 620-630.
10. L. Č. Popović, L. Č. Jovanović, T. Petrović, V. N. Shalyapin: AMPLIFICATION AND VARIABILITY OF THE AGN X-RAY EMISSION DUE TO MICROLENSING, *Astronomische Nachrichten*, 327 (10), (2006), 981-984.
11. E. Bon, L. Č. Popović, D. Ilić, E. Mediavilla: STRATIFICATION IN THE BROAD LINE REGION OF AGN: THE TWO-COMPONENT MODEL, *New Astronomy Reviews*, 50 (9-10), (2006), 716-719.
12. D. Ilić, L. Č. Popović, E. Bon, E. G. Mediavilla, V. H. Chavushyan: COMPLEX EMISSION LINE REGION OF Mrk 817, *Monthly Notices of the Royal Astronomical Society*, 371 (4), (2006), 1610-1616.
13. P. Jovanović: INFLUENCE OF GRAVITATIONAL MICROLENSING ON X-RAY RADIATION FROM ACCRETION DISKS OF ACTIVE GALAXIES, *Publications of the Astronomical Society of the Pacific*, 118 (842), (2006), 656-657.
14. H. Elabidi, N. Ben Nessib, M. S. Dimitrijević: ELECTRON IMPACT BROADENING OF MULTICHARGED ION LINES OF ASTROPHYSICAL INTEREST: Ne VII, Ne VIII, AND Si XI, *New Astronomy* 12 (2006), 64-70.
15. Z. Simić, M. S. Dimitrijević, L. Č. Popović, M. D. Dačić: STARK BROADENING PARAMETERS FOR Cu III, Zn III AND Se III LINES IN LABORATORY AND STELLAR PLASMA, *New Astronomy* 12 (2006), 187-191.
16. A. A. Smirnova, N. Gavrilović, A. V. Moiseev, L. Č. Popović, V. L. Afanasiev, P. Jovanović, M. Dačić: THE GAS KINEMATICS IN THE Mrk 533 NUCLEUS AND CIRCUMNUCLEAR REGION: A GASEOUS OUTFLOW, *Monthly Notices of the Royal Astronomical Society*, 377 (2), (2007), 480-490.
17. E. Lyratzi, E. Danezis, L. Č. Popović, M. S. Dimitrijević, D. Nikolaidis, A. Antoniou: THE COMPLEX STRUCTURE OF THE Mg II λ 2795.523, 2802.698 Å

REGIONS OF 64 Be STARS, *Publications of the Astronomical Society of Japan*, 59, (2007), 357-371.

18. E. Danezis, D. Nikolaidis, E. Lyratzi, L. Č. Popović, M. S. Dimitrijević, A. Antoniou, E. Theodossiou: A NEW MODEL FOR THE STRUCTURE OF THE DACs AND SACs REGIONS IN THE Oe AND Be STELLAR ATMOSPHERES, *Publications of the Astronomical Society of Japan* 59, (2007), 827-834.

19. A. N. Klyucharev, N. N. Bezuglov, A. A. Matveev, A. A. Mihajlov, Lj. M. Ignjatović, M. S. Dimitrijević: RATE COEFFICIENTS FOR THE CHEMIONIZATION PROCESSES IN SODIUM- AND OTHER ALKALI-METAL GEO-COSMICAL PLASMAS, *New Astronomy Review*, 51 (2007), 547-562.

20. S. Simić, L. Č. Popović, M. I. Andersen, L. Christensen: MECHANISM OF LIGHT CURVE VARIABILITY IN THE GAMMA RAY BURSTS, *Astrophysics and Space Science*, 309 (1-4), (2007), 173-177.

21. G. L. La Mura, L. Č. Popović, S. Ciroi, P. Rafanelli, D. Ilić: DETAILED ANALYSIS OF BALMER LINES IN A SELECTED SAMPLE OF 90 BROAD LINE AGN, *Astrophysical Journal*, 671, (2007) 104-117.

22. M. S. Dimitrijević, L. Č. Popović, J. Kovačević, M. Dačić, D. Ilić: THE FLUX RATIO OF THE [O III] $\lambda\lambda$ 5007, 4959 Å LINES IN AGN: COMPARISON WITH THEORETICAL CALCULATIONS, *Monthly Notices of The Royal Astronomical Society*, 374 (3), (2007) 1181-1184.

23. M. S. Dimitrijević, T. Ryabchikova, Z. Simić, L. Č. Popović, M. Dačić: THE INFLUENCE OF STARK BROADENING ON CrII SPECTRAL LINE SHAPES IN STELLAR ATMOSPHERES, *Astronomy and Astrophysics*, 469 (2), (2007) 681-686.

24. M. M. Abbas, D. Tankosić, P. D. Craven, J. F. Spann, A. Leclair, E. A. West: LUNAR DUST CHARGING BY PHOTOELECTRIC EMISSION, *Planetary and Space Science* 55, (2007), 953-965.

