



# The ESF Supported 2<sup>nd</sup> Conference on High Intensity Laser and Attosecond Science in Israel (CHILI2012)

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*Final report*

## Summary

The 2<sup>nd</sup> Conference on High Intensity Laser and Attosecond Science in Israel (CHILI2012) took place at the Carlton Tel-Aviv hotel on December 3<sup>rd</sup>-5<sup>th</sup> 2012. Over a 100 speakers, scientists and students participated in the 12 oral sessions and the poster presentation session.

## Scientific content

The conference was opened with two overview talks on ICF. Dr. Dimitri Batani (U. Bordeaux, France) discussed recent progress of fast electron transport and fast ignition. Dr. Mordi Rosen (LLNL, CA, USA) gave an overview of ICF experiments on NIF.

Two sessions dedicated to Laser-electron acceleration and X-ray sources included 7 talks, by V. Malka (Ecole Polytechnique, Palaiseau, France), J. Wang (IAMS, Taipei, Taiwan), H. Fiedorowicz (WAT, Warsaw, Poland), A. Faenov (JIHT RAS, Moscow, Russia), J. Rosenzweig (UC, Los Angeles, CA, USA) and D. Kaganovich (NRL, Washington, DC, USA).

Three sessions dedicated to Attosecond science were spread over the first two days of the meeting and included talks by U. Keller (ETH, Zurich, Switzerland), A. Scrinzi (LMU, Munich, Germany), N. Dudovitch (Weizmann Inst., Rehovot, Israel), J.

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Marangos (Imperial College, London, UK), R. Kienberger (TUM, Muenchen, Germany), C. Rödel (FSU, Jena, Germany) and C. Vozzi (CNR-IFN, Milano, Italy).

Three sessions covered topics on laser-ion acceleration and included talks from J. Jortner (Tel-Aviv U., Israel), I. Pogorelsky (BNL, Upton, NY, USA), M. Hegelich (U. Texas, Austin, TX, USA), M. Roth (TUD, Darmstadt, Germany), A. Zigler (The Hebrew U., Jerusalem, Israel), K. Krushelnick (U. Michigan, Ann Arbor, MI, USA), S. Tochitsky (UC, Los Angeles, CA, USA) and M. Krishnamurthy (Tata Inst., Mumbai, India).

One session was dedicated to computation and modeling of laser-plasma experiments, speakers included: D. Gordon (NRL, Washington, DC, USA), A. Andreev (MBI, Berlin, Germany), M. Botton (The Hebrew U., Jerusalem, Israel), F. Pegoraro (U. of Pisa, Italy) and N. Andreev (JIHT RAS, Moscow, Russia).

The meeting was adjourned with a session about future large-scale facilities. A. Shaykin (JIHT RAS, Moscow, Russia) presented the PEARL XCELS projects and J. Zhu (SIOM, Shanghai, China) presented the Petawatt upgrade in the SG-II facility.

## Results and impact

The conference was extremely lively and worthwhile, with much discussion and exchange of ideas. From the amount of new work presented, it was clearly timely, and the field is obviously still in a state of flux. The meeting of two communities was profitable as it allowed the mixing of ideas and assumptions from each area.

The main impact of the event included forming of new collaborations. An experiment designed at the Hebrew University of Jerusalem was suggested and accepted to run later on in 2013 on the Texas Petawatt laser facility at the University of Texas at Austin. A new collaboration between LANL, TUD Darmstadt and U. Texas was formed to collaborate on laser based neutron sources.

