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Record 1 of 50

By: Almansa, I (Almansa, I.); Russman, FB (Russman, F. B.); Marini, S (Marini, S.); Peter, E (Peter, E.); de Oliveira, GI (de Oliveira, G. I.); Cairns, RA (Cairns, R. A.); Rizzato, FB (Rizzato, F. B.)

Title: Ponderomotive and resonant effects in the acceleration of particles by electromagnetic modes

Source: PHYSICS OF PLASMAS

Volume: 26

Issue: 3

Article Number: 033105

DOI: 10.1063/1.5058748

Document Type: Article

Published: MAR 2019

Abstract: In the present analysis, we study the dynamics of charged particles under the action of slowly modulated electromagnetic carrier waves. With the use of a high-frequency laser mode along with a modulated static magnetic wiggler, we show that the ensuing total field effectively acts as a slowly modulated high-frequency heat-wave field typical of inverse free-electron laser schemes. This effective resulting field is capable of accelerating particles in much the same way as space-charge wake fields do in plasma accelerators, with the advantage of being more stable than plasma related methods. Acceleration occurs as particles transition from ponderomotive to resonant regimes, so we develop the ponderomotive formalism needed to examine this problem. The ponderomotive formalism includes terms that, although not discussed in the usual applications of the approximation, are nevertheless of crucial importance in the vicinity of resonant capture. The role of these terms is also briefly discussed in the context of generic laser-plasma interactions. Published under license by AIP Publishing.

Accession Number: WOS:000462916300048

Record 2 of 50

By: Beck, A (Beck, A.); Derouillat, J (Derouillat, J.); Lobet, M (Lobet, M.); Farjallah, A (Farjallah, A.); Massimo, F (Massimo, F.); Zemzemi, I (Zemzemi, I); Perez, F (Perez, F.); Vinci, T (Vinci, T.); Grech, M (Grech, M.)

Title: Adaptive SIMD optimizations in particle-in-cell codes with fine-grain particle sorting

Source: COMPUTER PHYSICS COMMUNICATIONS

Volume: 244

Pages: 246-263

DOI: 10.1016/j.cpc.2019.05.001

Document Type: Article

Published: NOV 2019

Abstract: Particle-In-Cell (PIC) codes are broadly applied to the kinetic simulation of plasmas, from laser matter interaction to astrophysics. Their heavy simulation cost can be mitigated by using the Single Instruction Multiple Data (SIMD) capability, or vectorization, now available on most architectures. This article details and discusses the vectorization strategy developed in the code SMILEI which takes advantage from an efficient, systematic, cell-based sorting of the particles. The PIC operators on particles (projection, push, deposition) have been optimized to benefit from large SIMD vectors on both recent and older architectures. The efficiency of these vectorized operations increases with the number of particles per cell (PPC), typically speeding up three-dimensional simulations by a factor 2 with 256 PPC. Although this implementation shows acceleration from as few as 8 PPC, it can be slower than the scalar version in domains containing fewer PPC as usually observed in vectorization attempts. This issue is overcome with an adaptive algorithm which switches locally between scalar (for few PPC) and vectorized operators (otherwise). The newly implemented methods are benchmarked on three different, large-

scale simulations considering configurations frequently studied with PIC codes. (C) 2019 Elsevier B.V. All rights reserved.

Accession Number: WOS:000487173700022

Record 3 of 50

By: Bolanos, S (Bolanos, S.); Beard, J (Beard, J.); Revet, G (Revet, G.); Chen, SN (Chen, S. N.); Pikuz, S (Pikuz, S.); Filippov, E (Filippov, E.); Safronova, M (Safronova, M.); Cerchez, M (Cerchez, M.); Willi, O (Willi, O.); Starodubtsev, M (Starodubtsev, M.); Fuchs, J (Fuchs, J.)

Title: Highly-collimated, high-charge and broadband MeV electron beams produced by magnetizing solids irradiated by high-intensity lasers

Source: MATTER AND RADIATION AT EXTREMES

Volume: 4

Issue: 4

Article Number: 044401

DOI: 10.1063/1.5082330

Document Type: Article

Published: JUL 2019

Abstract: Laser irradiation of solid targets can drive short and high-charge relativistic electron bunches over micron-scale acceleration gradients. However, for a long time, this technique was not considered a viable means of electron acceleration due to the large intrinsic divergence (similar to 50 degrees half-angle) of the electrons. Recently, a reduction in this divergence to 10 degrees-20 degrees half-angle has been obtained, using plasma-based magnetic fields or very high contrast laser pulses to extract the electrons into the vacuum. Here we show that we can further improve the electron beam collimation, down to similar to 1.5 degrees half-angle, of a high-charge (6 nC) beam, and in a highly reproducible manner, while using standard stand-alone 100 TW-class laser pulses. This is obtained by embedding the laser-target interaction in an external, large-scale (cm), homogeneous, extremely stable, and high-strength (20 T) magnetic field that is independent of the laser. With upcoming multi-PW, high repetition-rate lasers, this technique opens the door to achieving even higher charges (>100 nC). (C) 2019 Author(s).

Accession Number: WOS:000475743800007

Record 4 of 50

By: Bolis, R (Bolis, R.); Hernandez, JA (Hernandez, J. -A.); Recoules, V (Recoules, V.); Guarguaglini, M (Guarguaglini, M.); Dorchies, F (Dorchies, F.); Jourdain, N (Jourdain, N.); Ravasio, A (Ravasio, A.); Vinci, T (Vinci, T.); Brambrink, E (Brambrink, E.); Ozaki, N (Ozaki, N.); Bouchet, J (Bouchet, J.); Remus, F (Remus, F.); Musella, R (Musella, R.); Mazevet, S (Mazevet, S.); Hartley, NJ (Hartley, N. J.); Guyot, F (Guyot, F.); Benuzzi-Mounaix, A (Benuzzi-Mounaix, A.)

Title: X-ray absorption near edge spectroscopy study of warm dense MgO

Source: PHYSICS OF PLASMAS

Volume: 26

Issue: 11

Article Number: 112703

DOI: 10.1063/1.5105390

Document Type: Article

Published: NOV 2019

Abstract: We report time-resolved X-ray Absorption Near Edge Spectroscopy (XANES) measurements of warm dense MgO. We used a high power nanosecond pulse to drive a strong uniform shock wave into an MgO sample, and a picosecond pulse to generate a broadband X-ray source near the Mg K-edge. We used this setup to obtain XANES spectra across a large area of the phase diagram, with densities up to 6.8 g/cc and temperatures up to 30 000 K, conditions at which no prior investigations of electronic and ionic structure exist. Our XANES results, together with quantum molecular dynamic simulations, demonstrate that the sample metallizes due to the bandgap closure as it melts, after which it shows typical behavior for a disordered ionic liquid. Published under license by AIP Publishing.