25. M. S. Dimitrijević, M. Christova, S. Sahal-Bréchet: STARK BROADENING OF VISIBLE Ar I SPECTRAL LINES, *Physica Scripta*, 75, (2007) 809-819.

26. A. Dotter, B. Chaboyer, D. Jevremović, E. Baron, J. W. Ferguson, A. Sarajedini, J. Anderson: THE ACS SURVEY OF GALACTIC GLOBULAR CLUSTERS. II. STELLAR EVOLUTION TRACKS, ISOCHRONES, LUMINOSITY FUNCTIONS, AND SYNTHETIC HORIZONTAL-BRANCH MODELS, *Astronomical Journal*, 134, (2007), 376-390.

27. A. Dotter, B. Chaboyer, J. W. Ferguson, H. Lee, G. Worthey, D. Jevremović, E. Baron: STELLAR POPULATION MODELS AND INDIVIDUAL ELEMENT ABUNDANCES. I. SENSITIVITY OF STELLAR EVOLUTION MODELS, *Astrophysical Journal*, 666, (2007), 403-412.

28. L. Č. Popović, M. S. Dimitrijević, Z. Simić, M. Dačić, A. Kovačević, S. Sahal-Bréchet: STARK BROADENING AND HFS OF Mn II, *New Astronomy*, 13, (2008), 85-92.

29. R. Hamdi, N. Ben Nessib, N. Milovanović, L. Č. Popović, M. S. Dimitrijević, S. Sahal-Bréchet: ATOMIC DATA AND ELECTRON-IMPACT BROADENING EFFECT IN DO WHITE DWARF ATMOSPHERES: Si VI, *Monthly Notices of the Royal Astronomical Society*, 387, (2008), 871-882.
30. B. Zmerli, N. Ben Nessib, M. S. Dimitrijević, TEMPERATURE DEPENDENCE OF ATOMIC SPECTRAL LINE WIDTHS IN A PLASMA, *European Journal of Physics D* 48, (2008), 389-395.
31. D. J. Christian, M. Mathioudakis, D. Jevremović: ^6Li IN THE ATMOSPHERE OF GJ 117 REVISITED, *Astrophysical Journal*, 686 (1), (2008), 542-547.
32. A. Dotter, B. Chaboyer, D. Jevremović, V. Kostov, E. Baron, J. W. Ferguson: THE DARTHMOUT STELLAR EVOLUTION DATABASE, *Astrophysical Journal Supplement Series*, 178 (1), (2008), 89-101.
33. D. Casebeer, E. Baron, K. Leighly, D. Jevremovic, D. Branch: SELF-CONSISTENT NLTE-SPECTRA SYNTHESIS MODEL OF FeLoBAL QSOs, *Astrophysical Journal*, 676 (2), (2008), 857-867.
34. L. Č. Popović, A. I. Shapovalova, V. H. Chavushyan, D. Ilić, A. N. Burenkov, A. Mercado, N. G. Bochkarev: PROBING THE PHYSICAL PROPERTIES OF THE NGC 5548 BROAD LINE REGION USING BALMER LINES, *Publications of the Astronomical Society of Japan*, 60 (1), (2008), 1-9.
35. P. Jovanović, A. F. Zakharov, L. Č. Popović, T. Petrović: MICROLENSING OF THE X-RAY, UV AND OPTICAL EMISSION REGIONS OF QUASARS: SIMULATIONS OF THE TIME-SCALES AND AMPLITUDE VARIATIONS OF MICROLENSING EVENTS, *Monthly Notices of the Royal Astronomical Society*, 386 (1), (2008), 397-406.
36. P. Jovanović, L. Č. Popović: OBSERVATIONAL EFFECTS OF STRONG GRAVITY IN VICINITY OF SUPERMASSIVE BLACK HOLES, *Fortschrift für Physik (Progress in Physics)*, 55 (2008), 1-5.
37. A. I. Shapovalova, L. Č. Popović, S. Collin, A. N. Burenkov, V. H. Chavushyan, N. G. Bochkarev, E. Bentez, D. Dultzin, A. Kovačević, N. Borisov, L. Carrasco, J. León-Tavares, A. Mercado, J. R. Valdes, V. V. Vlasyuk, V. E. Zhdanova: LONG-TERM VARIABILITY OF THE OPTICAL SPECTRA OF NGC 4151. I. LIGHT CURVES AND FLUX CORRELATIONS, *Astronomy and Astrophysics*, 486 (1), (2008), 99-111.
38. S. Simić, L. Č. Popović: INVESTIGATION OF ELEMENTAL ABUNDANCE IN THE SURROUNDINGS OF GRB AFTERGLOWS, *International Journal of Modern Physics D*, 17, (2008), 1377-1382.

