



5th Conference on Elementary Processes in Atomic Systems

Belgrade, Serbia, June 21 - 25, 2011



CEPAS 2011 & CEAMPP 2011

CONTRIBUTED PAPERS
&
ABSTRACTS OF INVITED LECTURES

Editors

Aleksandar R. Milosavljević

Saša Dujko

Bratislav P. Marinković

IPB Institute of Physics
Belgrade - Serbia

2nd National Conference on Electronic,
Atomic, Molecular and Photonic Physics



IPB CEPAS 2011

Abstracts and Contributed Papers

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Institute of Physics
Belgrade, Serbia

Belgrade, 2011

CONTRIBUTED PAPERS & ABSTRACTS OF INVITED LECTURES
of the
5th CONFERENCE ON ELEMENTARY PROCESSES IN ATOMIC
SYSTEMS
and the satellite meeting
2nd NATIONAL CONFERENCE ON ELECTRONIC, ATOMIC,
MOLECULAR AND PHOTONIC PHYSICS

21st – 25th June 2011
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Aleksandar R. Milosavljević, Saša Dujko and Bratislav P. Marinković

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PREFACE

This book contains the Contributed papers and abstracts of the Invited lectures to be presented at the 5st Conference on Elementary Processes in Atomic Systems – CEPAS 2011 and 2nd National Conference on Electronic, Atomic, Molecular and Photonic Physics – CEAMPP 2011.

The Conference on Elementary Processes in Atomic Systems (CEPAS) is held triennially to promote the growth and exchange of scientific information in the field of photo-processes and laser collisions, electron (positron)/atom collisions, collisions with biomolecules, heavy particles (ion/atom) collisions, interactions with surfaces and processes with nano-sized complex systems. The first conference in the CEPAS series was organized in Uzhorod (Ukraine, 2000), the second one in Gdańsk (Poland, 2002), the third in Miskolc (Hungary, 2005), the fourth in Cluj-Napoha (Romania, 2008) and the present fifth in Belgrade (Serbia, 2011). In all of these places, scientific research has been well established in particular fields that highlight the conference topics but the given opportunity to organize the CEPAS conference leads to further promotion of science and local research groups, thus receiving the full international recognition. The scientific program of the CEPAS 2011 consists of sessions of invited plenary (30 min) and topical (25 min) lectures. Contributed papers are presented as posters in afternoon sessions.

The National Conference on Electronic, Atomic, Molecular and Photonic Physics - CEAMPP is now a traditional national conference covering a wide range of scientific topics in atomic and molecular physics. The CEAMPP aims to bring together and support collaboration between different groups working basically in various fields of atomic and molecular physics, so to induce new ideas and interdisciplinary research. The focus of the CEAMPP is placed upon the young and distinguished researchers, who will be invited to give the most of the lectures at the conference. Still, the CEAMPP aims to preserve a high scientific level with the goal of presenting the frontier results both in Serbia and worldwide.

We are grateful for the support to Ministry of Education and Science of Republic of Serbia, Embassy of France in Belgrade, Embassy of Austria in Belgrade, Framework programme 7 project "Virtual Atomic and Molecular Data Centre" - VAMDC, Springer's journal "European Physical Journal D: Atomic, Molecular, Optical and Plasma Physics". We also acknowledge the support of Serbian Academy of Science and Arts and Institute of Physics, University of Belgrade. Finally, we are also grateful to Astra travel agency for technical organization of the conference.

The Editors would like to thank the members of the International Advisory Board of CEPAS 2011 and Scientific Committee of CEAMPP 2011 for their efforts in proposing the program of the conference, as well as plenary and topical invited lectures. Finally, we acknowledge the support of all members of the Organizing Committee who contributed to the preparing and running of the conference.

The participants have been asked to send their papers in a format already prepared for publication. After peer review of contributions, the basic corrections have

been made to meet general form of the book and to avoid, as much as possible, typing, spelling and grammatical errors. The Editors apologize for all mistakes that emerged from the preparation process and software problems in the process of printing.

Finally we would like to thank all the invited speakers and the participants for taking part in CEPAS 2011 and CEAMPP 2011 and to wish them to have a pleasant stay in Belgrade.

