3rd XUIC

XUV/X-ray light and fast ions for ultrafast chemistry

GENERAL MEETING

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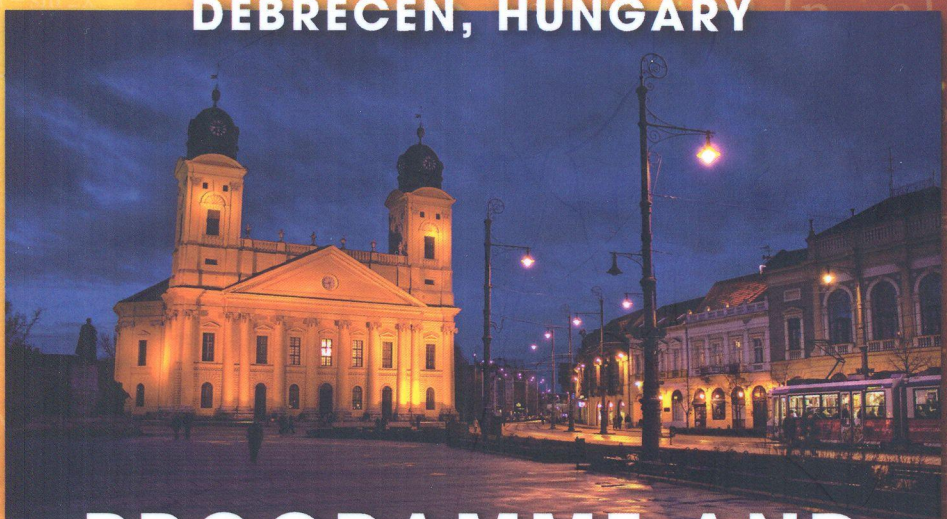
EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY

(COST ACTION CM 1204)

2-4 NOVEMBER 2015
DEBRECEN, HUNGARY



PROGRAMME AND BOOK OF ABSTRACTS

MTA atomki DEBRECEN

3rd XLIC GENERAL MEETING

2-4 NOVEMBER, 2015

Organised by: *ATOMKI / DE / ELFT*

Venue

Centrum Hotel, Debrecen, Hungary

The conference will be hosted at Centrum Hotel, Debrecen, Hungary. The hotel is located in the very heart of the city, at 4-8 Kalvin square, next to the Reformed Great Church. All lectures, the poster sessions and the management committee meeting will be held here.

Book of Abstracts

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

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WELCOME

Welcome to the 3rd XLIC General Meeting XUV/X-ray light and fast ions for ultrafast chemistry (XLIC), organized in Debrecen (Hungary).

The workshop is an annual meeting of CM1204 action, which deals with physical and chemical phenomena induced by electromagnetic fields and charged particles. The meeting is planned for 2nd - 4th November, 2015. It will take place at Centrum Hotel, Debrecen, Hungary. There will be 24 talks given by invited speakers, 12 oral presentations by early stage scientists and 2 poster sessions.

The organization of this meeting and its funding with COST CM1204 budget was approved in the 3rd MC meeting, held in Gdansk (Poland) on October 10th, 2014.

The objectives of the workshop are to assess the state of the art in the current understanding of a variety of basic phenomena in the electron and atom dynamics such as charge-exchange processes collective as well as single-particle excitation and ionization, energy loss, and photon emission processes, collision induced physical, chemical and biological reactions radiation damage and materials modification.

The XLIC conference is held for the 3rd time. Previous conferences were organized in Madrid (Spain, 2013), Gdansk (Poland, 2014). It is a great honour for Debrecen to be the host of this prestigious event in 2015.

Debrecen is the second largest city of Hungary, one of the most important educational, research and cultural centres in Middle-Europe. Stadiums of Debrecen have given place to great sport events (like Eurpoean Championship of Swimming, 2012) and the Carnival of Flowers attracts thousands of visitors from all over Europe every year. In addition, there are a lot of sights that must be seen, for instance the Great Church at the beautiful main square, Déri Museum, Reformed College and its unique library, the Great Forest and the main building of the University of Debrecen, but we could continue this list.

The 3rd XLIC conference is held at the Centrum Hotel. The hotel is located in the historic city centre of Debrecen, only 50 meters from the Great Reformed Church and the main square, the venue of many cultural events, in the close vicinity of the most important attractions, office buildings and institutions. It is one of the hotels of Eastern Hungary that provides ideal conditions for the work and recreation of business travellers, while also satisfying the needs of tourists in search of a lively atmosphere and vibrant experiences.

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 in addition to various social and cultural programs, where you can enjoy the famous Hungarian dishes and wine, too. Organizers have been doing their best to guarantee pleasant experiences for everyone.