6. MISCELLANEOUS

1. A. Kovačević: DETERMINATION OF THE MASS OF (4) VESTA BASED ON NEW CLOSE APPROACHES, *Astronomy and Astrophysics* 430, (2005), 319-325.
2. A. Kovačević, M. Kuzmanoski: A NEW DETERMINATION OF THE MASS OF (1) CERES, *Earth, Moon and Planets* 100, (2005), 117-123.

3. A. Kovačević: GRAVITATIONAL EFFECTS OF MINOR PLANETS AND THEIR MASS DETERMINATION, Publications of the Astronomical Society of Pacific 119, (2007), 134.

4. M. S. Dimitrijević, E. Th. Theodossiou, P. Z. Mantarakis: MILUTIN MILANKOVIĆ AND THE REFORM OF THE JULIAN CALENDAR IN 1923, Journal of Astronomical History and Heritage 11 (2008), 50-54.

7. CONFERENCES ORGANIZED BY THE GROUP FOR ASTROPHYSICAL SPECTROSCOPY 2005-2008

1. V SERBIAN CONFERENCE ON SPECTRAL LINE SHAPES IN ASTROPHYSICS, Vršac, 6 - 10 June 2005 (Co-Chairs of the Scientific Organizing Committee (SOC) L. Č. Popović, M. S. Dimitrijević, member D. Jevremović, Chair of the Local Organizing Committee (LOC) M. S. Dimitrijević).

2. DEVELOPMENT OF ASTRONOMY AMONG SERBS IV, Belgrade 22-26 April 2006 (Chair of the SOC, M. S. Dimitrijević).

3. V BULGARIAN-SERBIAN CONFERENCE ON ASTRONOMY AND SPACE SCIENCE, Sofia, 9-12 May 2006 (Organizers and editors of Proceedings M. K. Tsvetkov, L. G. Filipov, M. S. Dimitrijević, L. Č. Popović).

4. VI SERBIAN - BELARUSSIAN SYMPOSIUM ON PHYSICS AND DIAGNOSTICS OF LABORATORY AND ASTROPHYSICAL PLASMAS (PDP-VI'2006), Belgrade, 22 - 25. August 2006 (Co-Chairs of the SOC, M. Čuk, M. S. Dimitrijević, V. S. Burakov, A. F. Chernyavski, Scientific Secretary L. Č. Popović).

5. VI SERBIAN CONFERENCE ON SPECTRAL LINE SHAPES IN ASTROPHYSICS, Sremski Karlovci, 11-15 June 2007. (Co-Chairs of the SOC L. Č. Popović, M. S. Dimitrijević, Chairman of the LOC L. Č. Popović, Co-Vice Chairs D. Ilić, N. Milovanović).

6. THE FIRST SUMMER SCHOOL IN ASTRONOMY AND GEOPHYSICS, Belgrade, 6-10 August 2007 (Co-Chairs of the SOC M. S. Dimitrijević, N. Pejović, Scientific secretary A. Kovačević).

7. DEVELOPMENT OF ASTRONOMY AMONG SERBS V, Belgrade 18-22 April 2008 (Chair of the SOC, M. S. Dimitrijević).

8. VI SERBIAN-BULGARIAN ASTRONOMICAL CONFERENCE, Belgrade, 7-11 May 2008 (Co-Chairs of the SOC M. S. Dimitrijević, M. K. Tsvetkov, Co-Vice Chairs of the SOC, L. Č. Popović, V. Golev, Chair of the LOC A. Kovačević).

9. 24th SUMMER SCHOOL AND INTERNATIONAL SYMPOSIUM ON THE PHYSICS OF IONIZED GASES, Novi Sad, 25-29 August 2008 (Co-Chairs of the LOC L. Č. Popović, M. S. Dimitrijević, Secretary of the LOC D. Ilić).

10. VII BELARUSSIAN-SERBIAN SYMPOSIUM ON PHYSICS AND DIAGNOSTICS OF LABORATORY AND ASTROPHYSICAL PLASMAS (PDP-VII'2008), Minsk, 22-26 September 2008 (Co-Vice Chairs of the Programme Organizing Committee, V. I. Arkhipenko, M. S. Dimitrijević).

11. THE SECOND SUMMER SCHOOL IN ASTRONOMY, Belgrade, 29 September - 1 October 2008 (Co-Chairs of the SOC M. S. Dimitrijević, T. Prodanović, L. Č. Popović, Chair of the LOC A. Kovačević).
12. XV NATIONAL CONFERENCE OF ASTRONOMERS OF SERBIA, Belgrade, 2-5 October 2008 (Chair of the LOC D. Ilić).
13. DJORDJE STANOJEVIĆ - LIFE AND WORK (150 YEARS FROM HIS BIRTH), Novi Sad, 10-11 October 2008 (Organizers V. Marić, M. S. Dimitrijević).