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The ESF Supported 3rd Conference on High Intensity Laser and Attosecond Science in Israel (CHILI2013)

Final report

Summary

The 3rd Conference on High Intensity Laser and Attosecond Science in Israel (CHILI2013) took place at the Carlton Tel-Aviv hotel on December 2nd-4th 2013. Over a 80 speakers, scientists and students participated in the 12 oral sessions and the poster presentation session.

Scientific content

The key speakers in the meeting included S.V. Bulanov / Japan Atomic Energy Agency. Prof. Bulanov devoted his talk to the prospects of using the laser radiation interaction with matter in the laboratory relativistic astrophysics context. He discussed the dimensionless parameters characterizing the processes in the laser and astrophysical plasmas. In particular, he addressed basic properties of the collision less shock waves, of magnetic reconnection and the vortex dynamics relevant to the problem of ultrarelativistic particle acceleration and emission of hard electromagnetic radiation.

R. Falcone/UC Berkeley discussed three experiments involving warm and dense matter. On the first, femtosecond laser pulses were utilized to heat thin films, which are then probed by time-resolved, soft x-ray, near edge absorption to determine electron dynamics and temperature evolution. On the second, the NIF laser was utilized to compress CH to GBar pressures, and to probe the material using radiography and inelastic x-ray scattering. On the third experiment, the LCLS x-ray

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free-electron laser was utilized to create hot and dense Al plasmas, to determine the kinetics and ionization mechanisms at ultrafast timescales.

CH. Nam/GIST, Korea discussed the generation of energetic protons from relativistically driven laser-produced plasmas.

Chan Joshi/UCLA described his work on acceleration of electrons using both laser and particle beams in the so-called blow-out regime of the Plasma Wakefield Accelerator (PWFA).

G rard Mourou/IZEST reported on a revolutionary laser architecture that makes possible for the first time to accelerate particles to very high energy (GeV) at high repetition rate (kHz) with good efficiency. Based on massively parallel coherent fiber amplifiers the technique (CAN Coherent Amplification Network architecture) has the potential to produce simultaneously, petawatt peak power with megawatt average power with >30% efficiency.

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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.

One collaboration that was formed in this meeting is between the Ecole Polytechnique group of V. Malka and M. Hegelich of U. Texas. They have formed a plan to conduct high-pressure gas jet experiments on the Texas Petawatt laser, using a target system developed by V. Malka's group.

The conference teamed up with the Journal for high power lasers published by Chinese Laser Press and Cambridge U. press. The editors presented the journal during the meeting and invited the conference participants to submit original manuscripts for a themed issue on high intensity lasers and attosecond science.

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Program

Monday, Dec 2nd

9:15 - 9:30		Opening remarks
Session 1: ICF and Laboratory Astrophysics Chair: Arie Zigler		
9:30 - 10:10	C. Barty L. Livermore National Lab, USA	NIF and the Pursuit of Star Power on Earth
10:10 - 10:50	S. Bulanov Japan Atomic Energy Agency, Kyoto, Japan	Super Powerful Lasers & XFELs: Paving the Way towards Relativistic Laboratory Astrophysics
10:50 - 11:15 Break		
Session 2: Ultrahigh intensity and Ultrashort laser interactions Chair: Gilad Marcus		
11:15 - 11:55	G. Mourou Ecole Polytechnique/IZEST, France	Can the Future of Accelerators Be Fibers? The Optics Road to GeV Scientific and Societal Applications
11:55 - 12:35	K. Schafer Louisiana State U., USA	Attosecond Transient Absorption in Laser-Dressed Atoms
12:35 - 14:15 Lunch Break		
Session 3: Attosecond science I Chair: Kenneth Schafer		
14:15 - 14:45	K. Osvay ELI-HU, Szeged, Hungary	The Attosecond Facility of the Extreme Light Infrastructure
14:45 - 15:05	A. Landsman Eidgenössische Technische Hochschule, Zürich, Switzerland	Tunneling time and non-adiabatic effects in strong field ionization
15:05 - 15:25	K. Kim National Research Council Canada, Canada	Manipulating Quantum Paths for generation and characterization of attosecond pulses
15:25 - 15:45	G. Marcus Hebrew University of Jerusalem, Israel	K-shell excitation using the re-colliding electrons from a Carrier Envelop Phase Stabilized 2-Cycles IR (2.1um) Radiation Source
15:45 - 16:15 Break		
Session 4: Laser-particle acceleration I Chair: Moshe Fraenkel		

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16:15 - 16:45	D. Neely	Rutherford Appleton Laboratory, UK	High efficiency laser driven ion studies
16:45 - 17:15	C. Nam	Gwangju Inst. of Sci. and Technology, Korea	Energetic proton generation from relativistically driven laser-produced plasmas
17:15 - 17:45	H. Ruhl	Ludwig Maximilians U., München, Germany	The interaction of intense laser radiation with a nano foil

18:00 - 20:00 Reception

Tuesday, Dec 3rd

Session 6: High Harmonics Generation Chair: Alon Bahabad

9:00 - 9:20	Y. Deng	Max Planck Gesellschaft, Berlin, Germany	High Power OPCPA system for XUV sources at 500 kHz
9:20 - 9:40	A. Fleischer	Technion, Haifa, Israel	High harmonic generation with fully controlled polarization :examination of the role of spin angular momentum in extreme non-linear optics
9:40 - 10:00	I. Földes	Wigner Research center, Budapest, Hungary	High harmonics generation and ionization effects in cluster targets
10:00 - 10:20	S. Goh	University of Twente, The Netherlands	High harmonic generation in a large-volume capillary for seeding of free-electron lasers

