

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 Zoltán Kónya Béla Paripás Gábor Pszota

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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. Tőkési, 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. Tőkési, 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 Tőkési

Chair of MPS-2018

International Advisory Board

Ugo Ancarani (France) Lorenzo Avaldi (Italy) Klaus Bartschat (USA) Jamal Berakdar (Germany) Nora Berrah (USA) Igor Bray (Australia) XiangJun Chen (China) Piero Decleva (Italy) Mevlut Dogan (Turkey) Danielle Dowek (France) Reinhard Dörner (Germany) Alexander Dorn (Germany) Anatoly Faenov (Japan)+ **Omar Fojon (Argentina)** Alexei Grum-Grzhimailo (Russia) Laszlo Gulyas (Hungary) Tom Kirchner (Canada) Konstantin Kouzakov (Russia) Edwin Kukk (Finland) Don Madison (USA) Fernando Martin (Spain) Andrew Murray (UK) Bernard Piraux (Belgium) Ivan Powis (UK) Emma Sokell (Ireland) Magda Staicu-Casagrande (France) Masahiko Takahashi (Japan) Károly Tőkési (Hungary) Lokesh Tribedi (India) Kiyoshi Ueda (Japan) Jim Williams (Australia)

Scientific Program

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

Coffee Break (10:30 - 11:00)

Photoionization I. (Chair: Emma Sokell)

11:00 - 11:30	Liang-You Peng	Few-photon double ionization of Helium	
	Peking University, Beijing China		
44.00 44.50	Maria-Novella Piancastelli	Photoexcitation and photoionization dynamics of isolated	
11:30 - 11:50	Sorbonne Université, Paris,	atoms and molecules in the tender x-ray domain	
	France		
11.50 - 12.10	Stephan Fritzsche	Excitation and ionization of atoms by twisted light	
	Universität Jena, Germany		
12:10 – 12:30	Francis Penent		
	Sorbonne Université, Paris,	Multiple photoionization of alkali atoms	
	France		

Lunch (12:30 - 14:00)

Laser field I. (Chair: Nora Berrah)

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

Coffee Break (15:40 - 16:10)

Laser field II. (Chair: Alisher Kadyrov)

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

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

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

Lunch (12:30 - 14:00)

Interactions with molecules II. (Chair: Sebastian Otranto)

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

<u>Coffee Break (15:40 - 16:10)</u>

More complex systems (Chair: Piero Decleva)

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

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	Elastic electron scattering by triethyl phosphate molecul – experimental and theoretical study		
9:30 - 10:00	Zehra N. Ozer Afyon Kocatepe University, Afyon, Turkey	Experimental and theoretical investigation of triple differential cross sections of CO ₂ molecule at intermediate electron energy		
10:00 - 10:30	<i>Matthieu Genevriez</i> Universit e Catholique de Louvain, Belgium	Absolute cross section for electron-impact ionization of He(1s2s ³ S)		

Coffee Break (10:30 - 11:00)

Collision with molecular systems (Chair: Stephan Fritzsche)

11:00 – 11:30	Noboru Watanabe Tohoku University, Sendai,	Stereodynamics in electron-impact ionization of molecules studied by molecular-frame electron energy	
	Japan	loss spectroscopy	
44.00 44.50	Vishant Kumar	Investigating the fragmentation dynamics and geometry of	
11:30 - 11:50	Normandie Université, Caen,	CO molecular clusters	
	France		
44 50 40 40	Zoltán Jurek	Chamical dynamics in Argon clusters induced by intense	
11:50 - 12:10	Center for Free-Electron Laser	v-rave	
	Science, Hamburg, Germany	x-rays	
12:10 – 12:30	Isabella Floss	Multi scale simulation of high harmonic congration in	
	Vienna University of	condensed matter	
1	Technology, Austria		

Lunch (12:30 - 14:00)

Heavy particle collisions (Chairs: Nicolas Sisourat/ Nikolay Shvetsov-Shilovskiy)

14:00 – 14:30	<i>Ilkhom Abdurakhmanov</i> Curtin University, Perth, Australia	Calculating fully differential cross section for ionization of H and He by heavy projectiles		
14:30 – 14:50	Richard A. Wilhelm Vienna University of Technology, Austria	Ultrafast neutralization dynamics of highly charged ions upon impact on atomically thin solid targets"		
14:50 – 15:10	<i>Luca Repetto</i> Università di Genova, Italy	Ion induced self-organization of form birefringent Cr-Si subwavelength optical gratings		
15:10 – 15:30	Alisher Kadyrov Curtin University, Perth, Australia	Quantum suppression of antihydrogen formation in positronium-antiproton collisions		
15:30 – 15:50	Örs Asztalos Budapest University of Technology and Economics, Hungary	Application of Collisional Radiative models in Beam Emission Spectroscopy modeling for fusion plasma density diagnostics		
15:50 – 16:10	Sebastian Otranto Instituto de Física del Sur Bahía Blanca, Argentina	lon impact ionization of H_2O at intermediate energies: the role of multiple electron removal		

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

Timeresolved 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

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Electron elastic differential cross sections triethyl phosphate molecule (DCS) of $(C_2H_5)_3PO_4$ 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 fow technique, design and programming of digital acquisition system are detailed in [3]. DCS data as function of scattering angle, DCS (θ), is obtained measuring the signal by 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 uncertainities.

