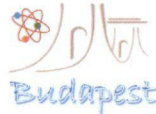


MPS '18



**INTERNATIONAL CONFERENCE
ON MANY PARTICLE SPECTROSCOPY
OF ATOMS, MOLECULES, CLUSTERS
AND SURFACES**



**BUDAPEST, HUNGARY
21-24 AUGUST 2018**

**PROGRAMME AND
BOOK OF ABSTRACTS**

**International Conference on Many Particle Spectroscopy of
Atoms, Molecules, Clusters and Surfaces**

Budapest, Hungary

21-24 August 2018



**Programme
and
Book of Abstracts**

Local Organizing Committee

Károly Tőkési (Chair)

Arnold Farkas

Henrik Haspel

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Web address: mpsbudapest2018.com

E-mail: mpsbudapest2018@gmail.com

Organized by
EKHO' 94 Ltd., Debrecen

Venue
Danubius Hotel Flamenco, Budapest, 3-7 Tas vezér str., 1113

Conference Issue

Papers submitted to the conference will be published following the conference in a Topical Issue (Many Particle Spectroscopy of Atoms, Molecules, Clusters and Surfaces) of EPJD: Atomic, Molecular, Optical and Plasma Physics.
Guest Editors: K. Tókési, B. Paripás, G. Pszota, and A V Solov'yov

Programme and Book of Abstracts

This book contains the programme of the International Conference on Many Particle Spectroscopy of Atoms, Molecules, Clusters and Surfaces held from 21-24 August 2018 in Budapest. Hungary and

the camera-ready copies of the abstracts as sent by the authors. In few cases only minor corrections were made.

Editors: K. Tókési, B. Paripás, G. Pszota

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Preface

Welcome to the International Conference on Many Particle Spectroscopy of Atoms, Molecules, Clusters and Surfaces, MPS-2018, organized in Budapest, Hungary, from 21 to 24 August 2018. The objective of MPS-2018 is to assess the state of the art in the current understanding of a variety of basic phenomena in the charged particle dynamics in atoms, molecules, clusters and at surfaces such as a) collision induced physical, chemical and biological reactions, b) ultrafast dynamics, c) charge-exchange processes, d) collective as well as single-particle excitation and ionization, e) electron-electron correlation effects in atoms and in solids, f) excitation and single and multiple ionization of various targets, g) energy loss, scattering and channeling of primary particles, and h) electron and photon emission processes.

MPS is a biannual meeting. The aim is to promote the growth and exchange of scientific information on these areas of atomic and molecular and surface physics. The most recent meetings have been held in Moscow (Russia, 2016) Metz (France, 2014), Berlin (Germany, 2012), Sendai (Japan, 2010), Paris (France, 2008), Rome (Italy, 2006).

Hungary is a landlocked country in the Carpathian Basin in Central Europe, bordered by Austria, Slovakia, Ukraine, Romania, Serbia, Croatia and Slovenia. Its capital is Budapest. Hungary has been a member state of the European Union since 1 May 2004.

The conference is held at the Danubius Hotel Flamenco (Address: 3-7 Tas vezér str., 1113 Budapest), the most modern conference centre in Budapest.

Hotel Flamenco offers something rare – accommodation close to the centre of Budapest yet surrounded by beautiful parkland. This four-star hotel near the so-called “Bottomless Lake” in Budapest’s 11th district has its own garage and rooftop car park, although it’s also easily accessible by public transport with metro, bus and tram stops a short walk away. Hotel Flamenco is also an ideal venue for events. Its conference rooms come in various sizes, making it equally suitable for hosting smaller conferences and major events for several hundred people.

We hope that all participants will have a lively and successful meeting while enjoying the attractive surroundings in this beautiful region of Hungary. We hope, furthermore, we may offer exciting scientific programs and last but not least famous Hungarian dishes and wines. Organizers have been doing their best to guarantee pleasant experiences for everyone.