Belgrade, June, 2011

Editors

ACKNOWLEDGEMENT

5th CONFERENCE ON ELEMENTARY PROCESSES IN
ATOMIC SYSTEMS
&
2nd NATIONAL CONFERENCE ON ELECTRONIC, ATOMIC,
MOLECULAR AND PHOTONIC PHYSICS

are organized by the

**Institute of Physics
Belgrade, Serbia**

in collaboration with the

Serbian Academy of Sciences and Arts

and under the auspices and with the support of the

Ministry of Education and Science, Republic of Serbia

and also sponsored by:



CONFERENCE TOPICS

CEPAS 2011

1. Photo-processes and laser collisions
2. Electron(positron)/atom collisions
3. Collisions with biomolecules
4. Heavy particles (ion/atom) collisions
5. Interactions with surfaces
6. Processes with nano-sized complex systems

CEAMPP 2011

1. Atomic and Molecular Structure and Properties
2. Collision Processes
3. Photon Interaction with Atoms and Molecules

CEPAS 2011

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CEAMPP/ CEPAS 2011 PROGRAM

Tuesday 21 st June 2011		
2 nd National Conference on Electronic, Atomic, Molecular and Photonic Physics - CEAMPP		
(PL – Plenary lecture: 25+5 min; PR – Progress report: 15+5 min)		
08:00-09:15	Registration (CEAMPP)	
09:15-09:30	Opening (CEAMPP), Chair: Saša Dujko	
	Plenary Session , Chair: Aleksandar Milosavljević	
09:30-10:00	<i>Dynamics of dissociative electron attachment to small molecules</i>	Juraj Fedor , University of Fribourg, Switzerland
10:00-10:30	<i>Soft X-ray spectroscopy of molecules and biomolecules</i>	Christoph Nicolas , SOLEIL Synchrotron, Saint-Aubin, France
10:30-11:00	<i>Grazing incidence fast atom diffraction on different materials</i>	Nenad Bundaleski , CEFITEC, Caparica, Portugal
11:00-11:30	Coffee break	
	Session 2 , Chair: Saša Dujko	
11:30-11:50	<i>On the propagation of positive streamers in N₂:O₂ mixtures</i>	Gideon Wormeester , CWI, Amsterdam, The Netherlands
11:50-12:10	<i>Numerical modeling of buffer gas positron traps</i>	Srđan Marjanović , Institute of Physics, Belgrade, Serbia
12:10-12:30	<i>Absolute cross sections for electron scattering from metal vapours</i>	Sanja Tošić , Institute of Physics, Belgrade, Serbia
12:30-12:50	<i>Excitation of molecules by low-energy electrons</i>	Miroslav Ristić , Faculty of Physics, Belgrade, Serbia
13:00-15:00	Lunch break	
	Session 3 , Chair: Nenad Simonović	
15:00-15:20	<i>Ab initio calculation of low-lying vibronic levels in the ground X²Π_u electronic state of dicyanoacetylene cation</i>	Radomir Ranković , Faculty of Physical Chemistry, Belgrade, Serbia
15:20-15:40	<i>Theoretical study of the Jahn-Teller effect</i>	Maja Gruden Pavlović , Faculty of Chemistry, Belgrade, Serbia
15:40-16:00	<i>Coherent effects in laser driven rubidium vapor</i>	Milan Radonjić , Institute of Physics, Belgrade, Serbia
16:00-16:20	<i>Monte Carlo modeling of Townsend discharges in hydrogen</i>	Vladimir Stojanović , Institute of Physics, Belgrade, Serbia
16:20-16:40	Coffee break	

16:45-18:00	Poster session (CEAMPP)	
18:00-19:00	Registration (CEPAS)	
19:00	<i>Welcome party for CEAMPP and CEPAS participants</i>	
Wednesday 22nd June 2011		
5th Conference on Elementary Processes in Atomic Systems - CEPAS		
<i>(PL – Plenary lecture: 30+5 min; TL – Topical lecture: 20+5 min)</i>		
08:00-08:45	Registration (CEPAS)	
08:45-09:00	Opening (CEPAS), Chair: Bratislav P. Marinković	
	Plenary Session , Chair: Zoran Lj. Petrović	
09:00-09:35	<i>Positronium negative ion experiments</i>	Yasuyuki Nagashima , Tokyo University of Science, Japan
09:35-10:10	<i>Imaging electron/ion coincidences for gas phase photoionization studies of chiral systems on the DESIRS beamline at SOLEIL</i>	Laurent Nahon , SOLEIL synchrotron, France
10:10-10:40	Coffee break	
	Session 2 , Chair: Nigel Mason	
10:40-11:05	<i>Cross sections for elastic electron scattering from iodine</i>	Michael Brunger , Flinders University, Australia
11:05-11:30	<i>Quantum interferences in atomic ionization by short laser pulses</i>	Diego Arbó , Astronomia y Física del Espacio, Buenos Aires , Argentina
11:30-11:55	<i>Electron driven processes in biomolecules</i>	Janina Kopyra , University of Podlasie, Poland
11:55-12:20	<i>Multi- photon ionization of biomolecular clusters</i>	Sam Eden , The Open University, UK
12:30-15:00	Lunch break	
	Session 3 , Chair: Robert DuBois	
15:00-15:25	<i>Coherent wavepacket shaping in high Rydberg states</i>	Shuhei Yoshida , Vienna University of Technology, Austria
15:25-15:50	<i>Positron scattering from krypton</i>	James Sullivan , Australian National University, Australia
15:50-16:15	<i>Absolute differential cross sections for electron scattering from building blocks of biopolymers</i>	Aleksandar Milosavljević , Institute of Physics Belgrade, Serbia
16:15-16:35	Coffee break	

