

XX International Workshop on
Low-Energy Positron and Positronium Physics

XXI International Symposium on
Electron-Molecule Collisions and Swarms

V Workshop on Non-Equilibrium Processes

18-21 July 2019, Belgrade, Serbia



POSMOL 2019

PROGRAM

XX Међународна радионица о физици
ниско енергијских позитрона и позитронијума

XXI Међународни симпозијум о
електрон-молекулским сударима и ројевима

V Радионица о неравнотежним процесима

18-21. јул 2019, Београд, Србија



SERBIAN ACADEMY OF
SCIENCES AND ARTS



UNIVERSITY OF BELGRADE
INSTITUTE OF PHYSICS | BELGRADE

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Low-Energy Positron and Positronium Physics**

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Serbian Academy of
Sciences and Arts

Institute of Physics Belgrade
University of Belgrade

Belgrade, 2019

ACKNOWLEDGEMENT

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are organized by the

**Serbian Academy of
Sciences and Arts**

and

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University of Belgrade
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POSMOL 2019

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Welcome

Dear colleagues, it is our pleasure to invite you to participate in the POSMOL2019. The conference will be held at the Serbian Academy of Sciences and Arts, Belgrade, Serbia, on July 18-20, 2019, starting with the Welcome Reception on Wednesday evening 17th July. Following the conference, on the 21st July 2019, one-day workshop will be held in honor of the retirement of Professor Zoran Lj. Petrović.

This will be the 8th joint meeting of the International Workshop on Low-Energy Positron and Positronium Physics and the International Symposium on Electron-Molecule Collisions and Swarms, satellite meetings of the International Conference on Photonic, Electronic, and Atomic Collisions (ICPEAC), that will be held in Deauville, France, on July 24-30, 2019.

POSMOL 2019 provides an opportunity for collision physicists from both the matter and antimatter communities to meet and share ideas and techniques. Topics in the positron sessions include the latest findings in the fields of positron and positronium physics, antiproton interactions with atoms, molecules and solid surfaces, and additional hot topics. The other sessions will focus on electron interactions with molecules in both gaseous and condensed phases as well as electron swarms. Finally, there will be sessions which discuss the complementary studies of electron and positron interactions with biomolecules, electron induced surface chemistry and studies of collisional plasmas. This combination of topics continues to represent the themes from the three ICPEAC satellites which have merged to form POSMOL. The International Swarm Seminar and Symposium on Electron-Molecule Collisions merged in 1999 following several joint conferences. The International Workshop on Low Energy Positron and Positronium Physics joined the other two in 2005. This is the first time that the meeting takes place in Eastern Europe.

POSMOL 2019 is organized by the Serbian Academy of Sciences and Arts (SASA) and Institute of Physics, Belgrade (IPB). We hope you will equally enjoy the scientific presentations and discussions together with the unique atmosphere of Belgrade.

POSMOL 2019 PROGRAM

PL: Plenary Lecture – 45 min (35 + 10 min);

JS: Joint Session Lecture – 30 min (25 + 5 min);

TL EMS: Topical Invited Lecture EMS – 30 min (25 + 5 min);

TL LEPPP: Topical Invited Lecture LEPPP – 30 min (25 + 5 min);

Hot Topic – 15 min (12 + 3 min)

Wednesday 17th July 2019

18:00–20:00 Registration and Welcome Reception

Thursday 18th July 2019

08:45–09:00 Welcome:

Vladimir S. Kostić, President of the Serbian Academy
of Sciences and Arts

Zoran Lj. Petrović, Secretary of the Department of
Technical Sciences and the POSMOL 2019 LOC Chair

Plenary/Joint Session 1

Hall A

Chairs: David Cassidy and Michael Brunger

09:00–09:45 PL 1 **Clifford Surko**, University of California San Diego,
USA

New Physics with Positron Traps and Trap-Based Beams

09:45–10:15 JS 1 **Paolo Crivelli**, ETH Zurich, Switzerland

*New Bounds from Positronium Decays on Massless
Mirror Dark Photons*

10:15–10:45 JS 2 **Gustavo García**, Instituto de Física Fundamental,
CSIC, Spain

*Electron Transport in Molecular Gases: a Modelling
Procedure to Evaluate Cross Section Data Sets*