On behalf of the local organizing committee,

Károly Tökési

Chair of MPS-2018

International Advisory Board

Ugo Ancarani (France)
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Károly Tókési (Hungary)
Lokesh Tribedi (India)
Kiyoshi Ueda (Japan)
Jim Williams (Australia)

Scientific Program

August 2018, Tuesday

16:00 – 20:00 Registration

18:00 – 19:30 Cheese and wine reception

22 August 2018, Wednesday

Femto-, attosecond physics and imaging (Chair: Edwin Kukk)

8:40 – 9:00	Opening	Károly Tökési, Norbert Kroó
9:00 – 9:30	Fernando Martin Universidad Autónoma de Madrid, Spain	<i>Attosecond coupled electron and nuclear dynamics in molecules</i>
9:30 – 10:00	Nora Berrah University of Connecticut, Storrs, USA	<i>C60 femtosecond dynamics induced by the LCLS X-ray FEL</i>
10:00 – 10:30	Florian Trinter DESY, Hamburg, Germany	<i>Imaging the correlated two-electron wave function of a hydrogen molecule</i>

Coffee Break (10:30 – 11:00)

Photoionization I. (Chair: Emma Sokell)

11:00 – 11:30	Liang-You Peng Peking University, Beijing China	<i>Few-photon double ionization of Helium</i>
11:30 – 11:50	Maria-Novella Piancastelli Sorbonne Université, Paris, France	<i>Photoexcitation and photoionization dynamics of isolated atoms and molecules in the tender x-ray domain</i>
11:50 – 12:10	Stephan Fritzsche Universität Jena, Germany	<i>Excitation and ionization of atoms by twisted light</i>
12:10 – 12:30	Francis Penent Sorbonne Université, Paris, France	<i>Multiple photoionization of alkali atoms</i>

Lunch (12:30 – 14:00)

Laser field I. (Chair: Nora Berrah)

14:00 – 14:30	Elena V. Gryzlova Lomonosov Moscow State University, Russia	<i>Ionic autoionizing states studied with free-electron lasers</i>
14:30 – 15:00	Diego G. Arbó IAFE (UBA-CONICET), Buenos Aires, Argentina	<i>Retrieving intracycle interference in angle-resolved laser assisted XUV atomic ionization</i>
15:00 – 15:20	Philipp V. Demekhin Universität Kassel, Germany	<i>Correlative two-electron dynamics in helium driven by intense laser pulses</i>
15:20 – 15:40	Barna Imre Wigner Research Centre for Physics, Budapest, Hungary	<i>Electron scattering and conduction in doped semiconductors in simultaneous strong infrared radiation field</i>

Coffee Break (15:40 – 16:10)

Laser field II. (Chair: Alisher Kadyrov)

16:10 – 16:40	Akiyoshi Hishikawa Nagoya University, Japan	<i>Photoelectron transversal momentum distribution from D2 in circularly polarized intense laser fields</i>
16:40 – 17:10	Nicolas Camus MPIK, Heidelberg, Germany	<i>Experimental studies of Wigner's tunnelling time</i>

17:10 – 18:30 Poster session (P1 - P54)

23 August 2018, Thursday

Photoionization II. (Chair: Shaofeng Zhang)

9:00 – 9:30	Nicolas Sisourat Sorbonne Université, Paris, France	<i>Interatomic Coulombic Decay in triatomic and more complex systems</i>
9:30 – 9:50	Eliezer Kolodney Technion - Israel Institute of Technology, Haifa Israel	<i>Postcollision (delayed) fission and multifragmentation in fullerene-surface impact: experiment and simulation</i>
9:50 – 10:10	Yuki Orimo The University of Tokyo, Japan	<i>Ab initio simulations of photoelectron energy spectra from multielectron systems subject to intense laser fields</i>
10:10 – 10:30	Stepan Balybin Lomonosov Moscow State University, Russia	<i>Enhancement of ionization of atoms in bright squeezed vacuum light</i>

Coffee Break (10:30 – 11:00)

Interactions with molecules I. (Chair: Lorenzo Avaldi)