10:20 - 10:45 Break

Session 7: Ultrahigh Power Laser Technology Chair: Arie Zigler

10:45 - 11:15	J. Zhu	Shanghai Inst. of Optics and Fine Mechanics, China	Research on the contrast test and improvement for PW Laser in SGII-UP
11:15 - 11:35	D. Kaganovich	Naval Research Laboratory, USA	Origin and control of the picosecond pedestal in femtosecond laser systems and its effect on laser wakefield acceleration of electrons
11:35 - 11:55	S. Szatmari	U. Szeged, Hungary	Contrast improvement by nonlinear temporal and spatial filtering of high-power laser beams

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11:55 - 12:15 N. Fisch Princeton U., USA Enhancing Resonant Raman
Compression in Plasmas

12:15 - 14:00 Lunch Break

Session 8: Laser-particle acceleration II Chair: Zohar Henis

14:00 - 14:30 K. Ledingham U. Strathclyde, UK A Turkish-Scottish
International Centre for
Laser Driven Ion Therapy
and Applications

14:30 - 14:50 I. Pomerantz U. Texas, USA An ultrashort pulsed neutron
source

14:50 - 15:20 Break

Session 9: Laser-particle acceleration III Chair: Ishay Pomerantz

15:20 - 15:50 C. Joshi UC Los Angeles, USA Latest results on the Plasma
Wakefield Acceleration
experiments

15:50 - 16:20 D. Jaroszynski U. Strathclyde, UK Ultra-short bunch
acceleration in the laser
plasma wakefield accelerator

16:20 - 16:40 A. Zigler Hebrew University of
Jerusalem, Israel Temporal evolution of
femtosecond laser generated
plasma filaments

16:40 - 17:40 Poster session + Coffee

18:30 Departure for the social dinner

19:00 - Social dinner

Wednesday, Dec 4th

8:50 - 9:00 Announcements

Session 10: Attosecond science II Chair: Gilad Marcus

9:00 - 9:20 A. Bahabad Tel Aviv U., Israel Macroscopic manipulation of
High-Harmonic-Generation
through bound-state
coherent control

9:20 - 9:40 O. Pedatzur Weizmann Inst., Rehovot,
Israel Attosecond Tunneling
Interferometry

9:40 - 10:00 T. Ruchon Commissariat à l'énergie
atomique, France Combined harmonic phase
spectroscopies

10:00 - 10:20 F. Légaré Inst. national de la
recherche sci., Montreal,
Canada Fourier plane Optical
Parametric Amplification

10:20 - 10:45 Break

Session 11: Warm Dense Matter Chair: Anatoly Faenov

10:45 - 11:15 R. Falcone UC Berkeley, USA X-ray lasers, laser-plasmas,

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11:15 - 11:45	D. Batani	U. Bordeaux, France	and high harmonics: what's best for creating and probing high-energy-density matter? Experimental results in the intensity regime relevant for shock ignition
11:45 - 12:05	O. Rosmej	GSI, Darmstadt, Germany	Heavy ion stopping in CHO-foam layers heated by hohlraum radiation
12:05 - 12:25	S. Eliezer	Soreq Nuclear Research Center, Israel	Laser Induced Relativistic Shock Waves
12:25 - 12:45	S. Moustazis	Technical University of Crete, Greece	A New Approach to Muon Catalyzed Fusion Energy Using Ultrahigh GeV Proton Beams from Nonlinear Force Driven Plasma Blocks

12:45 - 14:15 Lunch Break

Session 12: X-ray and Gamma Ray Sources I Chair: Ken Ledingham

14:15 - 14:45	V. Malka	Ecole Polytechnique, Palaiseau, France	Ultra-bright X ray beams with Laser Plasma Accelerators
14:45 - 15:10	C. Barty	L. Livermore National Lab, USA	Laser-Compton Gamma-ray Sources and the Emergence of Nuclear Photonics
15:10 - 15:35	A. Faenov	Japan Atomic Energy Agency, Kyoto, Japan	Radiation properties of plasma irradiated by ultra-short laser pulses with intensities of 10^{21} W/cm ²
15:35 - 16:00	N. Andreev	J. Inst. for High Temp., Russian Academy of Sci., Moscow, Russia	Fast particles and x-rays in the intense laser-matter interactions

16:00 - 16:30 Break

Session 13: X-ray and Gamma Ray Sources II Chair: Arie Zigler

16:30 - 16:50	B. Shen	State Key Laboratory of High Field Laser Physics, Shanghai, China	Particle acceleration and gamma-ray radiation in plasmas
16:50 - 17:10	O. Renner	Inst. of Physics v.v.i, Prague, Czech Republic	Search for effective X-ray spectroscopic diagnosis of suprathreshold electrons in fusion-relevant laser-produced plasmas
17:10 - 17:30	T. Pikuz	Japan Atomic Energy	Coherent X-ray mirage.

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	Agency, Kyoto, Japan	Discovery and possible applications
17:30 - 17:50 F. Pegoraro	Universita' di Pisa, Italy	Filamentation instability in relativistic pair plasmas