Károly Tőkési
Chair
3rd XLIC General Meeting

András Csehi
Co-Chair
3rd XLIC General Meeting

Poster-7

Calculation of probabilities and photoelectron angular distributions for strong field ionization of sodium

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Single ionization of the sodium atom in strong laser fields is studied for different frequencies and field strengths within the multiphoton ionization regime. The probabilities and photoelectron angular distributions are determined numerically using the wave-packet propagation technique [1] and the single electron model for alkali-metal atoms, where the valence electron moves in an effective core potential and the external field [2]. We considered a linearly polarized laser pulse with the intensity profile of the electric field component $F \sin^2(\pi t/T_p)$ and the pulse duration T_p of a few femtoseconds. The ionization probability $P_{\text{ion}}(t)$ is determined by calculating the occupation probabilities $P_n(t)$ for each eigenstate of the valence electron as $P_{\text{ion}}(t) = 1 - \sum_n P_n(t)$ (see e.g. Ref. 3). The photoelectron angular distributions are studied by inspecting the evolution of the electron wave function $\psi(\mathbf{r},t)$ in the interval $(0, T_p)$. Examples for the calculated occupation and ionization probabilities as functions of frequencies at a given field strength, as well as the probability distribution of photoelectrons $|\psi(\mathbf{r},t)|^2$ at a time near T_p are shown in Fig. 1. It is found that, due to low ionization potentials for alkali metal atoms, at the peak intensity of the laser field $\approx 3 \times 10^{12}$ W/cm^2 and wavelengths $\lambda << 3$ μm, the classical over-the-barrier threshold was reached inside the multiphoton regime.

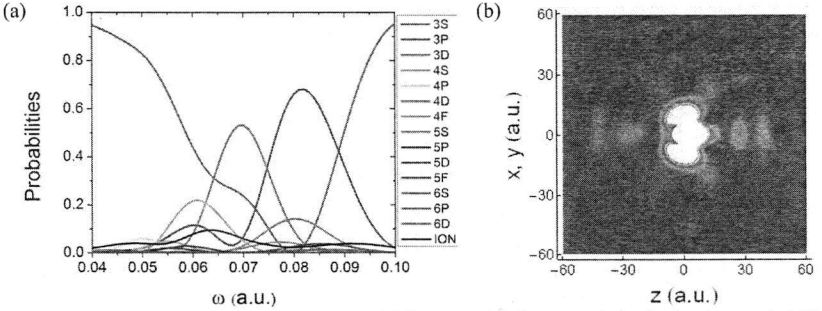

Figure 1: (a) Eigenstates occupation probabilities (different color lines) and the ionization probability (black line) as functions of the laser frequency ω at the peak intensity 1.72 10^{12} W/cm^2 ($F = 0.007$ a.u.) at $t = T_p = 10$ fs. (b) The valence electron probability distribution $|\psi(\mathbf{r},t)|^2$ at $t \approx T_p$ (for $\omega = 0.06$ a.u. and $F = 0.007$ a.u). The outgoing wave determines the photoelectron angular distribution.

Acknowledgments: This work is supported by the COST Action No. CM1204 (XLIC). We acknowledge support from the Ministry of Education, Science and Technological Development of Republic or Serbia under Project No. 171020.

References

[1] A. Askar and A. S. Cakmak, *J. Chem. Phys.*, **68**, 2794, (1978)
[2] M. Z. Milošević and N. S. Simonović, *Phys. Rev. A*, **91**, 023424, (2015)
[3] F. Grossmann, *Theoretical Femtosecond Physics* (Springer, Berlin, 2008), 106.

	MONDAY		TUESDAY	WEDNESDAY
8:00-9:00				
			Invited 8 Thomas Baumert	**Invited 12** Piero Decleva
9:00-10:00	**Registration**		**Invited 9** Luca Argenti	**Invited 13** Daniela Ascenzi
			Invited 10 Rebeca de Nalda	**Invited 14** Daniel Dundas
10:00-11:00			**Invited 11** Morten Forre	**Invited 15** Ronnie Hoekstra
			Coffee break	**Coffee break**
11:00-12:00			**Young Scientist Forum I** Sandra Gomez Mark Stockett Helena Levola András Csehi Aleksander Simonsen Morgane Vacher	**Invited 16** Leticia Gonzalez
				Invited 17 Nadja Doslic
12:00-13:00	**Lunch Opening (13:20)**			**Invited 18** Matjaz Zitnik
				Lunch
13:00-14:00			**Lunch** **Conference Photo (14:20)**	
	Invited 1 Thomas Weinacht			
14:00-15:00	**Invited 2** Franck Lepine			**Invited 19** Eva Lindroth
	Invited 3 Alicia Palacios		**Young Scientist Forum II** Rudy Delaunay Katrin Tanzer Michael Gatchell Vera Krizova Dmitrii Egorov Thomas Kierspel	**Invited 20** Jimena Gorfinkiel
15:00-16:00	**Coffee break**			**Invited 21** Sándor Borbély
	Invited 4 Benjamin Lasorne			**Coffee break**
16:00-17:00	**Invited 5** Alexander Kuleff			**Invited 22** Jan Petter Hansen
	Invited 6 Attila G. Császár		**Coffee break**	**Invited 23** Marta Labuda
17:00-18:00	**Invited 7** Alejandro Saenz		**Poster Session II**	**Invited 24** Nikolay Shvetsov-Shilovskiy
18:00-19:00	**Poster Session I**	**XLIC MC meeting**		
19:00-20:00				**Dinner**
20:00-	**Welcome dinner**		**Conference dinner**	