	Session 4, Chair: Viorica Stancalie	
16:35-17:00	<i>Differential cross sections of some noble atoms studied by fast electron impact and inelastic x-ray scattering</i>	Lin-Fan Zhu, Hefei National Laboratory for Physical Sciences at Microscale, China
17:00-17:25	<i>The effect of temperature on guiding of slow highly charged ions through mesoscopic glass capillaries</i>	Réka Bereczky, ATOMKI, Debrecen, Hungary
17:30-19:00	Poster session (1)	
Thursday 23rd June 2011		
	Plenary Session, Chair: Bratislav P. Marinković	
09:00-09:35	<i>Effect of projectile coherence on atomic fragmentation processes</i>	Michael Schulz, Missouri University of Science and Technology, USA
09:35-10:10	<i>Collisions with biomolecules: negative ion formation</i>	Paulo Limão-Vieira, Universidade Nova de Lisboa, Portugal
10:10-10:40	Coffee break	
	Session 2, Chair: Paulo Limão-Vieira	
10:40-11:05	<i>Hard X-ray polarimetry in energetic ion-atom collisions</i>	Günter Weber, Helmholtz Institute Jena, Germany
11:05-11:30	<i>Photoionization study of trapped biopolymer ions in the gas phase</i>	Alexandre Giuliani, SOLEIL synchrotron, France
11:30-11:55	<i>Spatially resolved transport properties for electrons in gases: Definition, interpretation, and calculation</i>	Saša Dujko, Institute of Physics Belgrade, Serbia
11:55-12:20	<i>Excitation reactions studied by electron induced fluorescence method</i>	Juraj Országh, Comenius University Bratislava, Slovakia
12:30-15:00	Lunch break	
	Session 3, Chair: Károly Tőkési	
15:00-15:25	<i>On deviations from theory of electron-atom elastic scattering cross sections</i>	Raymond Moreh, Ben-Gurion University of the Negev, Israel
15:25-15:50	<i>Photofragmentation of organic molecules of biological interest</i>	Paola Bolognesi, CNR-IMIP, Italy
15:50-16:15	<i>Electron-impact and thermal fragmentation of the amino acid molecules: mechanisms and structure of the molecules</i>	Alexander Snegursky, Institute of Electron Physics Uzhgorod, Ukraine
16:15-16:40	<i>Nanostructures formed on various surfaces due to the impact of individual slow highly charged ions</i>	Robert Ritter, Vienna University of Technology, Austria
16:40-17:00	Coffee break	

17:00-18:30	CEPAS Advisory Board meeting	
19:30	<i>Concert</i>	
Friday 24th June 2011		
	Plenary Session, Chair: Friedrich Aumayr	
09:00-09:35	<i>Inelastic transitions of atoms (and molecules) induced by van der Waals interaction with a surface</i>	Jacques Baudon, University Paris 13, France
09:35-10:10	<i>Ions Colliding with Cold Polycyclic Aromatic Hydrocarbon Clusters</i>	Patrick Rousseau, CIMAP Caen, France
10:10-10:40	Coffee break	
	Session 2, Chair: Jiří Horáček	
10:40-11:05	<i>Laser Raman scattering from biomolecules in nanoparticles-embedded tissue</i>	Simona Cintă Pinzaru, Babes-Bolyai University, Romania
11:05-11:30	<i>Scattering from biomolecules in helium droplets</i>	Stefan Denifl, University of Innsbruck, Austria
11:30-11:55	<i>Channeling of charged particles through carbon nanotubes</i>	Duško Borka, Vinča Institute of Nuclear Sciences, Serbia
11:55-12:20	<i>Resonant inelastic collisions of electrons with diatomic molecules</i>	Karel Houfek, Institute for Theoretical Physics Prague, Czech Republic
12:30-15:00	Lunch break	
	Closing session, Chair: Andrey Solov'yov	
15:00-15:35	<i>Classical theory of atomic collisions – the first hundred years</i>	Petar Grujić, Institute of Physics Belgrade, Serbia
15:35-16:00	<i>Thermo-mechanical impact on biomolecules induced by heavy ions</i>	Alexander V. Yakubovich, Frankfurt Institute for Adv. Studies, Germany
16:00-16:25	<i>Ion Interactions with Graphene</i>	Zoran Mišković, University of Waterloo, Canada
16:30-16:50	Coffee break	
16:50-18:20	Poster session (2)	
20:00	<i>Conference dinner</i>	
Saturday 25th June 2011		
10:00	Excursion	