Accession Number: WOS:000509382600003

Record 5 of 50

By: Bolouki, N (Bolouki, N.); Sakai, K (Sakai, K.); Huang, TY (Huang, T. Y.); Isayama, S (Isayama, S.); Liu, YL (Liu, Y. L.); Peng, CW (Peng, C. W.); Chen, CH (Chen, C. H.); Khasanah, N (Khasanah, N.); Chu, HH (Chu, H. H.); Moritaka, T (Moritaka, T.); Tomita, K (Tomita, K.); Sato, Y (Sato, Y.); Uchino, K (Uchino, K.); Morita, T (Morita, T.); Matsukiyo, S (Matsukiyo, S.); Hara, Y (Hara, Y.); Shimogawara, H (Shimogawara, H.); Sakawa, Y (Sakawa, Y.); Sakata, S (Sakata, S.); Kojima, S (Kojima, S.); Fujioka, S (Fujioka, S.); Shoji, Y (Shoji, Y.); Tomiya, S (Tomiya, S.); Yamazaki, R (Yamazaki, R.); Koenig, M (Koenig, M.); Kuramitsu, Y (Kuramitsu, Y.)

Title: Collective Thomson scattering measurements of electron feature using stimulated Brillouin scattering in laser-produced plasmas

Source: HIGH ENERGY DENSITY PHYSICS

Volume: 32

Pages: 82-88

DOI: 10.1016/j.hedp.2019.06.002

Document Type: Article

Published: JUL 2019

Abstract: Collective Thomson scattering (CTS) has been applied to laser-produced plasmas with Gekko XII HIPER laser facility. A scheme of stimulated Brillouin scattering (SBS) has been used in CTS measurements for the first time. Utilizing SBS shortens the probe pulse, which increases the scattered power, and thus collected scattered signal of CTS. Therefore, a lower energy probe laser can be used for given background emission levels to avoid probe heating, which is crucial for plasmas with low electron temperature. Both electron and ion features of CTS have been successfully detected by using the SBS technique. The spatial profile of electron density, temperature, and drift velocity have been estimated in an ablation plasma. In addition to the local measurements with CTS, a global structure of plasmas has been obtained with optical imaging of the self-emission of plasmas and the interferometry. In the aspects of drift velocity and plasma density, the local and global information are in good agreement.

Accession Number: WOS:000484661300012

Record 6 of 50

By: Bonfigli, F (Bonfigli, F.); Hartley, NJ (Hartley, N. J.); Inubushi, Y (Inubushi, Y.); Koenig, M (Koenig, M.); Matsuoka, T (Matsuoka, T.); Makarov, S (Makarov, S.); Montereali, RM (Montereali, R. M.); Nichelatti, E (Nichelatti, E.); Ozaki, N (Ozaki, N.); Piccinini, M (Piccinini, M.); Pikuz, S (Pikuz, S.); Pikuz, T (Pikuz, T.); Sagae, D (Sagae, D.); Vincenti, MA (Vincenti, M. A.); Yabashi, M (Yabashi, M.); Yabuuchi, T (Yabuuchi, T.)

Edited by: Juha, L (Juha, L); Bajt, S (Bajt, S); Guizard, S (Guizard, S)

Title: Photoluminescence properties and characterization of LiF-based imaging detector irradiated by 10 keV XFEL beam

Source: OPTICS DAMAGE AND MATERIALS PROCESSING BY EUV/X-RAY RADIATION VII

Book Series Title: Proceedings of SPIE

Volume: 11035

Article Number: UNSP 110350N

DOI: 10.1117/12.2520907

Document Type: Proceedings Paper

Published: 2019

Abstract: We present the study of optical and spectral properties of radiation-induced stable point defects, known as color centers (CCs), in lithium fluoride (LiF) for the detection of 10 keV XFEL beam at Spring-8 Angstrom Compact free electron LAser (SACLA) in Japan. A thick LiF crystal was irradiated in four spots with 10 keV XFEL beam (pulse duration = 10 fs) with different number of accumulated shots. After irradiation the colored-LiF spots were characterized with an optical microscope in fluorescence mode and their photoluminescence intensity and spectra were analyzed.

Conference Title: Conference on Optics Damage and Materials Processing by EUV/X-Ray Radiation VII

Conference Date: APR 01-03, 2019

Conference Location: Prague, CZECH REPUBLIC
Sponsor(s): SPIE
Accession Number: WOS:000489750600008

Record 7 of 50

By: Bouchet, J (Bouchet, J.); Bottin, F (Bottin, F.); Recoules, V (Recoules, V); Remus, F (Remus, F.); Morard, G (Morard, G.); Bolis, RM (Bolis, R. M.); Benuzzi-Mounaix, A (Benuzzi-Mounaix, A.)

Title: Ab initio calculations of the B1-B2 phase transition in MgO

Source: PHYSICAL REVIEW B

Volume: 99

Issue: 9

Article Number: 094113

DOI: 10.1103/PhysRevB.99.094113

Document Type: Article

Published: MAR 29 2019

Abstract: We present an ab initio study of MgO at high temperature and pressure, around the phase transition between the B1 and B2 phases. By means of ab initio molecular dynamic calculations, the thermal evolution of vibrational properties and thermodynamic quantities is obtained. We carefully compare our results with previous theoretical works on the phase transition curve and we analyze the differences among them. We show that anharmonic effects have been underestimated in the quasiharmonic approximation and that their inclusion in the free energy strongly straightens up the transition curve. Then, we use our B1-B2 phase boundary and our calculated Hugoniot to analyze recent decaying shock experiments on MgO. We also provide important thermodynamic quantities as the Gruneisen parameter and sound velocities and we discussed their temperature dependence.

Accession Number: WOS:000462886400001

Record 8 of 50

By: Casner, A (Casner, A.); Mailliet, C (Mailliet, C.); Rigon, G (Rigon, G.); Khan, SF (Khan, S. F.); Martinez, D (Martinez, D.); Albertazzi, B (Albertazzi, B.); Michel, T (Michel, T.); Sano, T (Sano, T.); Sakawa, Y (Sakawa, Y.); Tzeferacos, P (Tzeferacos, P.); Lamb, D (Lamb, D.); Liberatore, S (Liberatore, S.); Izumi, N (Izumi, N.); Kalantar, D (Kalantar, D.); Di Nicola, P (Di Nicola, P.); Di Nicola, JM (Di Nicola, J. M.); Le Bel, E (Le Bel, E.); Igumenshchev, I (Igumenshchev, I.); Tikhonchuk, V (Tikhonchuk, V.); Remington, BA (Remington, B. A.); Ballet, J (Ballet, J.); Falize, E (Falize, E.); Masse, L (Masse, L.); Smalyuk, VA (Smalyuk, V. A.); Koenig, M (Koenig, M.)