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

Absolute cross section for electron-impact ionization of $He(1s2s \ ^{3}S)$

M. Génévriez^{*,†}, J. J. Jureta^{*}, P. Defrance^{*}, X. Urbain^{*}

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Electron-impact ionization of ground state helium is a benchmark process which, as such, has been extensively studied. Good agreement is now reached between the results of state-ofthe-art theoretical and experimental investigations. The case of electron-impact ionization of the metastable, 1s2s ³S state of helium is far from being as satisfactory. For example, despite sustained theoretical effort within the past decades, the only measurement of the absolute total ionization cross section which spans a significant energy range [4] lies more than 60% higher than the results of all recent, state-of-the-art calculations (see, e.q., [3, 5]). This difference is not acceptable due to the importance of metastable helium in a wide variety of physical environments and processes, from Bose-Einstein condensates to diagnosis of thermonuclear fusion plasmas.

We have measured the absolute cross sections for electron-impact single and double ionization of He(1s2s ³S) and for double ionization of He⁻ [1], using the animated-crossed-beam technique of Defrance *et al.* [2]. A source of fast metastable helium atoms was purpose-built for this study and overcomes the lack of state selectivity existing in the earlier experiment. It is based on the photodetachment of fast (keV) He⁻ ions by a CO₂ laser, which ensures that atoms are produced in the 1s2s ³S state only. A relatively high beam brightness can be reached due to the large detachment efficiency, and purity is better than 5% with contamination limited to He(1s² ¹S) only.

The present results for single ionization of $He(1s2s \ ^3S)$ lie significantly lower than the previous experiment, and are in fact in the region reached by recent, *ab initio* calculations [1]. They are in excellent agreement with the multicore calculation of Fursa and Bray [3], as shown in Fig. 1, over the whole energy range covered. Frozen-core calculations fail to match the present results at higher energies, hinting at significant contributions from inner-shell ionization and indirect mechanisms such as excitation to doubly excited states and autoionization.



Figure 1. Cross sections for electron-impact single and double ionization of $He(1s2s \ ^3S)$ and double ionization of He^- .

Results for the double ionization of metastable helium and He⁻ are the first data reported in the literature for these processes. The cross section for double ionization of He(1s2s ³S) has roughly the same magnitude as that for ground state helium, suggesting that ionization of the second (1s) electron is the limiting factor. The cross section for double ionization of He⁻ is much larger than typical values, as expected for such a weakly bound system (77 meV), and does not match for universal shape of Rost and Pattard [6].

References

- M. Génévriez et al. 2017 Phys. Rev. A 96 010701(R)
- [2] P. Defrance et al. 1981 J. Phys. B 14 103
- [3] D. V. Fursa and I. Bray 2003 J. Phys. B 36 1663
- [4] A. J. Dixon et al. 1976 J. Phys. B 9 2617
- [5] Y. Ralchenko et al. 2008 At. Data Nucl. Data Tables 94 603
- $[6]\,$ J. M. Rost and T. Pattard 1999 J. Phys. B 94 $_{603}$

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	Opening Norbert Kroó	9:00 - 9:30	Nicolas Sisourat	9:00 - 9:30	Jelena Maljković
9:00 - 9:30	Fernando Martin	9:30 - 9:50	Eliezer Kolodney	9:30 - 10:00	Zehra N. Ozer
9:30 - 10:00	Nora Berrah	9:50 - 10:10	Yuki Orimo	10:00 - 10:30	Matthieu Genevriez
10:00 - 10:30	Florian Trinter	10:10 - 10:30	Stepan Balybin		
10:30 - 11:00	Coffee Break	10:30 - 11:00	Coffee Break	10:30 - 11:00	Coffee Break
Photoion	ization I. (Chair: Emma Sokell)	Interactions with	molecules I. (Chair: Lorenzo Avaldi)	Coll. with mole	cular syst. (Chair: Stephan Fritzsche)
11:00 - 11:30	Liang-You Peng	11:00 - 11:30	Da Bo	11:00 - 11:30	Noboru Watanabe
11:30 - 11:50	Maria-Novella Piancastelli	11:30 - 11:50	Victor Despre	11:30 - 11:50	Vishant Kumar
11:50 - 12:10	Stephan Fritzsche	11:50 - 12:10	Moustafa Zmerli	11:50 - 12:10	Zoltán Jurek
12:10 - 12:30	Francis Penent	12:10 - 12:30	Raimund Feifel	12:10 - 12:30	Isabella Floss
12:30 - 14:00	Lunch	12:30 - 14:00	Lunch	12:30 - 14:00	Lunch
Laser	f <mark>ield I.</mark> (Chair: Nora Berrah)	Interactions with molecules II. (Chair: Sebastian Otranto)		Heavy particle collisions (Chairs: Nicolas Sisourat/ Nikolay Shvetsov-Shilovski)	
14:00 - 14:30	Elena V. Gryzlova	14:00 - 14:30	Miriam Weller	14:00 - 14:30	Ilkhom Abdurakhmanov
14:30 - 15:00	Diego G. Arbó	14:30 - 15:00	Kilian Fehre	14:30 - 14:50	Richard A. Wilhelm
15:00 - 15:20	Ph. V. Demekhin	15:00 - 15:20	Moh. F. Gharaibeh	14:50 - 15:10	Luca Repetto
15:20 - 15:40	Imre Barna	15:20 - 15:40	Nikolay Shvetsov-Shilovski	15:10 - 15:30	Alisher Kadyrov
15:40 - 16:10	Coffee Break	15:40 - 16:10	Coffee Break	- 15:30 – 15:50 15:50 – 16:10	Örs Asztalos Sebastian Otranto
Laser fie	ld II. (Chair: Alisher Kadyrov)	More comple	ex systems (Chair: Piero Decleva)	16:10 - 16:30	Final remarks
16:10 - 16:40	Akiyoshi Hishikawa	16:10 - 16:40	Péter Dombi	16:30	End of the conference
16:40 - 17:10	Nicolas Camus	16:40 - 17:00	Hicham Agueny		
17:10 - 18:30	Poster session	17:00 - 18:30	Poster session		
		19:30	Conference dinner		

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