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## Program

Monday, December 3rd					
9:30	-	9:45	A. Zigler		Opening remarks from conference chairperson
9:45		10:00	J. Jortner		Greetings from the Israeli National Academy of Science
Session 1: Inertial Confinement Fusion Chair: A. Zigler					
10:00	-	10:30	D. Batani	U. Bordeaux, France	Recent progress in the understanding of fast electron transport for fast ignition
10:30	-	11:00	M. Rosen	LLNL, Livermore, CA, USA	ICF experiments on the national ignition facility - an overview
<b>11:00</b>	-	<b>11:25</b>	<b>Break</b>		
Session 2: Laser-plasma wakefield acceleration and X-ray sources Chair: A. Zigler					
11:25	-	11:55	V. Malka	Ecole Polytechnique, Palaiseau, France	Electron and X ray beam with laser-plasma accelerators.
11:55	-	12:25	S. Karsch	MPQ, Garching, Germany	Overview of electron acceleration and X-ray generation activities at MPQ
12:25	-	12:45	J. Wang	IAMS, Taipei, Taiwan	Ultrafast particle and photon sources driven by intense laser-plasma interaction
<b>12:45</b>	-	<b>14:15</b>	<b>Lunch Break</b>		
Session 3: Attosecond science Chair: C. Vozzi					

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14:15	-	14:45		U. Keller	ETH, Zurich, Switzerland	Attoclock seems to reveal a real tunneling delay time in strong field ionization of helium
14:45	-	15:05		A. Scrinzi	LMU, Munich, Germany	Photo-electron spectra beyond the limit: micrometer wavelength, elliptic polarization, fully differential double emission.
15:05	-	15:25		N. Dudovitch	Weizmann Inst., Rehovot, Israel	When does an electron exit a tunneling barrier?
<b>15:25</b>	-	<b>15:55</b>		<b>Break</b>		
<b>Session 4: Laser plasma acceleration of ions</b> Chair: E. Frumker						
15:55	-	16:25		T. Cowan	Helmholtz- Zentrum, Dresden, Germany	Probing high intensity laser plasma interactions with X-ray FELs
16:25	-	16:55		J. Jortner	Tel-Aviv U., Israel	Conversion of laser energy to nuclear energy
16:55	-	17:15		L. Schachter	Technion, Haifa, Israel	Particle acceleration at optical scales
17:15	-	17:35		I. Pogorelsky	BNL, Upton, NY, USA	Proton acceleration by the laser hole-boring in near-critical plasma
<b>Tuesday December 4th</b>						
<b>Session 5: Laser plasma (Parallel)</b> Chair: I. Pomerantz						
8:50	-	9:00				Announcements

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9:00	-	9:30	E. Raicher	SNRC, Yavne, Israel	Generalized Volkov Solution in the Presence of Ambient Plasma
9:30	-	9:50	A. Stepanov	JIHT RAS, Moscow, Russia	Optically produced collimated quasimonoeenergetic electron beams for laser-plasma acceleration
9:50	-	10:10	E. Kroup	Weizmann Inst., Rehovot, Israel	Tomography and properties of laser-produced solid-density plasmas
10:10	-	10:30	A. Jarnac	Ecole Polytechnique, Palaiseau, France	Four-dimensional imaging of ultraviolet filaments in water
Session 6: High Harmonics Generation (Parallel) Chair: G. Marcus					
9:00	-	9:20	O. Cohen	Technion, Haifa, Israel	Generation of high-order harmonics in a planar waveguide
9:20	-	9:40	A. Landsman	ETH, Zurich, Switzerland	Distribution of tunneling times in strong field ionization
9:40	-	10:00	A. Fleischer	Technion, Haifa, Israel	Generating high harmonics with desirable elliptical polarizations
10:00	-	10:20	E. Oliva	Ecole Polytechnique, Palaiseau, France	Towards fully coherent, 27 GW peak power plasma-based seeded soft-x-ray laser
10:30	-	10:55	<b>Break</b>		
Session 7: Attosecond science Chair: N. Dudovitch					
10:55	-	11:25	J. Marangos	Imperial College, London, UK	Controlling recollisions to extract attosecond molecular dynamics