Title: From ICF to laboratory astrophysics: ablative and classical Rayleigh-Taylor instability experiments in turbulent-like regimes

Source: NUCLEAR FUSION

Volume: 59

Issue: 3

Special Issue: SI

Article Number: 032002

DOI: 10.1088/1741-4326/aae598

Document Type: Article; Proceedings Paper

Published: MAR 2019

Abstract: Rayleigh-Taylor instability (RTI) occurs whenever fluids of different densities are accelerated against the density gradient, as is the case for the target ablator in ICF implosions. The advent of megajoule class lasers, like the National Ignition Facility (NIF) or Laser Megajoule, offers novel opportunities to study turbulent mixing flows in high energy density plasmas for fundamental hydrodynamics or laboratory astrophysics experiments. Here, we review different RTI experiments, performed either at the ablation front or at a classical embedded interface. A two-dimensional bubble-merger, bubble-competition regime was evidenced for the first time at the ablation front in indirect-drive on the NIF thanks to an unprecedented long x-ray drive. Similarly, a novel large-area, planar platform enables the capabilities to perform long duration direct drive hydrodynamics experiments on NIF. Starting from imprinted seeds, a three-dimensional bubble-merger regime was also observed in direct-drive, as larger bubbles

overtook and merged with smaller bubbles. In the astrophysical context, RTI also plays a role in supernova (SN) explosions, either of Type Ia or II. We report on experiments performed on the LULI2000 facility studying RTI in scaled laboratory conditions relevant for the physics of young SN remnants. Using a light CH foam as a deceleration medium, we measured, for the first time, the RTI mixing zone by PW transverse radiography.

Conference Title: 10th International Conference on Inertial Fusion Sciences and Applications

Conference Date: 2017

Conference Location: Saint Malo, FRANCE

Accession Number: WOS:000453823800002

Record 9 of 50

By: Casner, A (Casner, Alexis); Jacquemot, S (Jacquemot, Sylvie)

Title: Special issue: Inertial Fusion State of the Art-a collection of overview and technical papers from IFSA2017

Source: NUCLEAR FUSION

Volume: 59

Issue: 3

Special Issue: SI

Article Number: 030201

DOI: 10.1088/1741-4326/ab039e

Document Type: Editorial Material

Published: MAR 2019

Accession Number: WOS:000460810200001

Record 10 of 50

By: Chen, SN (Chen, S. N.); Negoita, F (Negoita, F.); Spohr, K (Spohr, K.); d'Humieres, E (d'Humieres, E.); Pomerantz, I (Pomerantz, I); Fuchs, J (Fuchs, J.)

Title: Extreme brightness laser-based neutron pulses as a pathway for investigating nucleosynthesis in the laboratory

Source: MATTER AND RADIATION AT EXTREMES

Volume: 4

Issue: 5

Article Number: 054402

DOI: 10.1063/1.5081666

Document Type: Article

Published: SEP 2019

Abstract: With the much-anticipated multi-petawatt (PW) laser facilities that are coming online, neutron sources with extreme fluxes could soon be in reach. Such sources would rely on spallation by protons accelerated by the high-intensity lasers. These high neutron fluxes would make possible not only direct measurements of neutron capture and beta-decay rates related to the r-process of nucleosynthesis of heavy elements, but also such nuclear measurements in a hot plasma environment, which would be beneficial for s-process investigations in astrophysically relevant conditions. This could, in turn, finally allow possible reconciliation of the observed element abundances in stars and those derived from simulations, which at present show large discrepancies. Here, we review a possible pathway to reach unprecedented neutron fluxes using multi-PW lasers, as well as strategies to perform measurements to investigate the r- and s- processes of nucleosynthesis of heavy elements in cold matter, as well as in a hot plasma environment. (C) 2019 Author(s).

Accession Number: WOS:000483877600008

Record 11 of 50

By: Condamine, FP (Condamine, F. P.); Filippov, E (Filippov, E.); Angelo, P (Angelo, P.); Pikuz, SA (Pikuz, S. A.); Renner, O (Renner, O.); Rosmej, FB (Rosmej, F. B.)

Title: High-resolution spectroscopic study of hot electron induced copper M-shell charge states emission from laser

produced plasmas

Source: HIGH ENERGY DENSITY PHYSICS

Volume: 32

Pages: 89-95

DOI: 10.1016/j.hedp.2019.06.004

Document Type: Article

Published: JUL 2019

Abstract: Theoretically predicted red shifts of the Cu Ka emission from partly populated M-shell ionic states have been studied in experiments performed at the LULI2000 kJ-ns laser facility. The X-ray spectra were recorded by using three spherically bent crystal spectrometers providing a very high spatial (delta(x) approximate to 7 mu m) and spectral (lambda/Delta lambda approximate to 3100) resolution. The spatially resolved profiles of K alpha lines are characterized by red shifts due to a strong overlap of X-ray lines emitted from low charge states at the initial phase of the laser-matter interaction.
Detailed theoretical interpretation of the spectra based on multi-configuration Hartree-Fock simulations provided the population factors of each charge state of 3 s and 3p subshells. The advanced diagnostic presented here provides a vehicle for studying the hot and/or dense plasmas in transient environments and gives important information about hot electrons induced X-ray line emission.