CONTENTS

CEPAS 2011

Abstracts of Invited Plenary Lectures

- L. Nahon*
Imaging electron/ion coincidences for gas phase photoionization studies of chiral systems on the DESIRS beamline at SOLEIL5
- Y. Nagashima*
Positronium negative ion experiments6
- P. Limão-Vieira*
Collisions with biomolecules: negative ion formation7
- M. Schulz, K. Egodapitiya, S. Sharma, A.C. Laforge, R. Moshhammer, A. Hasan, D.H. Madison*
Effect of projectile coherence on atomic fragmentation processes8
- J. Baudon, M. Hamamda, M. Boustimi, V. Bocvarski, T. Taillandier-Loize, G. Dutier, F. Perales and M. Ducloy*
Inelastic transitions of atoms (and molecules) induced by van der Waals interaction with a surface10
- P. Rousseau, A. I. S. Holm, A. Ławicki, H. Zettergren, M. Capron, H. A. B. Johansson, E. Lattouf, S. Maclot, R. Maisonny, F. Seitz, A. Domaracka, A. Méry, J.-C. Poully, J. Rangama, S. Rosén, H. T. Schmidt, L. Adoui, B. Manil, H. Cederquist, B. A. Huber*
Ions colliding with cold polycyclic aromatic hydrocarbon clusters11
- P. Grujić*
Classical theory of atomic collisions – the first hundred years12

Abstracts of Invited Topical Lectures

- S. Yoshida, C. O. Reinhold, J. Burgdorfer, B. Wyker, S. Ye, F. B. Dunning*
Probing the coherent evolution of wavepackets in high Rydberg states15
- D. G. Arbó*
Quantum interferences in atomic ionization by short laser pulses.....16
- P. Bolognesi, P. O’Keeffe, L. Avaldi*
Photofragmentation of organic molecules of biological interest17
- J. Országh, M. Danko, A. Ribar, Š. Matejčík*
Excitation reactions studied by electron induced fluorescence method18
Lin-Fan Zhu and Ya-Wei Liu
- Lin-Fan Zhu and Ya-Wei Liu*
Differential cross sections of some noble atoms studied by fast electron impact and inelastic x-ray scattering19

<i>M. J. Brunger, L. R. Hargreaves, D. B. Jones, R. Murrie, J. R. Brunton, O. Zatsarinny, K. Bartschat, G. García, F. Blanco, M. Hoshino, S. J. Buckman</i>	
Cross sections for elastic electron scattering from iodine	21
<i>R. Moreh, D. Nemirovsky</i>	
On deviations from theory of electron-atom elastic scattering cross sections	22
<i>S. Dujko, R. D. White, Z. M. Raspopović, Z. Lj. Petrović</i>	
Spatially resolved transport properties for electrons in gases: definition, interpretation, and calculation	23
<i>J. P. Sullivan</i>	
Positron scattering from krypton	24
<i>K. Houfek, M. Čížek, J. Horáček</i>	
Resonant inelastic collisions of electrons with diatomic molecules	25
<i>J. Kopyra, H. Abdoul-Carime, E. Illenberger</i>	
Electron driven processes in biomolecules	26
<i>A. Giuliani, A. R. Milosavljević, C. Nicolas, M. Réfrégiers, L. Nahon</i>	
Photoionization and photodetachment study of trapped biopolymer ions in the gas phase	27
<i>A. R. Milosavljević, F. Blanco, J. B. Maljković, G. García, B. P. Marinković</i>	
Absolute differential cross sections for electron scattering from building blocks of biopolymers	28
<i>A. V. Yakubovich, E. Surdutovich, A.V. Solov'yov</i>	
Thermo-mechanical impact on biomolecules induced by ion beams propagating in biological medium as seen from molecular dynamics simulations	29
<i>J. Tamuliene, L.G. Romanova, V.S. Vukstich, A.V. Snegursky</i>	
Electron-impact and thermal fragmentation of the amino acid molecules: mechanisms and structure of the molecules	30
<i>G. Weber, H. Bräuning, S. Fritzsche, S. Hess, R. Martin, R. Reuschl, U. Spillmann, A. Surzhykov, D. F. A. Winters, Th. Stöhlker</i>	
Title of the hard X-ray polarimetry in energetic ion-atom collision	31
<i>I. Radović, V. Borka Jovanović, D. Borka, Z. L. Mišković</i>	
Wake effect in the polarization of graphene by slowly moving charges	32
<i>D. Borka</i>	
Channeling of charged particles through carbon nanotubes	33
<i>R. J. Berezky, G. Kowarik, F. Ladinig, K. Tőkés, F. Aumayr</i>	
The effect of temperature on guiding of slow highly charged ions through mesoscopic glass capillaries	34
<i>S. Cintă Pinzaru, A. Falamas, C. Dehelean</i>	
Laser Raman scattering from biomolecules in nanoparticles-embedded tissue	35
<i>S. Denifl, F. Ferreira da Silva, P. Bartl, A. M. Ellis, T. D. Märk, P. Scheier</i>	
Scattering from biomolecules in helium droplets	36