11:00 – 11:30	Da Bo National Institute for Materials Science, Tsukuba, Japan	<i>Virtual Substrate Method for Nanomaterials Characterization</i>
11:30 – 11:50	Victor Despre Universität Heidelberg, Germany	<i>Charge migration in propiolic acid and its dephasing by the coupling to the nuclear motion</i>
11:50 – 12:10	Moustafa Zmerli Sorbonne Université, Paris(05), France	<i>Charge transfer and nuclear dynamics after methyl iodide core ionization following single photon absorption</i>
12:10 – 12:30	Raimund Feifel University of Gothenburg, Sweden	<i>Ultrafast molecular three-electron collective Auger decay</i>

Lunch (12:30 – 14:00)

Interactions with molecules II. (Chair: Sebastian Otranto)

14:00 – 14:30	Miriam Weller Goethe-Universität Frankfurt, Germany	<i>Time-resolved Studies of Molecular Systems Using Synchrotron Radiation</i>
14:30 – 15:00	Kilian Fehre Goethe-Universität Frankfurt, Germany	<i>Strong Field Ionization of Chiral Molecules</i>
15:00 – 15:20	Mohammad F. Gharaibeh Qatar University, Doha, Qatar	<i>K-shell photoionization of molecular oxygen-ions</i>
15:20 – 15:40	Nikolay Shvetsov Leibniz Universität Hannover, Germany	<i>Semiclassical two-step model and strong-field ionization of hydrogen molecule</i>

Coffee Break (15:40 – 16:10)

More complex systems (Chair: Piero Decleva)

16:10 – 16:40	Péter Dombi Wigner Research Centre for Physics, Budapest, Hungary	<i>Photoelectron spectroscopy for ultrasensitive measurement of plasmon fields</i>
16:40 – 17:00	Hicham Agueny University of Bergen, Norway	<i>Electron dynamics in single-cycle THz pulses</i>

17:00 – 18:30 Poster session (P55 – P108)

19:30 – Conference dinner

24 August 2018, Friday**Electron collisions** (Chair: Alexander Dorn)

9:00 – 9:30	Jelena Maljković Institute of Physics Belgrade, Serbia	<i>Elastic electron scattering by triethyl phosphate molecule – experimental and theoretical study</i>
9:30 – 10:00	Zehra N. Ozer Afyon Kocatepe University, Afyon, Turkey	<i>Experimental and theoretical investigation of triple differential cross sections of CO₂ molecule at intermediate electron energy</i>
10:00 – 10:30	Matthieu Genevriez Universit e Catholique de Louvain, Belgium	<i>Absolute cross section for electron-impact ionization of He(1s2s ³S)</i>

Coffee Break (10:30 – 11:00)**Collision with molecular systems** (Chair: Stephan Fritzsche)

11:00 – 11:30	Noboru Watanabe Tohoku University, Sendai, Japan	<i>Stereodynamics in electron-impact ionization of molecules studied by molecular-frame electron energy loss spectroscopy</i>
11:30 – 11:50	Vishant Kumar Normandie Université, Caen, France	<i>Investigating the fragmentation dynamics and geometry of CO molecular clusters</i>
11:50 – 12:10	Zoltán Jurek Center for Free-Electron Laser Science, Hamburg, Germany	<i>Chemical dynamics in Argon clusters induced by intense x-rays</i>
12:10 – 12:30	Isabella Floss Vienna University of Technology, Austria	<i>Multi-scale simulation of high harmonic generation in condensed matter</i>

Lunch (12:30 – 14:00)**Heavy particle collisions** (Chairs: Nicolas Sisourat/ Nikolay Shvetsov-Shilovskiy)

14:00 – 14:30	Ilkhom Abdurakhmanov Curtin University, Perth, Australia	<i>Calculating fully differential cross section for ionization of H and He by heavy projectiles</i>
14:30 – 14:50	Richard A. Wilhelm Vienna University of Technology, Austria	<i>Ultrafast neutralization dynamics of highly charged ions upon impact on atomically thin solid targets"</i>
14:50 – 15:10	Luca Repetto Università di Genova, Italy	<i>Ion induced self-organization of form birefringent Cr-Si subwavelength optical gratings</i>
15:10 – 15:30	Alisher Kadyrov Curtin University, Perth, Australia	<i>Quantum suppression of antihydrogen formation in positronium-antiproton collisions</i>
15:30 – 15:50	Örs Asztalos Budapest University of Technology and Economics, Hungary	<i>Application of Collisional Radiative models in Beam Emission Spectroscopy modeling for fusion plasma density diagnostics</i>
15:50 – 16:10	Sebastian Otranto Instituto de Física del Sur Bahía Blanca, Argentina	<i>Ion impact ionization of H₂O at intermediate energies: the role of multiple electron removal</i>