Accession Number: WOS:000484661300013

Record 12 of 50

By: Danson, CN (Danson, Colin N.); Haefner, C (Haefner, Constantin); Bromage, J (Bromage, Jake); Butcher, T (Butcher, Thomas); Chanteloup, JCF (Chanteloup, Jean-Christophe F.); Chowdhury, EA (Chowdhury, Enam A.); Galvanauskas, A (Galvanauskas, Almantas); Gizzi, LA (Gizzi, Leonida A.); Hein, J (Hein, Joachim); Hillier, DI (Hillier, David, I); Hopps, NW (Hopps, Nicholas W.); Kato, Y (Kato, Yoshiaki); Khazanov, EA (Khazanov, Em A.); Kodama, R (Kodama, Ryosuke); Korn, G (Korn, Georg); Li, RX (Li, Ruxin); Li, YT (Li, Yutong); Limpert, J (Limpert, Jens); Ma, JG (Ma, Jingui); Nam, CH (Nam, Chang Hee); Neely, D (Neely, David); Papadopoulos, D (Papadopoulos, Dimitrios); Penman, RR (Penman, Rory R.); Qian, LJ (Qian, Liejia); Rocca, JJ (Rocca, Jorge J.); Shaykin, AA (Shaykin, Andrey A.); Siders, CW (Siders, Craig W.); Spindloe, C (Spindloe, Christopher); Szatmari, S (Szatmari, Sandor); Trines, RMGM (Trines, Raoul M. G. M.); Zhu, JQ (Zhu, Jianqiang); Zhu, P (Zhu, Ping); Zuegel, JD (Zuegel, Jonathan D.)

Title: Petawatt and exawatt class lasers worldwide

Source: HIGH POWER LASER SCIENCE AND ENGINEERING

Volume: 7

Article Number: e54

DOI: 10.1017/hpl.2019.36

Document Type: Article

Published: AUG 22 2019

Abstract: In the 2015 review paper 'Petawatt Class Lasers Worldwide' a comprehensive overview of the current status of high-power facilities of >200 TW was presented. This was largely based on facility specifications, with some description of their uses, for instance in fundamental ultra-high-intensity interactions, secondary source generation, and inertial confinement fusion (ICF). With the 2018 Nobel Prize in Physics being awarded to Professors Donna Strickland and Gerard Mourou for the development of the technique of chirped pulse amplification (CPA), which made these lasers possible, we celebrate by providing a comprehensive update of the current status of ultra-high-power lasers and demonstrate how the technology has developed. We are now in the era of multi-petawatt facilities coming online, with 100 PW lasers being proposed and even under construction. In addition to this there is a pull towards development of industrial and multi-disciplinary applications, which demands much higher repetition rates, delivering high-average powers with higher efficiencies and the use of alternative wavelengths: mid-IR facilities. So apart from a comprehensive update of the current global status, we want to look at what technologies are to be deployed to get to these new regimes, and some of the critical issues facing their development.

Accession Number: WOS:000482415200001

Record 13 of 50

By: David, SP (David, Samuel Paul); Jambunathan, V (Jambunathan, Venkatesan); Yue, FX (Yue, Fangxin); Le Garrec, BJ (Le Garrec, Bruno Jean); Lucianetti, A (Lucianetti, Antonio); Mocek, T (Mocek, Tomas)

Title: Laser performances of diode pumped Yb:Lu2O3 transparent ceramic at cryogenic temperatures

Source: OPTICAL MATERIALS EXPRESS

Volume: 9

Issue: 12

Pages: 4669-4676

DOI: 10.1364/OME.9.004669

Document Type: Article

Published: DEC 1 2019

Abstract: Continuous wave (CW) laser performances of 1 at.% Yb:Lu2O3 sesquioxide ceramic medium were studied under various cryogenic temperatures. Two different fiber coupled diode pump sources, one emitting around 975.7 nm volume Bragg grating (VBG) stabilized and another around 940 nm were used for comparison. Under the pump at 975.7 nm and 100 K cryogenic temperature, the laser yielded CW output power of 11.24 W for 20.3 W incident pump power, corresponding to an overall optical-to optical efficiency of 55%; the slope efficiency was 59%. For operation at room temperature, the output power was limited to 4.44 W whereas the slope efficiency was 27.5%. Optimum operation under 940 nm pump was obtained at 80 K. Under 940 nm pumping, Yb:Lu2O3 medium generated a CW output power of 3 W for 20 W; the slope efficiency was around 17%. The passive Q-switch operation was investigated with Cr4+:YAG saturable absorber (SA) crystal, employing the pump at 975.7 nm. Laser pulses with an energy of 0.35 mJ and a pulse duration of 116 ns at 26.1 kHz repetition rate were recorded with a Cr4+:YAG SA having 85% initial transmission. (C) 2019 Optical Society of America under the terms of the OSA Open Access Publishing Agreement

Accession Number: WOS:000499348700018

Record 14 of 50

By: Dong, ZC (Dong, Zhencai); Xu, C (Xu, Chao); Wu, YM (Wu, Yongmin); Tang, WP (Tang, Weiping); Song, SF (Song, Shufeng); Yao, JY (Yao, Jianyao); Huang, ZY (Huang, Zhengyong); Wen, ZY (Wen, Zhaoyin); Lu, L (Lu, Li); Hu, N (Hu, Ning)

Title: Dual Substitution and Spark Plasma Sintering to Improve Ionic Conductivity of Garnet Li7La3Zr2O12

Source: NANOMATERIALS

Volume: 9

Issue: 5

Article Number: 721

DOI: 10.3390/nano9050721

Document Type: Article

Published: MAY 2019

Abstract: Garnet Li7La3Zr2O12 is one of the most promising solid electrolytes used for solid-state lithium batteries. However, low ionic conductivity impedes its application. Herein, we report Ta-doping garnets with compositions of Li7-xLa3Zr2-xTaxO12 (0.1 <= x <= 0.75) obtained by solid-state reaction and free sintering, which was facilitated by graphene oxide (GO). Furthermore, to optimize Li6.6La3Zr1.6Ta0.4O12, Mg2+ was select as a second dopant. The dual substitution of Ta5+ for Zr4+ and Mg2+ for Li+ with a composition of Li6.5Mg0.05La3Zr1.6Ta0.4O12 showed an enhanced total ionic conductivity of 6.1 x 10(-4) S cm(-1) at room temperature. Additionally, spark plasma sintering (SPS) was applied to further densify the garnets and enhance their ionic conductivities. Both SPS specimens present higher conductivities than those produced by the conventional free sintering. At room temperature, the highest ionic conductivity of Li6.5Mg0.05La3Zr1.6Ta0.4O12 sintered at 1000 degrees C is 8.8 x 10(-4) S cm(-1), and that of Li6.6La3Zr1.6Ta0.4O12 sintered at 1050 degrees C is 1.18 x 10(-3) S cm(-1).