<i>S. Eden, B. Barc, P. Cahillane, N. J. Mason</i> Nanosecond-timescale UV multi-photon ionization of DNA base monomers and hydrated clusters	37
<i>R. Ritter, G. Kowarik, R. A. Wilhelm, R. Heller, R. Ginzl, L. Maunoury, M. Toulemonde, C. Dufour, H. Lebius, R. M. Papaléo, W. Rupp, Q. Shen, C. Teichert, S. Facsko, J. R. Crespo López-Urrutia, J. Ullrich, F. Aumayr</i> Nanostructures formed on various surfaces due to the impact of individual slow highly charged ions	38

Abstracts of Poster Contributions

<i>D. G. Arbó, K.L. Ishikawa, E. Persson and J. Burgdörfer</i> Intracycle interferences traces in 2D-momentum distribution of atomic photoionization.....	41
<i>M. Boca, V. Dinu, V. Florescu</i> Spin effects in nonlinear Compton scattering in a plane-wave laser pulse	42
<i>D. B. Popović, I. P. Mendaš</i> Multiphoton excitation in a Γ -type three-level system with generally nondegenerate excited states	43
<i>G. Buica</i> Propagation of a laser pulse train under electromagnetically induced transparency conditions	44
<i>M. Vatasescu</i> Preparing isolated vibrational wave packets by light-induced molecular potentials with chirped laser pulses	45
<i>J. Dimitrijević, D. Arsenović and B. M. Jelenković</i> Perturbative solution for analysis of processes in a double- Λ atomic scheme	46
<i>S. Vučić</i> Electronic densities associated with atomic resonances in laser fields	47
<i>I. L. Glukhov</i> Blackbody radiation induced excitation and decay of Rydberg states in potassium	48
<i>M. Klenivskiy, V. Kelman, Yu. Zhmenyak, Yu. Shpenik</i> Luminescence of exciplex XeCl*- and XeBr*- molecules excited by an electric discharge in the Xe/CsCl/CsBr gas-vapor mixture	49
<i>M. S. Rabasović, D. Šević, M. Terzić, B. P. Marinković</i> Time resolved laser induced fluorescence measurements: considerations when using Nd:YAG based system	50
<i>M. S. Rabasović, D. Šević, V. Pejčev, B. P. Marinković</i> Detecting indium spectral lines using electron spectroscopy and laser induced breakdown spectroscopy	51
<i>J. Országh, M. Danko, M. Lacko, Š. Matejčík</i> Nitrogen first negative system studied by electron induced fluorescence	52