16:10 – Final remarks**16:30 – End of Meeting**

Invited lecturers

Ilkhom Abdurakhmanov

Calculating fully differential ionization cross section of H and He upon heavy projectile impact
Department of Physics, Astronomy and Medical Radiation Sciences, Curtin University, GPO Box U1987,
Perth 6845, Australia

Diego Arbó

Retrieving intracycle interference in angle-resolved laser assisted XUV atomic ionization
Institute for Astronomy and Space Physics - IAFE, Buenos Aires, Argentina

Nora Berrah

X-ray induced time-resolved dynamics in Fullerenes
University of Connecticut Department of Physics, USA

Nicolas Camus

Experimental studies of Wigner's tunneling time
Max-Planck-Institut für Kernphysik, Heidelberg, Germany

Bo Da

Virtual Substrate Method for Nanomaterials Characterization
Research and Services Division of Materials Data and Integrated System, National Institute for Materials
Science, Tsukuba, Ibaraki 305-0047, Japan

Péter Dombi

Photoelectron spectroscopy for ultrasensitive measurement of plasmon fields
Wigner Research Centre for Physics, Budapest

Kilian Fehre

Strong Field Ionization of Chiral Molecules
Institut für Kernphysik, Johann Wolfgang Goethe Universität, Max-von-Laue-Strasse 1, 60438 Frankfurt am
Main, Germany

Matthieu Génévriez

Absolute cross section for electron-impact ionization of He(1s2s 3S)
Laboratory for Physical Chemistry, ETH Zürich, Switzerland.

Elena Gryzlova

Ionic autoionizing states studied with free-electron lasers
Lomonosov Moscow State University, Skobeltsyn Institute of Nuclear Physics, Moscow, Russia

Akiyoshi Hishikawa

Manipulating atoms and molecules by intense laser fields
Department of Chemistry, Graduate School of Science, Nagoya University, Nagoya, Japan

Jelena Maljković

Elastic electron scattering by triethyl phosphate molecule – experimental and theoretical study
Institute of Physics Belgrade, Serbia

Fernando Martin

Attosecond coupled electron and nuclear dynamics in molecules
Departamento de Química, Módulo13, Universidad Autónoma de Madrid, 28049 Madrid, Spain

Zehra Nur Özer

Experimental and theoretical investigation of triple differential cross sections of CO₂ molecule at intermediate electron energy

Afyon Kocatepe University, Physics Department, Turkey

Laing-You Peng

Few-Photon Double Ionization of Helium.

School of Physics, Peking University, 100871, Beijing, China

Nicolas Sisourat

Interatomic Coulombic Decay in triatomic and more complex systems

Sorbonne Universités, UPMC Univ Paris 06, CNRS, Laboratoire de Chimie Physique Matière et Rayonnement, F-75005, Paris, France

Florian Trinter

Imaging the correlated two-electron wave function of a hydrogen molecule

Deutsches Elektronen-Synchrotron (DESY), FS-PE, Notkestrasse 85, 22607 Hamburg, Germany and Fritz-Haber-Institut der Max-Planck-Gesellschaft, Molecular Physics, Faradayweg 4, 14195 Berlin, Germany

Noboru Watanabe

Stereodynamics in electron-impact ionization of molecules studied by molecular-frame electron energy loss spectroscopy

Institute of Multidisciplinary Research for Advanced Materials Tohoku University, Sendai, Japan

Miriam Weller

Time-resolved Studies of Molecular Systems Using Synchrotron Radiation

Institut für Kernphysik, Goethe-University Frankfurt am Main, Germany

Elastic electron scattering by triethyl phosphate molecule – experimental and theoretical study