Accession Number: WOS:000479007900063

PubMed ID: 31083313

Record 15 of 50

By: Doudet, I (Doudet, Ivan); Wattellier, B (Wattellier, Benoit); Meignien, L (Meignien, Loic)

Book Group Author(s): IEEE

Title: High vacuum compatible wave front sensor focal spot diagnostics and optimization

Source: 2019 CONFERENCE ON LASERS AND ELECTRO-OPTICS EUROPE & EUROPEAN QUANTUM ELECTRONICS CONFERENCE (CLEO/EUROPE-EQEC)

Document Type: Proceedings Paper

Published: 2019

Conference Title: Conference on Lasers and Electro-Optics Europe / European Quantum Electronics Conference (CLEO/Europe-EQEC)

Conference Date: JUN 23-27, 2019

Conference Location: Munich, GERMANY

Sponsor(s): European Phys Soc, Quantum Elect & Opt Div; IEEE Photon Soc; Opt Soc; World Photon Congress; EPS Young Minds

Accession Number: WOS:000630002701075

Record 16 of 50

By: Dozieres, M (Dozieres, M.); Thais, F (Thais, F.); Bastiani-Ceccotti, S (Bastiani-Ceccotti, S.); Blenski, T (Blenski, T.); Comet, M (Comet, M.); Condamine, F (Condamine, F.); Fariaut, J (Fariaut, J.); Gilleron, F (Gilleron, F.); Gilles, D (Gilles, D.); Pain, JC (Pain, J. C.); Poirier, M (Poirier, M.); Reverdin, C (Reverdin, C.); Rosmej, F (Rosmej, F.); Silvert, V (Silvert, V); Soullie, G (Soullie, G.); Villette, B (Villette, B.)

Title: Simultaneous X-ray and XUV absorption measurements in nickel laser-produced plasma close to LTE

Source: HIGH ENERGY DENSITY PHYSICS

Volume: 31

Pages: 83-91

DOI: 10.1016/j.hedp.2019.03.007

Document Type: Article

Published: APR 2019

Abstract: We present an experiment performed in 2016 at the LULI2000 laser facility in which X-ray and XUV absorption structures of nickel hot plasmas were measured simultaneously. Such experiments may provide stringent tests of the accuracy of plasma atomic-physics codes used to the modeling of plasmas close to local thermodynamic equilibrium. The experimental set-up relies on a symmetric heating of the sample foil by two gold hohlraums in order to reduce the spatial gradients. The plasma conditions are characterized by temperatures between 10 and 20 eV and densities of the order of 10(-3) g/cm(3)-10(-2)g/cm(3). For the X-ray part, we investigate the 2p-3d and 2p-4d transitions, and for the XUV part, we recorded the Delta n = 0 (n = 3) transitions, which present a high sensitivity to plasma temperature. These latter transitions are of particular interest because, in mid-Z plasmas, they dominate the Planck and Rosseland mean opacities. Measured spectra are compared to calculations performed using the hybrid opacity code SCO-RCG and the Flexible Atomic Code (FAC). The influence of a spectator electron on the calculated spectra is analyzed using the latter code.

Accession Number: WOS:000465111800015

Record 17 of 50

By: Filippov, ED (Filippov, E. D.); Skobelev, IY (Skobelev, I. Yu); Revet, G (Revet, G.); Chen, SN (Chen, S. N.); Khiar, B (Khiar, B.); Ciardi, A (Ciardi, A.); Khaghani, D (Khaghani, D.); Higginson, DP (Higginson, D. P.); Pikuz, SA (Pikuz, S. A.); Fuchs, J (Fuchs, J.)

Title: X-ray spectroscopy evidence for plasma shell formation in experiments modeling accretion columns in young stars

Source: MATTER AND RADIATION AT EXTREMES

Volume: 4

Issue: 6

Special Issue: SI

Article Number: 064402

DOI: 10.1063/1.5124350

Document Type: Article

Published: NOV 2019

Abstract: Recent achievements in laboratory astrophysics experiments with high-power lasers have allowed progress in our understanding of the early stages of star formation. In particular, we have recently demonstrated the possibility of simulating in the laboratory the process of the accretion of matter on young stars [G. Revet et al., Sci. Adv. 3, e1700982 (2017)]. The present paper focuses on x-ray spectroscopy methods that allow us to investigate the complex plasma hydrodynamics involved in such experiments. We demonstrate that we can infer the formation of a plasma shell, surrounding the accretion column at the location of impact with the stellar surface, and thus resolve the present discrepancies between mass accretion rates derived from x-ray and optical-radiation astronomical observations originating from the same object. In our experiments, the accretion column is modeled by having a collimated narrow (1 mm diameter) plasma stream first propagate along the lines of a large-scale external magnetic field and then impact onto an obstacle, mimicking the high-density region of the stellar chromosphere. A combined approach using steady-state and quasi-stationary models was successfully applied to measure the parameters of the plasma all along its propagation, at the impact site, and in the structure surrounding the impact region. The formation of a hot plasma shell, surrounding the denser and colder core, formed by the incoming stream of matter is observed near the obstacle using x-ray spatially resolved spectroscopy. (C) 2019Author(s).

Accession Number: WOS:000512299700005

Record 18 of 50

By: Guarguaglini, M (Guarguaglini, M.); Hernandez, JA (Hernandez, J-A); Okuchi, T (Okuchi, T.); Barroso, P (Barroso, P.); Benuzzi-Mounaix, A (Benuzzi-Mounaix, A.); Bethkenhagen, M (Bethkenhagen, M.); Bolis, R (Bolis, R.); Brambrink, E (Brambrink, E.); French, M (French, M.); Fujimoto, Y (Fujimoto, Y.); Kodama, R (Kodama, R.); Koenig, M (Koenig, M.); Lefevre, F (Lefevre, F.); Miyanishi, K (Miyanishi, K.); Ozaki, N (Ozaki, N.); Redmer, R (Redmer, R.); Sano, T (Sano, T.); Umeda, Y (Umeda, Y.); Vinci, T (Vinci, T.); Ravasio, A (Ravasio, A.)

Title: Laser-driven shock compression of "synthetic planetary mixtures" of water, ethanol, and ammonia

Source: SCIENTIFIC REPORTS

Volume: 9

Article Number: 10155

DOI: 10.1038/s41598-019-46561-6

Document Type: Article

Published: JUL 12 2019

Abstract: Water, methane, and ammonia are commonly considered to be the key components of the interiors of Uranus and Neptune. Modelling the planets' internal structure, evolution, and dynamo heavily relies on the properties of the complex mixtures with uncertain exact composition in their deep interiors. Therefore, characterising icy mixtures with varying composition at planetary conditions of several hundred gigapascal and a few thousand Kelvin is crucial to improve our understanding of the ice giants. In this work, pure water, a water-ethanol mixture, and a water-ethanol-ammonia "synthetic planetary mixture" (SPM) have been compressed through laser-driven decaying shocks along their principal Hugoniot curves up to 270, 280, and 260 GPa, respectively. Measured temperatures spanned from 4000 to 25000 K, just above the coldest predicted adiabatic Uranus and Neptune profiles (3000-4000 K) but more similar to those predicted by more recent models including a thermal boundary layer (7000-14000 K). The experiments were performed at the GEKKO XII and LULI2000 laser facilities using standard optical diagnostics (Doppler velocimetry and optical pyrometry) to measure the thermodynamic state and the shock-front reflectivity at two different wavelengths. The results show that water and the mixtures undergo a similar compression path under single shock loading in agreement with Density Functional Theory Molecular Dynamics (DFT-MD) calculations using the Linear Mixing Approximation (LMA). On the contrary, their shock-front reflectivities behave differently by what concerns both the onset pressures and the saturation values, with possible impact on planetary dynamos.