<i>M. Popović, G. Poparić</i>	
Optimizing the parameters for maximal ion extraction efficiency in time-of-flight mass spectroscopy	53
<i>V. I. Kelemen, E. Yu. Remeta</i>	
Spin exchange asymmetry in the elastic electron scattering by Eu atom	54
<i>B. Paripás, B. Palásthy, M. Žitnik</i>	
Experimental (e,2e) study of resonant Auger states of Ar	55
<i>T. Mukoyama, Y. Nagashima, K. Tőkési</i>	
K-shell ionization of Cu by positron impact	56
<i>K. Tőkési</i>	
Site selective electron capture in low energy positron and argon collisions	57
<i>N. V. Delić, J. P. Šetrajčić, S. Armačević, I. J. Šetrajčić</i>	
Possible structure of electron and positron	58
<i>N. Simonović</i>	
The collinear versus 3D adiabatic model for helium atom in hyperspherical coordinates	59
<i>A. Nina, V. Čadež, D. Šulić, V. Srećković</i>	
Altitude distribution of electron concentration in the ionospheric D-region in presence of time-varying solar radiation flux	60
<i>A. Nina, V. Čadež, D. Šulić, V. Srećković, V. Žigman</i>	
Effective electron recombination coefficient in the ionospheric D-region during the relaxation regime following a solar flare on February 18, 2011	61
<i>V. Stojanović, Ž. Nikitović, Z. Lj. Petrović</i>	
Title of the Monte Carlo modeling of electrons and heavy particles in pure H ₂ discharge	62
<i>S. Marjanović, M. Šuvakov, J. J. Engbrecht, Z. Lj. Petrović</i>	
Numerical modeling of positronium thermalization	63
<i>M. Radmilović-Radjenović, B. Radjenović, M. Savić</i>	
Modelling of microhollow cathode discharges in argon at atmospheric pressures	64
<i>M. Klas, Š. Matejčik, B. Radjenović, M. Radmilović-Radjenović</i>	
The secondary emission coefficient for air	65
<i>A. Banković, S. Dujko, R. D. White, S. J. Buckman, Z. Lj. Petrović</i>	
Monte Carlo simulation and Boltzmann equation analysis of non-conservative positron transport in H ₂	66
<i>V. Stojanović, Z. Raspopović, J. Jovanović, S. Radovanov, Ž. Nikitović, Z. Lj. Petrović</i>	
Transport properties of positive ions in BF ₃ plasmas	67
<i>V. Stancalie</i>	
Contribution of near threshold states to dielectronic recombination in Li-like Al and C ions	68
<i>J. B. Maljković, F. Blanco, G. García, B. P. Marinković, A. R. Milosavljević</i>	
Elastic electron scattering from formamide molecule	69

<i>M. Stano, P. Papp, K. Pisklová, Š. Matejíček, J. Urban</i> Electron impact ionization and electron attachment to Gly-Gly in a gas phase ...	70
<i>P. Papp, M. Stano, S. Engmann, P. Mach, O. Ingolfsson, Š. Matejíček</i> Combined experimental and theoretical study of electron impact ionization of Co(CO) ₃ NO molecule	71
<i>I. V. Chernyshova, J. E. Kontros, P. P. Markus, O. B. Shpenik</i> Near-threshold electron-impact ionization of thymine	72
<i>I. V. Chernyshova, J. E. Kontros, P. P. Markus, O. B. Shpenik</i> Positive and negative electron-impact ionization of the cytosine molecule	73
<i>M. M. Erdevdy, O. B. Shpenik, V. V. Zvenihorodsky</i> Electron impact excitation of the gas-phase thymine molecule	74
<i>O. B. Shpenik, M. M. Erdevdy, V. V. Zvenihorodsky</i> Electron impact excitation of the gas-phase uracil molecule	75
<i>M. C. Castrovillia, P. Bolognesia, P. O'Keeffe, A. Casavolaa, D. Catonec, S. Turchinic, L. Avaldia</i> Site-selective fragmentation studies of halogenated pyrimidines in the valence and inner shell region	76
<i>A. V. Verkhovtsev, R. G. Polozkov, V. K. Ivanov, A. V. Korol, A. V. Solov'yov</i> Calculations of the structure and photoionization processes of pristine and endofullerenes	77
<i>I. Benkő, I. Rajta, A. Csik, J. Tóth, K. Géresi, É. Ungvári, B. Szabó, G. Sarkadi, K. Tőkési</i> Major and trace elements in mouse bone measured by surface and bulk sensitive methods	78
<i>S. Maclot, M. Capron, R. Maisonnay, E. Lattouf, A. Ławicki, S. Bari, A. Méry, J. Rangama, J.-Y. Chesnel, A. Domaracka, J.-C. Pouilly, R. Hoekstra, T. Schlathölter, B. Manil, L. Adoui, P. Rousseau, B. A. Huber</i> Influence of the environment on the fragmentation of amino acids provoked by low-energy ions	79
<i>S. Kovács, P. Herczku, Z. Juhász, L. L. Horváth, F. Gáll, B. Sulik</i> A specific beamline at a 5 MV electrostatic accelerator for studying ion- biomolecule collisions in the energy region of the Bragg peak	80
<i>B. S. Frankland, R. O. Barrachina, J.-Y. Chesnel, F. Frémont</i> Oscillations in the Auger energy distribution following atoms colliding with molecules	81
<i>S. Das, A. Källberg, J. Harasimowicz</i> Spatial resolution test of a beam profile monitoring system with a proton beam of energy 0.5, 1, 10, and 40 keV	82
<i>A. C. Scafes, C. Ciortea, D. E. Dumitriu, A. Enulescu, D. Flueraşu, M. M. Gugiu, D. M. Pena, I. Piticu</i> Radiative electron capture and K-shell vacancy production in ³² S, ³⁵ Cl + Cu collisions at 0.5 ÷ 2.5 MeV/u energies	83