10:45–11:15 Coffee break

Parallel Session A1

Hall A

Chair: Sylwia Ptasinska

- 11:15–11:45 TL EMS 1 **Ilya I. Fabrikant**, University of Nebraska-Lincoln, USA
Recent Advances in the Theory of Dissociative Electron Attachment
- 11:45–12:15 TL EMS 2 **Roman Čurík**, J. Heyrovský Institute of Physical Chemistry, Czech Republic
Indirect Dissociative Recombination of Small Ions
- 12:15–12:45 TL EMS 3 **Maria Cristina A. Lopes**, Universidade Federal de Juiz de Fora, Brazil
Electron Impact Ionisation and Fragmentation of Biofuels

Parallel Session B1

Hall B

Chair: László Liszka

- 11:15–11:45 TL LEPPP 1 **Matthew Stoneking**, Lawrence University, USA
Injection and Trapping of Positrons in a Magnetic Dipole Trap: Toward Magnetic Confinement of Positron-Electron Plasma
- 11:45–12:15 TL LEPPP 2 **Fiona Panther**, UNSW Canberra/ANU, Australia
Low Energy Positrons in the Galactic ISM
- 12:15–12:45 TL LEPPP 3 **James Harrington**, Max-Planck-Institut für Kernphysik/RIKEN/CERN, Germany
BASE: Ultra-High Precision Measurements of Proton and Antiproton Fundamental Properties
- 12:45–14:30 Lunch

Plenary Session 2

Hall A

Chair: Oddur Ingólfsson

- 14:30–15:15 PL 2 **Jimena Gorfinkiel**, The Open University, United Kingdom
Electron Collisions with Molecules and Molecular Clusters

Hot Topic Session A2

Hall A

Chair: Oddur Ingólfsson

- 15:15–15:30 EMS 5 **Mónica Mendes**, Universidade NOVA de Lisboa, Portugal
Selective Bond Excision of Nitroimidazoles in Electron Transfer Experiments
- 15:30–15:45 EMS 23 **Juraj Fedor**, J. Heyrovský Institute of Physical Chemistry, Czech Republic
Vibrational Excitation and Dissociative Electron Attachment Cross Sections in Cyanoacetylene HC₃N
- 15:45–16:00 EMS 35 **Grzegorz P. Karwasz**, University Nicolaus Copernicus, Poland
“Recommended” Cross Sections for Electron Collisions with Molecules
- 16:00–16:15 EMS 49 **Maicol Cipriani**, University of Iceland, Iceland
Promoting Reaction Channels in Dissociative Electron Attachment to Improve the Cross-Linking Efficiency of SAMs for the Production of Carbon Nano-Membranes

Hot Topic Session B2

Hall B

Chair: Masanori Tachikawa

- 15:15–15:30 LEPPP 15 **Michael D. Higgins**, Purdue University, USA
Low-Energy Scattering Properties of Ground-State and Excited-State Positronium Collisions
- 15:30–15:45 LEPPP 19 **Antoine Camper**, CERN, Switzerland
Positronium Manipulation for Antihydrogen Production
- 15:45–16:00 LEPPP 22 **Yugo Nagata**, Tokyo University of Science, Japan
Hyperfine Resonance of Positronium Atoms Using a Static Periodic Magnetic Field
- 16:00–16:15 LEPPP 23 **Dmitry Fursa**, Curtin University, Australia
Coordinate-Space Method for Calculation of Ps-formation Matrix Elements and its Application to Positron Scattering on Hydrogen Negative Ion
- 16:15–16:45 Coffee break

Parallel Session A3

Hall A

Chair: Roman Čurík

- 16:45–17:15 TL EMS 4 **Daniel Slaughter**, Lawrence Berkeley National Laboratory, USA
Coupled Electronic and Nuclear Dynamics of Dissociative Electron Attachment Revealed by Anion Fragment Momentum Imaging
- 17:15–17:45 TL EMS 5 **Ilija Simonović**, Institute of Physics Belgrade, Serbia
Transport Coefficients of Higher-Order for Electrons and Positrons in Neutral Gases and Nonpolar Liquids

Parallel Session B3

Hall B

Chair: Gleb F. Gribakin

- 16:45–17:15 TL LEPPP 4 **Bobby Antony**, Indian Institute of Technology, India
Positron Interactions with Hydrocarbon Molecules
- 17:15–17:45 TL LEPPP 5 **Daniel J. Murtagh**, The Stefan Meyer Institute for Subatomic Physics, Austria
The ASACUSA-Cusp Experiment - Progress Towards an Antihydrogen Beam