J. Vuković¹, B. P. Marinković², B. Predojević¹, K. Tökési^{3,4}, J. Maljković²

¹Faculty of Natural Sciences, University of Banja Luka, Republic of Srpska, Bosnia and Herzegovina

²Institute of Physics Belgrade, University of Belgrade, Pregrevica 118, 11080 Belgrade, Serbia

³Institute for Nuclear Research, Hungarian Academy of Sciences (ATOMKI), Debrecen, Hungary

⁴ELI-ALPS, ELI-HU Non-profit Kft., Szeged, Hungary

Corresponding author: jelena.maljkovic@ipb.ac.rs

Electron elastic differential cross sections (DCS) of triethyl phosphate molecule ($(C_2H_5)_3PO_4$) have been investigated both experimentally and theoretically. Beside its role as a polymer resin modifier or a common intermediate in the manufacture of pesticides [1], triethyl phosphate molecule can serve as a model for radiation damage of the phosphate group as a part of DNA backbone (Fig.1).

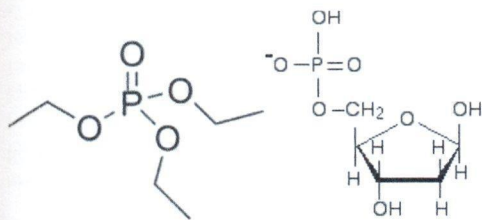


Figure 1. The skeletal formula of (a) triethyl phosphate molecule and (b) a phosphate group attached to the sugar molecule in place of the -OH group on the 5' carbon atom in DNA backbone.

The home-made experimental setup is based on a crossed beam technique comprising of an electron gun, a single capillary gas needle and a detection system with a channeltron [2], while construction of a gas line used for relative low technique, design and programming of digital acquisition system are detailed in [3]. DCS data as function of scattering angle, $DCS(\theta)$, is obtained by measuring the signal and background for each angle point. For the relative flow measurements argon gas was taken as a reference gas and the absolute cross sections have been used from the recent measurements in our group [4].

The partial expansion method was used to describe the differential and total cross sections for electron elastic scattering. The method of calculations can be found in reference [5].

Measurements have been performed at several electron impact energies, i.e. 50, 100,

150 200 and 250 eV and in the angular range from 25° to 125° . In Fig.2 measured and calculated DCS at 100 eV are shown. Both sets of data are arbitrary normalized at the same point at 40° scattering angle.

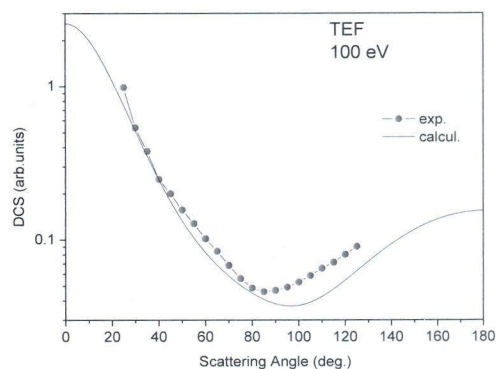


Figure 2. The experimental and calculated differential cross sections for electron elastic scattering by triethyl phosphate molecule at 100 eV impact energy. Both curves are normalized at scattering angle of 40 degrees.

The comparison in shape between experimental and calculated gives a good agreement. Still, we need to match the absolute scales and to estimate the uncertainties.

References

- [1] D. Betteridge, M. Thompson, A.D. Baker, and N.R. Kemp, *Analytical Chem.*, (1972) 44, 2005.
- [2] A.R. Milosavljević, S. Madžunkov, D. Šević, I. Čadež, B.P. Marinković, *J. Phys. B* (2006) **39**, 609.
- [3] J.B. Maljković, A.R. Milosavljević, F. Blanco, D. Šević, G. García, B.P. Marinković, *Phys. Rev. A* (2009) **79**, 052706.
- [4] Miloš Lj. Ranković, Jelena B. Maljković, Károly Tökési, and Bratislav P. Marinković, *Nucl. Instrum. Meth. B* (2018) **72**, 30.
- [5] F. Salvat, R. Mayol, *Comput. Phys. Commun.* (1993) **74**, 358