<i>A. A Mihajlov, V. A. Srećković, Lj. M. Ignjatović</i> Chemi-ionization processes in slow Neon Rydberg atom collisions with ground state parent atoms	84
<i>M. Popović, M. Novaković, N. Bibić</i> Effects of 200 keV argon ions irradiation on microstructural properties of titanium nitride films	85
<i>O. B. Shpenik, T. Yu. Popika, R. O. Ortikova, V. M. Feyerb, Yu. V. Popikc</i> Elementary processes of interaction of slow electrons with metal surfaces	86
<i>I. Rajta, R. J. Berezky, K. Vad, K. Tőkési</i> Investigation of MeV proton microbeam transmission between two flat plates – the cases of homogeneous metallic and insulator plates	87
<i>Z. Juhász, P. Herczku, S. Kovács, R. Rácz, S. Biri, I. Rajta, G. Gáll, S. Szilasi, B. Sulik</i> Ion-guiding and blocking of ion transmission in dense polycarbonate nanocapillary arrays at 3 keVAr ⁷⁺ impact	88
<i>A. R. Milosavljević, K. Schiessl, C. Lemell, M. Mátéfi-Tempfli, S. Mátéfi-Tempfli, B. P. Marinković, J. Burgdörfer</i> Establishing a dynamical equilibrium in electron transmission through insulating microcapillaries	89
<i>R. D. DuBois, K. Tőkési</i> Can positrons be guided by insulating capillaries	90
<i>D. Borka, V. Lukic, J. Timko, V. Borka Jovanović</i> Identification of the types of carbon nanotubes using donut effects	91
<i>R. Brzozowski, M. E. Moneta</i> Correlation between thermal induced structural and magnetic transformations in Si-rich Fe ₇₃ Cu ₁ Si ₁₆ B ₇ Nb ₃ metal alloy	92
<i>A. Puszkarz, M. E. Moneta</i> Role of Ta replacing Nb in finemet alloy	93
<i>B. Pawłowski, M. E. Moneta</i> Depth selective PIXE for surface analysis with low energy heavy ions	94
<i>T. M. Gwizdała, M. E. Moneta</i> Mössbauer distribution fitting by using global optimization approach	95
<i>M. M. Milić, N. Dj. Lazarov, D. A. Cucić</i> Study on the photo-induced oxygen reordering in YBa ₂ Cu ₃ O _{6+x}	96
<i>N. Dj. Lazarov, M. M. Milić, V. M. Matić, D.A. Cucić</i> Effect of illumination on the superconducting transition temperature T_c in YBa ₂ Cu ₃ O _{6+x}	97

CEAMPP 2011

Abstracts of Invited Plenary Lectures

- J. Fedor, O. May, D. Kubala, M. Allan*
Dynamics of dissociative electron attachment to small molecules103
- C. Nicolas*
Soft X-ray spectroscopy of molecules and biomolecules104
- N. Bundaleski*
Grazing incidence fast atom diffraction on different materials105

Abstracts of Invited Progress Reports

- M. Gruden Pavlović*
Theoretical study of the Jahn-Teller effect109
- R. Ranković*
Ab initio calculation of low-lying vibronic levels in the ground X²Π_u electronic state of dicyanoacetylene cation110
- M. Ristić*
Excitation of molecules by low-energy electrons111
- S. Tošić*
Absolute cross sections for electron scattering from metal vapours112
- M. Radonjić*
Coherent effects in laser driven rubidium vapor113
- S. Marjanović*
Numerical modeling of buffer gas positron traps114
- V. Stojanović*
Monte Carlo modeling of Townsend discharges in hydrogen115
- G. Wormeester*
On the propagation of positive streamers in N₂:O₂ mixtures116

Abstracts of Poster Contributions

- M. Milovanović and S. Jerosimić*
An ab initio calculation of the vibronic energy levels in the X²Π electronic state of C₂Sb119
- Lj. Stojanović*
Ab initio study of the non-adiabatic coupling between X¹A' and 2¹A' states of D₃⁺ ion120
- N. V. Delić, B. Markoski, J. P. Šetrajčić, S. Armačević and I. J. Šetrajčić*
Photon structure121
- Lj. Stevanović and V. Pavlović*
Confined hydrogen atom in the stationary electric field122