Accession Number: WOS:000475293800001

PubMed ID: 31300690

Record 19 of 50

By: Guarguaglini, M (Guarguaglini, M.); Hernandez, JA (Hernandez, J. -A.); Benuzzi-Mounaix, A (Benuzzi-

Mounaix, A.); Bolis, R (Bolis, R.); Brambrink, E (Brambrink, E.); Vinci, T (Vinci, T.); Ravasio, A (Ravasio, A.)

Title: Characterizing equation of state and optical properties of dynamically pre-compressed materials

Source: PHYSICS OF PLASMAS

Volume: 26

Issue: 4

Article Number: 42704

DOI: 10.1063/1.5060732

Document Type: Article

Published: APR 2019

Abstract: Characterizing materials at pressures of several megabars and temperatures of a few thousand Kelvin is critical for the understanding of the Warm Dense Matter regime and to improve planetary models as these conditions are typical of planets' interiors. The laser-driven shock compression technique is capable of simultaneously achieving conditions of several megabars and several thousand Kelvin, but the explored states are too hot to be representative of planetary interiors. Double-shock compression provides an alternative to probe lower temperatures. Here, we present a method to create well-controlled double-shocked states and measure their thermodynamic state and optical reflectivity using standard optical diagnostics (Doppler velocimetry and optical pyrometry) in a laser-driven shock experiment. This method, which does not require the support of hydrodynamical simulations, is based on the application of generalized Rankine-Hugoniot relations together with a self-impedance mismatch technique. A validation experiment has been performed at the LULI2000 facility (Ecole Polytechnique, France) on a water sample. A temperature 63% lower than along the principal Hugoniot has been obtained at 1.9 Mbar. Published under license by AIP Publishing.

Accession Number: WOS:000466708400048

Record 20 of 50

By: Hantonl, F (Hantonl, F.); Chaudhary, P (Chaudhary, P.); Doria, D (Doria, D.); Gwynne, D (Gwynne, D.); Maiorino, C (Maiorino, C.); Scullion, C (Scullion, C.); Ahmed, H (Ahmed, H.); Marshall, T (Marshall, T.); Naughton, K (Naughton, K.); Romagnani, L (Romagnani, L.); Kar, S (Kar, S.); Schettino, G (Schettino, G.); McKenna, P (McKenna, P.); Botchway, S (Botchway, S.); Symes, DR (Symes, D. R.); Rajeev, PP (Rajeev, P. P.); Prise, KM (Prise, K. M.); Borghesi, M (Borghesi, M.)

Title: DNA DSB Repair Dynamics following Irradiation with Laser-Driven Protons at Ultra-High Dose Rates

Source: SCIENTIFIC REPORTS

Volume: 9

Article Number: 4471

DOI: 10.1038/s41598-019-40339-6

Document Type: Article

Published: MAR 14 2019

Abstract: Protontherapy has emerged as more effective in the treatment of certain tumors than photon based therapies. However, significant capital and operational costs make protontherapy less accessible. This has stimulated interest in alternative proton delivery approaches, and in this context the use of laser-based technologies for the generation of ultra-high dose rate ion beams has been proposed as a prospective route. A better understanding of the radiobiological effects at ultra-high dose-rates is important for any future clinical adoption of this technology. In this study, we irradiated human skin fibroblasts-AG01522B cells with laser-accelerated protons at a dose rate of 10(9)Gy/s, generated using the Gemini laser system at the Rutherford Appleton Laboratory, UK. We studied DNA double strand break (DSB) repair kinetics using the p53 binding protein-1(53BP1) foci formation assay and observed a close similarity in the 53BP1 foci repair kinetics in the cells irradiated with 225 kVp X-rays and ultra- high dose rate protons for the initial time points. At the microdosimetric scale, foci per cell per track values showed a good correlation between the laser and cyclotron-accelerated protons indicating similarity in the DNA DSB induction and repair, independent of the time duration over which the dose was delivered.

Accession Number: WOS:000461151800055

PubMed ID: 30872656

Record 21 of 50

By: Hartley, NJ (Hartley, N. J.); Brown, S (Brown, S.); Cowan, TE (Cowan, T. E.); Cunningham, E (Cunningham, E.); Doppner, T (Doppner, T.); Falcone, RW (Falcone, R. W.); Fletcher, LB (Fletcher, L. B.); Frydrych, S (Frydrych, S.); Galtier, E (Galtier, E.); Gamboa, EJ (Gamboa, E. J.); Garcia, AL (Garcia, A. Laso); Gericke, DO (Gericke, D. O.); Glenzer, SH (Glenzer, S. H.); Granados, E (Granados, E.); Heimann, PA (Heimann, P. A.); Lee, HJ (Lee, H. J.); MacDonald, MJ (MacDonald, M. J.); MacKinnon, AJ (MacKinnon, A. J.); McBride, EE (McBride, E. E.); Nam, I (Nam, I.); Neumayer, P (Neumayer, P.); Pak, A (Pak, A.); Pelka, A (Pelka, A.); Prencipe, I (Prencipe, I.); Ravasio, A (Ravasio, A.); Rodel, M (Roedel, M.); Rohatsch, K (Rohatsch, K.); Saunders, AM (Saunders, A. M.); Scholmerich, M (Schoelmerich, M.); Schorner, M (Schoerner, M.); Schuster, AK (Schuster, A. K.); Sun, P (Sun, P.); van Driel, T (van Driel, T.); Vorberger, J (Vorberger, J.); Kraus, D (Kraus, D.)