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11:25	-	11:55		R. Kienberger	TUM, Muenchen, Germany	Attosecond spectroscopy on solid surfaces
11:55	-	12:15		C. Rödel	FSU, Jena, Germany	Intense attosecond pulse trains from relativistic surface plasmas
12:15	-	12:35		C. Vozzi	CNR-IFN, Milano, Italy	Molecular imaging by high-order harmonic generation
12:35	-	12:55		E. Frumker	MPQ, Garching, Germany	High harmonic generation with oriented molecules
<b>12:55</b>	-	<b>14:45</b>		<b>Lunch Break</b>		
<b>Session 8: X-ray, EUV radiation sources and electron acceleration</b> Chair: R. Kumar						
14:45	-	15:05		H. Fiedorowicz	WAT, Warsaw, Poland	Laser plasma sources of extreme ultraviolet (EUV) for applications in nanotechnology and bioengineering
15:05	-	15:25		A. Faenov	JIHT RAS, Moscow, Russia	Exotic dense matter states pumped by relativistic laser plasma in the radiation dominant regime
15:25	-	15:45		J. Rosenzweig	UC, Los Angeles, CA, USA	Nonlinear inverse compton scattering
15:45	-	16:05		D. Kaganovich	NRL, Washington, DC, USA	Laser acceleration of electrons in shock wave enhanced gas jets
16:05	-	16:25		J. Xu	MPQ, Garching, Germany	High-quality electron accelerator with shock-front injection

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16:25	-	18:10			Poster session + Coffee
18:30				Departure for the social dinner	
Wednesday December 5th					
8:50	-	9:00			Announcements
Session 9: Laser-plasma acceleration of ions Chair: Z. Henis					
9:00	-	9:20	M. Hegelich	U. Texas, Austin, TX, USA	Laser-particle acceleration in transparent overdense plasmas: from Trident to the Texas Petawatt
9:20	-	9:50	M. Roth	TUD, Darmstadt, Germany	Laser produced plasma as a new, compact neutron source for dynamic materials
9:50	-	10:10	A. Zigler	The Hebrew U., Jerusalem, Israel	Microstructured snow target for quasi-monochromatic high energy proton acceleration by ultra relativistic laser plasma interaction
10:10	-	10:30	R. Kumar	Tata Inst., Mumbai, India	Ultrafast dynamics of dense, hot plasmas
10:30	-	10:55	Break		
Session 10: Laser-plasma acceleration of ions Chair: N. Andreev					
10:55	-	11:25	K. Krushelnick	U. Michigan, Ann Arbor, MI, USA	Intense high contrast laser interactions with solid density plasmas

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11:25	-	11:55		S. Tochitsky	UC, Los Angeles, CA, USA	Laser-driven shock acceleration of high-energy monoenergetic proton beams
11:55	-	12:25		M. Krishnamurthy	Tata Inst., Mumbai, India	Accelerating neutral atoms with intense laser fields
<b>12:25</b>	-	<b>13:55</b>		<b>Lunch Break</b>		
Session 11: Computaion and modeling Chair: M. Roth						
13:55	-	14:15		D. Gordon	NRL, Washington, DC, USA	Ab initio ionization model and application to laser-plasma accelerators
14:15	-	14:35		A. Andreev	MBI, Berlin, Germany	Fast particles and short wavelength radiation generation from nano-structure targets irradiated by relativistic intensity laser pulses
14:35	-	14:55		M. Botton	The Hebrew U., Jerusalem, Israel	Laser assisted proton acceleration from highly structured plasma targets- theory and simulations
14:55	-	15:15		F. Pegoraro	U. of Pisa, Italy	Radiation reaction effects and $\gamma$ -ray generation in a plasma target interacting with an ultraintense laser pulse
15:15	-	15:35		N. Andreev	JIHT RAS, Moscow, Russia	Wide-range models of laser-matter interaction: high energy particles and x-rays under the action of short intense laser pulses
<b>15:35</b>	-	<b>16:05</b>		<b>Break</b>		
Session 12: Future large scale facilities Chair: A. Zigler						
16:05	-	16:25		A. Shaykin	JIHT RAS, Moscow, Russia	Petawatt laser PEARL and Russian Mega-science project XCELS



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16:25	-	16:45	J. Zhu	SIOM, Shanghai, China	PW Laser facility in SG-II upgrading program
16:45	-	17:05	A. Zigler		Closing remarks and farewell