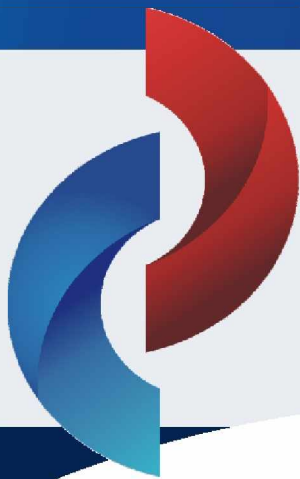


XX International Workshop on  
Low-Energy Positron and Positronium Physics

XXI International Symposium on  
Electron-Molecule Collisions and Swarms

V Workshop on Non-Equilibrium Processes

*18-21 July 2019, Belgrade, Serbia*



# POSMOL 2019

## BOOK OF ABSTRACTS

XX Међународна радионица о физици  
ниско енергијских позитрона и позитронијума

XXI Међународни симпозијум о  
електрон-молекулским сударима и ројевима

V Радионица о неравнотежним процесима



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*Editors*

David Cassidy, Michael J. Brunger,  
Zoran Lj. Petrović, Saša Dujko, Bratislav P. Marinković,  
Dragana Marić and Sanja Tošić

Serbian Academy  
of Sciences and Art

Institute of Physics, Belgrade  
University of Belgrade

Belgrade, 2019

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## PREFACE

With great pleasure, we would like to welcome the participants and guests to POSMOL 2019, the XX International Workshop on Low-Energy Positron and Positronium Physics, and the XXI International Symposium on Electron-Molecule Collisions and Swarms. The conference takes place in Belgrade, Serbia, at the Serbian Academy of Sciences and Arts, between July 18<sup>th</sup> and 21<sup>st</sup>, 2019, with a welcome reception taking place in the afternoon of July 17<sup>th</sup>. POSMOL 2019 is a satellite meeting of the International Conference on Photonic, Electronic, and Atomic Collisions (ICPEAC), that will be held in Deauville, France, during 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. While POSMOL meetings have been held biannually since 2005, this is the first time that the meeting takes place in Eastern Europe.

POSMOL 2019 brings together over 120 scientists from more than 20 countries and 5 different continents who will attend 5 plenary talks, 36 invited talks, 8 hot topic talks, and more than 100 poster presentations. We are grateful to all the invited speakers and participants for making major efforts to attend the meeting, prepare talks and, in advance, for submitting their manuscripts to the Topical Issue of The European Physical Journal D: Low-Energy Positron and Positronium Physics and Electron-Molecule Collisions and Swarms.

POSMOL 2019 is augmented by one day Workshop on Non-Equilibrium Processes in honor of the retirement of Professor Zoran Lj. Petrović. This will be a special occasion for his friends to meet and review the progress in the field, specifically his contributions, present new results and look forward to new discoveries. The program includes 10 invited talks, but of equal importance, there will be ample opportunity for sharing memories, many stories and jokes from the past throughout the day and at the celebratory dinner.

We would like to express our gratitude to all members of the Local Organizing Committee, in particular to Dragana Marić (Conference Manager) and Sanja Tošić (Conference Secretary), and the staff of PanaComp, who worked very hard to make this meeting a success. We would also like to thank all the members of the Positron and Electron Advisory Committees, and in particular to Michael Brunger and David Cassidy, for their valuable advice, suggestions and help with the organization of POSMOL 2019.

We gratefully acknowledge the financial support of this meeting, by the Serbian Academy of Sciences and Arts, Ministry of Education, Science and Technological Development of the Republic of Serbia and The European Physical Journal D (EPJ D).

On behalf of the Local Organizing Committee, we wish you a successful meeting and a pleasant stay in Belgrade.