Title: Evidence for Crystalline Structure in Dynamically-Compressed Polyethylene up to 200 GPa

Source: SCIENTIFIC REPORTS

Volume: 9

Article Number: 4196

DOI: 10.1038/s41598-019-40782-5

Document Type: Article

Published: MAR 12 2019

Abstract: We investigated the high-pressure behavior of polyethylene (CH2) by probing dynamically-compressed samples with X-ray diffraction. At pressures up to 200 GPa, comparable to those present inside icy giant planets (Uranus, Neptune), shock-compressed polyethylene retains a polymer crystal structure, from which we infer the presence of significant covalent bonding. The A2/m structure which we observe has previously been seen at significantly lower pressures, and the equation of state measured agrees with our findings. This result appears to contrast with recent data from shock-compressed polystyrene (CH) at higher temperatures, which demonstrated demixing and recrystallization into a diamond lattice, implying the breaking of the original chemical bonds. As such chemical processes have significant implications for the structure and energy transfer within ice giants, our results highlight the need for a deeper understanding of the chemistry of high pressure hydrocarbons, and the importance of better constraining planetary temperature profiles.

Accession Number: WOS:000460922200032

PubMed ID: 30862904

Record 22 of 50

By: Henares, JL (Henares, J. L.); Puyuelo-Valdes, P (Puyuelo-Valdes, P.); Hannachi, F (Hannachi, F.); Ceccotti, T (Ceccotti, T.); Ehret, M (Ehret, M.); Gobet, F (Gobet, F.); Lancia, L (Lancia, L.); Marques, JR (Marques, J. -R.); Santos, JJ (Santos, J. J.); Versteegen, M (Versteegen, M.); Tarisien, M (Tarisien, M.)

Title: Development of gas jet targets for laser-plasma experiments at near-critical density

Source: REVIEW OF SCIENTIFIC INSTRUMENTS

Volume: 90

Issue: 6

Article Number: 063302

DOI: 10.1063/1.5093613

Document Type: Article

Published: JUN 2019

Abstract: Computational fluid dynamics simulations are performed to design gas nozzles, associated with a 1000 bars backing pressure system, capable of generating supersonic gas jet targets with densities close to the critical density for 1053 nm laser radiation (10(21) cm(-3)). Such targets should be suitable for laser-driven ion acceleration at a high repetition rate. The simulation results are compared to the density profiles measured by interferometry, and characterization of the gas jet dynamics is performed using strioscopy. Proton beams with maximum energies up to 2 MeV have been produced from diatomic hydrogen gas jet targets in a first experiment.

Accession Number: WOS:000474601100048

PubMed ID: 31254995

Record 23 of 50

By: Henri, P (Henri, P.); Sgattoni, A (Sgattoni, A.); Briand, C (Briand, C.); Amiranoff, F (Amiranoff, F.); Riconda,

C (Riconda, C.)

Title: Electromagnetic Simulations of Solar Radio Emissions

Source: JOURNAL OF GEOPHYSICAL RESEARCH-SPACE PHYSICS

Volume: 124

Issue: 3

Pages: 1475-1490

DOI: 10.1029/2018JA025707

Document Type: Article

Published: MAR 2019

Abstract: Solar radio emissions are electromagnetic waves emitted in the solar wind as a consequence of electron beams accelerated during solar flares or interplanetary shocks such as interplanetary coronal mass ejections. Different physical mechanisms have been suggested to describe their origin. A good understanding of the emission process would enable to infer the kinetic energy transferred from accelerated electrons to radio waves. Even if the electrostatic case has been extensively studied, full electromagnetic simulations were attempted only recently. In this work, we report large-scale 2D3V electromagnetic particle-in-cell simulations that enable to identify the generation of both electrostatic and electromagnetic waves originated by a succession of plasma instabilities. They confirm that an efficient mechanism to generate solar radio emissions close to T-2f, the harmonic of the plasma frequency, is a multistage model based on a succession of nonlinear three-wave interaction processes. Through a parametric study of the electron beam parameters, we show that (i) the global efficiency of the multistep conversion mechanism from the electron beam kinetic energy to the T-2f radio wave is independent of the beam parameters, approximately 10(-5) in all tested configurations, while (ii) the directivity of the electromagnetic radio wave strongly depends on the origin electron beam. Those results represent a step forward toward the use of solar wind radio emissions, observed remotely, as a diagnostic for the properties of the electron beam located at the source of the radio emission, and therefore to eventually better characterize remotely electron acceleration mechanisms in space regions not directly accessible to in situ measurements.

Accession Number: WOS:000466087900001

Record 24 of 50

By: Higginson, DP (Higginson, D. P.); Korneev, P (Korneev, Ph.); Ruyer, C (Ruyer, C.); Riquier, R (Riquier, R.); Moreno, Q (Moreno, Q.); Beard, J (Beard, J.); Chen, SN (Chen, S. N.); Grassi, A (Grassi, A.); Grech, M (Grech, M.); Gremillet, L (Gremillet, L.); Pepin, H (Pepin, H.); Perez, F (Perez, F.); Pikuz, S (Pikuz, S.); Pollock, B (Pollock, B.); Riconda, C (Riconda, C.); Shepherd, R (Shepherd, R.); Starodubtsev, M (Starodubtsev, M.); Tikhonchuk, V (Tikhonchuk, V.); Vinci, T (Vinci, T.); d'Humieres, E (d'Humieres, E.); Fuchs, J (Fuchs, J.)

Title: Laboratory investigation of particle acceleration and magnetic field compression in collisionless colliding fast plasma flows

Source: COMMUNICATIONS PHYSICS

Volume: 2

Article Number: 60

DOI: 10.1038/s42005-019-0160-6

Document Type: Article

Published: JUN 20 2019

Abstract: In many natural phenomena in space (cosmic-rays, fast winds), non-thermal ion populations are produced, with wave-particle interactions in self-induced electromagnetic turbulence being suspected to be mediators. However, the processes by which the electromagnetic energy is bestowed upon the particles is debated, and in some cases requires field compression. Here we show that laboratory experiments using high-power lasers and external strong magnetic field can be used to infer magnetic field compression in the interpenetration of two collisionless, high-velocity (0.01-0.1c) quasi-neutral plasma flows. This is evidenced through observed plasma stagnation at the flows collision point, which Particle-in-Cell (PIC) simulations suggest to be the signature of magnetic field compression into a thin layer, followed by its dislocation into magnetic vortices. Acceleration of protons from the plasma collision is observed as well. As a possible scenario, with 1D and 2D PIC simulations we consider a compression of the vortices against dense plasma remnants.