<i>Lj. Stevanović, V. Pavlović and M. Rančić</i> Properties of the F center based on the model of confined atomic system	123
<i>C. Köhn and U. Ebert</i> Differential cross sections for Bremsstrahlung and pair production and for predicting Terrestrial Gamma – ray flashes	124
<i>B. P. Marinković, V. Pejčev, B. Predojević and D. Šević</i> Elastic electron scattering by bismuth	125
<i>J. J. Jureta, A. R. Milosavljević and B. P. Marinković</i> High resolution electron spectrometer OHRHA	126
<i>A. R. Milosavljević, C. Nicolas, J.-F. Gil, F. Canon, M. Réfrégiers, L. Nahon and A. Giuliani</i> Fast in-vacuo photon shutter for synchrotron radiation quadrupole ion trap tandem mass spectrometry.....	127
<i>M. Terzić, M. S. Rabasović, D. Šević, A. Delneri, M. Franko and B. P. Marinković</i> Analysis of cyanobacterial Cr-Phycocyanin by laser based techniques	128
<i>S. N. Nikolić, M. Radonjić, S. M. Ćuk, Z. D. Grujić, A. J. Kmrpot, B. M. Jelenković</i> The influence of radial laser beam profile on handle dark state evolution	129
<i>P. Kolarž and B. Miljković</i> Air-ion counter and mobility spectrometer	130
<i>N. Škoro, D. Marić, G. Malović and Z. Lj. Petrović</i> Effective ionization coefficients in water vapour.....	131
<i>D. Maletić, S. Lazović, N. Puač, G. Malović and Z. Lj. Petrović</i> Detection of atomic species in micro atmospheric pressure discharge by using mass spectrometry	132
<i>A. Banković, S. Dujko, R. D. White, S.J. Buckman and Z. Lj. Petrović</i> Transport properties of positron swarm in molecular nitrogen under the influence of electric and magnetic field	133
<i>M. Savić, M. Radmilović-Radjenović, M. Šuvakov and Z. Lj. Petrović</i> Monte Carlo simulation of RF discharges	134

**2nd National Conference on Electronic, Atomic,
Molecular and Photonic Physics**

PROGRESS REPORTS

Absolute cross sections for electron excitation of silver

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The differential cross sections (DCSs) are widely used experimental tools in the study of electron interactions with different atoms. In electron-atom scattering processes, DCS is used to describe the strength of interactions among atomic particles, i.e. to relate the impact parameter to the scattering angle of a particle that has experienced a collision with the force field of another particle. Generally, this observable gives the probability of specific interaction at certain electron energy and scattering angle. To determine absolute DCS it is necessary to know absolute atom target density and its spatial distribution, energy and angular distribution of electron beam and its current density, as well as effective scattering volume [1] and response function of detection system.

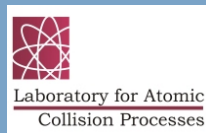
In the Laboratory for Atomic Collision Processes of the Institute of Physics in Belgrade, we undertook a series of electron spectroscopic measurements to study electron collision with metal atoms. The experimental method used to determine differential cross section (DCS) is based on crossed beam technique in the electron spectrometer ESMA, described in details elsewhere [2]. Monoenergetic electron beam was obtained by means of hemispherical selector and it is focused by cylindrical electrostatic lenses. Electron beam of energies from 10 to 100 eV was perpendicularly crossed by effusive atomic beam formed by heating oven crucible containing metal atoms. Elastically and inelastically scattered electrons were energy analyzed by the selector, and were detected by a single-channel electron multiplier. Absolute values for the resonance states are obtained by normalization of relative differential cross sections to the optical oscillator strengths [3], while the absolute values for the elastic scattering and excitations other than resonance are obtained from the intensity ratios at particular scattering angle(s).

Here we present results of our experimental investigations of the electron excitation of the ground $4d^{10}5s$ state of silver. DCSs for excitation of the combined resonant $4d^{10}5p$ state (two fine-structure levels with total angular momentum $J = 1/2$ and $3/2$ which cannot be distinguished in the present experiment) were measured at electron-impact energies (E_0) of 10, 20, 40, 60, 80 and 100 eV and for a range of scattering angles (θ) from 1° up to 150° . Absolute DCSs were obtained through the procedure of normalization which was described elsewhere [4]. Other details will be presented at the conference.

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