BELGRADE CEPAS 2011

5th Conference on Elementary Processes in Atomic Systems

CEPAS 2011 & CEAMPP 2011

CONTRIBUTED PAPERS
&
ABSTRACTS OF INVITED LECTURES

Editors
Aleksandar R. Milosavljević
Saša Dujko
Bratislav P. Marinković

Institute of Physics
Belgrade - Serbia

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

CEAMPP 2011

CEPAS 2011

Abstracts and Contributed Papers

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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
Belgrade, Serbia

Editors

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 forth 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

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Belgrade, Serbia

in collaboration with the

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VAMDC Virtual Atomic and Molecular Data Centre

EPJ.org your physics journal

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

ADVISORY BOARD

ORGANIZING COMMITTEE

(Institute of Physics, University of Belgrade, Serbia)

CEAMPP 2011

SCIENTIFIC COMMITTEE

ORGANIZING COMMITTEE
(Institute of Physics, University of Belgrade, Serbia)

CEAMPP/ CEPAS 2011 PROGRAM

Tuesday 21st June 2011		
2nd 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	*Dynamics of dissociative electron attachment to small molecules*	**Juraj Fedor**, University of Fribourg, Switzerland
10:00-10:30	*Soft X-ray spectroscopy of molecules and biomolecules*	**Christoph Nicolas,** SOLEIL Synchrotron, Saint-Aubin, France
10:30-11:00	*Grazing incidence fast atom diffraction on different materials*	**Nenad Bundaleski,** CEFITEC, Caparica, Portugal
11:00-11:30	***Coffee break***	
	***Session 2**, Chair: Saša Dujko*	
11:30-11:50	*On the propagation of positive streamers in N_2:O_2 mixtures*	**Gideon Wormeester,** CWI, Amsterdam, The Netherlands
11:50-12:10	*Numerical modeling of buffer gas positron traps*	**Srđan Marjanović,** Institute of Physics, Belgrade, Serbia
12:10-12:30	*Absolute cross sections for electron scattering from metal vapours*	**Sanja Tošić,** Institute of Physics, Belgrade, Serbia
12:30-12:50	*Excitation of molecules by low-energy electrons*	**Miroslav Ristić,** Faculty of Physics, Belgrade, Serbia
13:00-15:00	***Lunch break***	
	***Session 3**, Chair: Nenad Simonović*	
15:00-15:20	*Ab initio calculation of low-lying vibronic levels in the ground $X^2\Pi_u$ electronic state of dicyanoacetylene cation*	**Radomir Ranković,** Faculty of Physical Chemistry, Belgrade, Serbia
15:20-15:40	*Theoretical study of the Jahn-Teller effect*	**Maja Gruden Pavlović,** Faculty of Chemistry, Belgrade, Serbia
15:40-16:00	*Coherent effects in laser driven rubidium vapor*	**Milan Radonjić,** Institute of Physics, Belgrade, Serbia
16:00-16:20	*Monte Carlo modeling of Townsend discharges in hydrogen*	**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	***Welcome party for CEAMPP and CEPAS participants***	
Wednsday 22nd June 2011		
5th Conference on Elementary Processes in Atomic Systems - CEPAS		
*(**PL** – Plenary lecture: 30+5 min; **TL** – Topical lecture: 20+5 min)*		
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	*Positronium negative ion experiments*	**Yasuyuki Nagashima**, Tokyo University of Science, Japan
09:35-10:10	*Imaging electron/ion coincidences for gas phase photoionization studies of chiral systems on the DESIRS beamline at SOLEIL*	**Laurent Nahon**, SOLEIL synchrotron, France
10:10-10:40	***Coffee break***	
	***Session 2**, Chair: Nigel Mason*	
10:40-11:05	*Cross sections for elastic electron scattering from iodine*	**Michael Brunger**, Flinders University, Australia
11:05-11:30	*Quantum interferences in atomic ionization by short laser pulses*	**Diego Arbó**, Astronomia y Fisica del Espacio, Buenos Aires , Argentina
11:30-11:55	*Electron driven processes in biomolecules*	**Janina Kopyra**, University of Podlasie, Poland
11:55-12:20	*Multi- photon ionization of biomolecular clusters*	**Sam Eden**, The Open University, UK
12:30-15:00	***Lunch break***	
	***Session 3**, Chair: Robert DuBois*	
15:00-15:25	*Coherent wavepacket shaping in high Rydberg states*	**Shuhei Yoshida**, Vienna University of Technology, Austria
15:25-15:50	*Positron scattering from krypton*	**James Sullivan**, Australian National University, Australia
15:50-16:15	*Absolute differential cross sections for electron scattering from building blocks of biopolymers*	**Aleksandar Milosavljević**, Institute of Physics Belgrade, Serbia
16:15-16:35	***Coffee break***	

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

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

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Abstracts of Invited Topical Lectures

Abstracts of Poster Contributions

CEAMPP 2011

Abstracts of Invited Plenary Lectures

Abstracts of Invited Progress Reports

Abstracts of Poster Contributions

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

PROGRESS REPORTS

Absolute cross sections for electron excitation of silver

S. D. Tošić[a], V. Pejčev[b], D. Šević[a] and B. P. Marinković[a]

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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^o up to 150^o. Absolute DCSs were obtained through the procedure of normalization which was described elsewhere [4]. Other details will be presented at the conference.

Acknowledgments: The work was supported by the Ministry of Education and Science of Republic of Serbia (Project No. 171020).

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[3] N. B. Avdonina, Z. Felfli, A. Msezane, J. Phys. B: At. Mol. Opt. Phys. 30 (1997) 2591.
[4] S. D. Tošić, D. Šević, V. Pejčev, D. M. Filipović, B. P. Marinković, Proc. 10th European Conf. on Atoms, Molecules and Photons, Poster contribution P065.

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