Poster session 1 – Gallery of Science and Technology, SASA

- 17:45–19:30 Posters: EMS 1 – EMS 33; LEPPP 1 – LEPPP 21

Friday 19th July 2019

Plenary/Joint Session 3

Hall A

Chair: Paulo Limão - Vieira

- 09:00–09:45 PL 3 **Paul Scheier**, Universität Innsbruck, Austria
Electron Interactions with Helium Nanodroplets
- 09:45–10:15 JS 3 **William McCurdy**, University of California, USA
Dissociative Electron Attachment to Polyatomic Molecules: Ab initio Calculation of Attachment Amplitudes and Nonadiabatic Dissociation Dynamics
- 10:15–10:45 JS 4 **Paul Antoine Hervieux**, Université de Strasbourg, France
Positron and Positronium Physics Around GBAR
- 10:45–11:15 Coffee break

Parallel Session A4

Hall A

Chair: Hajime Tanuma

- 11:15–11:45 TL EMS 6 **Janina Kopyra**, Siedlce University, Poland
Irradiation of Biomolecules by Low Energy Electrons
- 11:45–12:15 TL EMS 7 **Jaime de Urquijo**, Universidad Nacional Autónoma de México, Mexico
Electron Swarm and Photon Interactions with Biomolecules and Atmospheric Gases
- 12:15–12:45 TL EMS 8 **Ronald White**, James Cook University, Australia
The Gas-Liquid Interface: Kinetic and Fluid Modelling of Charged Particle Transport

Parallel Session B4

Hall B

Chair: James Danielson

- 11:15–11:45 TL LEPPP 6 **James Sullivan**, Australian National University, Australia
Positron Interactions with Targets of Fundamental Interest
- 11:45–12:15 TL LEPPP 7 **Kengo Shibuya**, University of Tokyo, Japan
Partial-wave analysis for Positronium–Xenon collisions
- 12:15–12:45 TL LEPPP 8 **Anna Soter**, Paul Scherrer Institute, Switzerland
Cold Muonium Beam for Atomic Physics and Gravity Experiments
- 12:45–14:30 Lunch / Joint Committee Meeting

Plenary Session 4

Hall A

Chair: Gustavo García

- 14:30–15:15 PL 4 **Gleb Gribakin**, Queen's University Belfast, UK
Positron Attachment, Annihilation and Binding in Molecules

Parallel Session A5

Hall A

Chair: Bratislav Marinković

- 15:15–15:45 TL EMS 9 **Stephan Denifl**, Universität Innsbruck, Austria
Experimental Studies on Low-Energy Electron Collisions with Radiosensitizers
- 15:45–16:15 TL EMS 10 **Jaroslav Kočíšek**, J. Heyrovský Institute of Physical Chemistry, Czech Republic
Electron Interactions with Biomolecular Models of Increasing Complexity

Parallel Session B5

Hall B

Chair: **Gustavo García**

- 15:15–15:45 TL LEPPP 9 **Lokesh Gurung**, University College London, UK
Precision Microwave Spectroscopy of the $n=2$ Positronium Fine Structure
- 15:45–16:15 TL LEPPP 10 **Ruggero Caravita**, CERN, Switzerland
Experiments and Perspectives with Metastable 2^3S Positronium Beams
- 16:15–16:45 Coffee break

Parallel Session A6

Hall A

Chair: **Dragana Marić**

- 16:45–17:15 TL EMS 11 **Linda Feketeová**, Université de Lyon, France
Thermalisation in Water Nano-droplets
- 17:15–17:45 TL EMS 12 **Peter Stokes**, James Cook University, Australia
Challenges in Obtaining Cross Sections from Electron Swarm Data

Parallel Session B6

Hall B

Chair: **Marcio Varela**

- 16:45–17:15 TL LEPPP 11 **Bernardo Barbiellini**, LUT university, Lappeenranta, Finland
Positronium Emission from Materials for Li-ion Batteries
- 17:15–17:45 TL LEPPP 12 **Andrés Reyes**, Universidad Nacional de Colombia, Bogota, Colombia
Calculation of Positron Binding Energies Using the Generalized any Particle Propagator Theory