August 22, 2018 Wednesday		August 23, 2018 Thursday		August 24, 2018 Friday	
Femto-, attosecond physics (Chair: Edwin Kukk)		Photoionization II. (Chair: Shaofeng Zhang)		Electron collisions (Chair: Alexander Dorn)	
8:40 – 9:00	<i>Opening Norbert Kroó</i>	9:00 – 9:30	<i>Nicolas Sisourat</i>	9:00 – 9:30	<i>Jelena Maljković</i>
9:00 – 9:30	<i>Fernando Martin</i>	9:30 – 9:50	<i>Eliezer Kolodney</i>	9:30 – 10:00	<i>Zehra N. Ozer</i>
9:30 – 10:00	<i>Nora Berrah</i>	9:50 – 10:10	<i>Yuki Orimo</i>	10:00 – 10:30	<i>Matthieu Genevriez</i>
10:00 – 10:30	<i>Florian Trinter</i>	10:10 – 10:30	<i>Stepan Balybin</i>		
10:30 – 11:00	Coffee Break	10:30 – 11:00	Coffee Break	10:30 – 11:00	Coffee Break
Photoionization I. (Chair: Emma Sokell)		Interactions with molecules I. (Chair: Lorenzo Avaldi)		Coll. with molecular syst. (Chair: Stephan Fritzsche)	
11:00 – 11:30	<i>Liang-You Peng</i>	11:00 – 11:30	<i>Da Bo</i>	11:00 – 11:30	<i>Noboru Watanabe</i>
11:30 – 11:50	<i>Maria-Novella Piancastelli</i>	11:30 – 11:50	<i>Victor Despre</i>	11:30 – 11:50	<i>Vishant Kumar</i>
11:50 – 12:10	<i>Stephan Fritzsche</i>	11:50 – 12:10	<i>Moustafa Zmerli</i>	11:50 – 12:10	<i>Zoltán Jurek</i>
12:10 – 12:30	<i>Francis Penent</i>	12:10 – 12:30	<i>Raimund Feifel</i>	12:10 – 12:30	<i>Isabella Floss</i>
12:30 – 14:00	Lunch	12:30 – 14:00	Lunch	12:30 – 14:00	Lunch
Laser field I. (Chair: Nora Berrah)		Interactions with molecules II. (Chair: Sebastian Otranto)		Heavy particle collisions (Chairs: Nicolas Sisourat/ Nikolay Shvetsov-Shilovski)	
14:00 – 14:30	<i>Elena V. Gryzlova</i>	14:00 – 14:30	<i>Miriam Weller</i>	14:00 – 14:30	<i>Ilkhom Abdurakhmanov</i>
14:30 – 15:00	<i>Diego G. Arbó</i>	14:30 – 15:00	<i>Kilian Fehre</i>	14:30 – 14:50	<i>Richard A. Wilhelm</i>
15:00 – 15:20	<i>Ph. V. Demekhin</i>	15:00 – 15:20	<i>Moh. F. Gharaibeh</i>	14:50 – 15:10	<i>Luca Repetto</i>
15:20 – 15:40	<i>Imre Barna</i>	15:20 – 15:40	<i>Nikolay Shvetsov-Shilovski</i>	15:10 – 15:30	<i>Alisher Kadyrov</i>
15:40 – 16:10	Coffee Break	15:40 – 16:10	Coffee Break	15:30 – 15:50	<i>Őrs Asztalos</i>
				15:50 – 16:10	<i>Sebastian Otranto</i>
Laser field II. (Chair: Alisher Kadyrov)		More complex systems (Chair: Piero Decleva)		16:10 – 16:30	Final remarks
16:10 – 16:40	<i>Akiyoshi Hishikawa</i>	16:10 – 16:40	<i>Péter Dombi</i>	16:30	End of the conference
16:40 – 17:10	<i>Nicolas Camus</i>	16:40 – 17:00	<i>Hicham Agueny</i>		
17:10 – 18:30	Poster session	17:00 – 18:30	Poster session		
		19:30	Conference dinner		