Zoran Lj. Petrović  
Saša Dujko  
Bratislav Marinković  
POSMOL 2019 Chairs  
Belgrade, July 2019

## ACKNOWLEDGEMENT

XX International Workshop on Low-Energy Positron and Positronium Physics  
XXI International Symposium on Electron-Molecule Collisions and Swarms  
Workshop on Non-Equilibrium Processes

*are organized by the*

**Serbian Academy of  
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*and*

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# POSMOL 2019

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## Absolute Differential Cross Sections for Electron Scattering from Anaesthetic Molecules

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We have investigated elastic electron scattering from anaesthetic molecules, halothane and sevoflurane, in the medium energy range from 50-300 eV [1]. Experiment has been performed on the UGRA apparatus [2] settled at the Institute of Physics Belgrade. The experimental setup, based on a crossed beam technique comprising of an electron gun, a single capillary gas needle and a detection system with a channeltron, was used to measure differential cross sections. The absolute scale for the cross sections is obtained by relative-flow method using argon gas as a reference [3]. Absolute DCSs for elastic electron scattering from sevoflurane at 100 eV are shown in Fig.1.

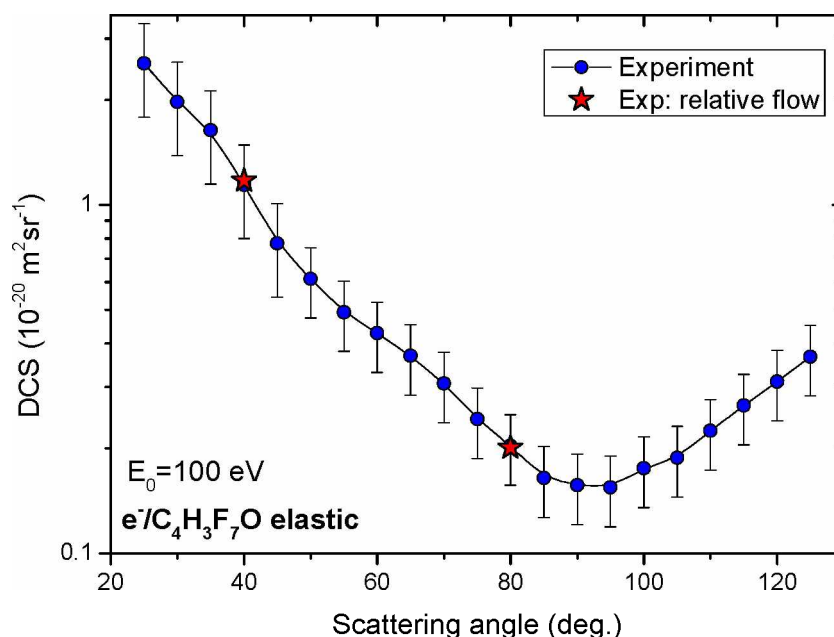


Fig.1. Angular dependence of the DCSs for elastic electron scattering from sevoflurane at 100 eV. Circles represent absolute experimental differential cross sections; stars represent absolute values obtained by relative flow method.

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## Cross Sections for Collisional and Radiative Processes: BEAMDB and MOLD Databases

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Many fields in today's science such as plasma physics [1], astrophysics [2, 3], etc. depend on data for atomic and molecular collision and radiative processes. Recently, electron interactions with some of astro chemical compounds have been reviewed [4], while the importance of electrons in understanding of processes inside comas has been recognised in Rosetta Mission [5,6]. For the radiative processes we consider photo-dissociation cross-sections for the individual ro-vibrational states of the diatomic molecular ions such as  $\text{H}_2^+$ ,  $\text{He}_2^+$ ,  $\text{HeH}^+$ ,  $\text{LiH}^+$ ,  $\text{NaH}^+$  and  $\text{MgH}^+$  ions [7]. We also consider processes of collisional ionisation (chemi-ionization) and collisional excitation and de-excitation [8]. A collection of new data for electron interactions with molecules as well as radiative data for photo-dissociation will be presented.

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