Poster session 2 – Gallery of Science and Technology, SASA

- 17:45–19:30 Posters: EMS 34 – EMS 65; LEPPP 22 – LEPPP 42

Saturday 20th July 2019

Plenary Session 5

Hall A

Chair: Ilya I. Fabrikant

- 09:00–09:45 PL 5 **Zoran Lj. Petrović**, Institute of Physics Belgrade, Serbia
Non-Equilibrium in Ionized Gases Determined by Charged Particle Collisions with Molecules

Parallel Session A7

Hall A

Chair: Ilya I. Fabrikant

- 09:45–10:15 TL EMS 13 **E. Krishnakumar**, Raman Research Institute, India
Functional Group Dependence and Site Selectivity in Dissociative Attachment
- 10:15–10:45 TL EMS 14 **Márcio Varela**, University of São Paulo, Brazil
Chirality Sensitive Effects in Electron Collisions against Halocamphors

Parallel Session B7

Hall B

Chair: James Sullivan

- 09:45–10:15 TL LEPPP 13 **William Bertsche**, University of Manchester, UK
Precision Spectroscopy of Trapped Antihydrogen
- 10:15–10:45 TL LEPPP 14 **Dermot Green**, Queen's University Belfast, UK
Many-Body Theory for Ps-Atom Scattering and Pickoff Annihilation
- 10:45–11:15 Coffee break

Parallel Session A8
Chair: Ronald White

Hall A

- 11:15–11:45 TL EMS 15 **Masashi Kitajima**, Tokyo Institute of Technology, Japan
High-Resolution Measurements of Total Cross Section for Very-Low-Energy Electron Collisions with Molecules
- 11:45–12:15 TL EMS 16 **Liam Scarlett**, Curtin University, Australia
Electron-Impact Vibrational Excitation of Molecular Hydrogen

Parallel Session B8
Chair: Zoran Petrović

Hall B

- 11:15–11:45 TL LEPPP 15 **Lilian Ellis-Gibbings**, University College London
Positron Interactions with Nitrogen and Oxygen and Pyridine Molecules: Elastic, Inelastic and Total Cross Sections
- 11:45–12:15 TL LEPPP 16 **Stefan Eriksson**, Swansea University, UK
Experiments with Positronium and Cold Atoms
- 12:15–14:00 Lunch
- 17:00–19:30 Excursion (Boat Cruise)
- 19:30–00:00 Conference Dinner (Restaurant Amsterdam)

Sunday 21st July 2019

Workshop on Non-Equilibrium Processes

Chair: Saša Dujko

Session 1

Hall A

- 10:30–10:45 Introduction
- 10:45–11:15 WL 1 **Toshiaki Makabe**, Keio University, Japan
Metastables as a Probe for Low-Temperature Plasmas
Correlation between N^ and n_e in Ar*
- 11:15–11:45 WL 2 **Joan Marler**, Clemson University, USA
Dancing with the Stars: Laboratory Astrophysics with
Highly Charged Ions
- 11:45–12:15 WL 3 **Ronald White**, James Cook University, Australia
Foundations and Interpretations of the Pulsed-Townsend
Swarm Experiment and the use of Machine Learning for
Self-Consistent Cross-Section Sets
- 12:15–14:00 Lunch

Session 2

Hall A

- 14:00–14:30 WL 4 **Dragana Marić**, Institute of Physics Belgrade, Serbia
All That You Never Wanted to Know About Breakdown
- 14:30–15:00 WL 5 **Vasco Guerra**, Universidade de Lisboa, Portugal
It's all About Monte Carlo
- 15:00–15:30 WL 6 **Paul Maguire**, Ulster University, UK
The Multi-Phase Game: Liquid Wets Gas, Gas Dilutes
Plasma, Plasma Surrounds Liquid and all Together They
Produce Solid Nanorocks
- 15:30–16:00 WL 7 **Nobuhiko Nakano**, Keio University, Japan
Collisions and Impacts in Semiconductor Device
- 16:00–16:30 Coffee break

Session 3

Hall A

- 16:30–17:00 WL 8 **Lowell Morgan**, Kinema Research & Software LLC, USA
Double Layers & Striations in Spherical Plasmas
- 17:00–17:30 WL 9 **Bill Graham**, Queen's University Belfast, UK
Plasmas in Liquids
- 17:30–18:00 WL 10 **Stephen Buckman**, Australian National University, Australia
The Petrović Chronicles – Non-Equilibria Rules
- 18:00–18:30 Closing remarks
- 20:00–00:00 Workshop Dinner (Restaurant Reka)



Ministry of Education,
Science and Technological Development of the
Republic of Serbia