Accession Number: WOS:000472079600001

Record 25 of 50

By: Khiar, B (Khiar, B.); Revet, G (Revet, G.); Ciardi, A (Ciardi, A.); Burdonov, K (Burdonov, K.); Filippov, E (Filippov, E.); Beard, J (Beard, J.); Cerchez, M (Cerchez, M.); Chen, SN (Chen, S. N.); Gangolf, T (Gangolf, T.); Makarov, SS (Makarov, S. S.); Ouille, M (Ouille, M.); Safronova, M (Safronova, M.); Skobelev, IY (Skobelev, I. Yu.); Soloviev, A (Soloviev, A.); Starodubtsev, M (Starodubtsev, M.); Willi, O (Willi, O.); Pikuz, S (Pikuz, S.); Fuchs, J (Fuchs, J.)

Title: Laser-Produced Magnetic-Rayleigh-Taylor Unstable Plasma Slabs in a 20 T Magnetic Field

Source: PHYSICAL REVIEW LETTERS

Volume: 123

Issue: 20

Article Number: 205001

DOI: 10.1103/PhysRevLett.123.205001

Document Type: Article

Published: NOV 15 2019

Abstract: Magnetized laser-produced plasmas are central to many novel laboratory astrophysics and inertial confinement fusion studies, as well as in industrial applications. Here we provide the first complete description of the three-dimensional dynamics of a laser-driven plasma plume expanding in a 20 T transverse magnetic field. The plasma is collimated by the magnetic field into a slender, rapidly elongating slab, whose plasma-vacuum interface is unstable to the growth of the "classical," fluidlike magnetized Rayleigh-Taylor instability.

Accession Number: WOS:000496929700007

PubMed ID: 31809120

Record 26 of 50

By: Kraus, D (Kraus, D.); Bachmann, B (Bachmann, B.); Barbrel, B (Barbrel, B.); Falcone, RW (Falcone, R. W.); Fletcher, LB (Fletcher, L. B.); Frydrych, S (Frydrych, S.); Gamboa, EJ (Gamboa, E. J.); Gauthier, M (Gauthier, M.); Gericke, DO (Gericke, D. O.); Glenzer, SH (Glenzer, S. H.); Gode, S (Gode, S.); Granados, E (Granados, E.); Hartley, NJ (Hartley, N. J.); Helfrich, J (Helfrich, J.); Lee, HJ (Lee, H. J.); Nagler, B (Nagler, B.); Ravasio, A (Ravasio, A.); Schumaker, W (Schumaker, W.); Vorberger, J (Vorberger, J.); Doppner, T (Doppner, T.)

Title: Characterizing the ionization potential depression in dense carbon plasmas with high-precision spectrally resolved x-ray scattering

Source: PLASMA PHYSICS AND CONTROLLED FUSION

Volume: 61

Issue: 1

Article Number: 014015

DOI: 10.1088/1361-6587/aadd6c

Document Type: Article

Published: JAN 2019

Abstract: We discuss the possibility of obtaining highly precise measurements of the ionization potential depression in dense plasmas with spectrally resolved x-ray scattering, while simultaneously determining the electron temperature and the free electron density. A proof-of-principle experiment at the Linac Coherent Light Source, probing isochorically heated carbon samples, demonstrates the capabilities of this method and motivates future experiments at x-ray free electron laser facilities.

Accession Number: WOS:000450240400006

Record 27 of 50

By: Kumar, D (Kumar, Deepak); Smid, M (Smid, Michal); Singh, S (Singh, Sushil); Soloviev, A (Soloviev, Alexander); Bohlin, H (Bohlin, Hannes); Burdonov, K (Burdonov, Konstantin); Fente, G (Fente, Gashaw); Kotov, A (Kotov, Alexander); Lancia, L (Lancia, Livia); Ledl, V (Ledl, Vit); Makarov, S (Makarov, Sergey); Morrissey, M (Morrissey, Michael); Perevalov, S (Perevalov, Sergey); Romanovsky, D (Romanovsky, Denis); Pikuz, S (Pikuz, Sergey); Kodama, R (Kodama, Ryousuke); Neely, D (Neely, David); McKenna, P (McKenna, Paul); Lastovicka, T (Lastovicka, Tomas); Starodubtsev, M (Starodubtsev, Mikhail); Weber, S (Weber, Stefan); Nakatsutsumi, M

(Nakatsutsumi, Motoaki); Fuchs, J (Fuchs, Julien)

Title: Alignment of solid targets under extreme tight focus conditions generated by an ellipsoidal plasma mirror

Source: MATTER AND RADIATION AT EXTREMES

Volume: 4

Issue: 2

Article Number: 024402

DOI: 10.1063/1.5088166

Document Type: Article

Published: MAR 2019

Abstract: The design of ellipsoidal plasma mirrors (EPMs) for the PEARL laser facility is presented. The EPMs achieve a magnification of 0.32 in focal spot size, and the corresponding increase in focused intensity is expected to be about 8. Designing and implementing such focusing optics for short-pulse (<100 fs) systems paves the way for their use in future high-power facilities, where they can be used to achieve intensities beyond 10(23) W/cm(2). A retro-imaging-based target alignment system is also described, which is used to align solid targets at the output of the ellispoidal mirrors (with a numerical aperture of 0.75 in this case). (C) 2019 Author(s).

Accession Number: WOS:000461511900003

Record 28 of 50

By: La Fontaine, AC (La Fontaine, A. Compant); Courtois, C (Courtois, C.); Gobet, F (Gobet, F.); Hannachi, F (Hannachi, F.); Marques, JR (Marques, J. R.); Tarisien, M (Tarisien, M.); Versteegen, M (Versteegen, M.); Bonnet, T (Bonnet, T.)

Title: Bremsstrahlung spectrum and photon dose from short-pulse high-intensity laser interaction on various metal targets

Source: PHYSICS OF PLASMAS

Volume: 26

Issue: 11

Article Number: 113109

DOI: 10.1063/1.5118361

Document Type: Article

Published: NOV 2019

Abstract: During the interaction of an intense picosecond laser pulse with a plasma created by a plastic foil ablated by a nanosecond laser pulse, relativistic electrons are produced. A metal solid target placed behind the foil allows converting these high-energy electrons into hard X-rays. The use of an ablated CH foil allows maximizing the conversion efficiency and thus the X-ray emission. In this study, the photon energy spectrum and dose are measured for different thicknesses of various metal targets such as tantalum. Numerical simulations including hydrodynamical radiative, particle-in-cell, and Monte Carlo codes are made to give comparison with the experimental data. These are also compared with that of a bremsstrahlung emission and photon dose model in which the energy loss by Ohmic heating arising from the return current driven by the background electrons of the conductive target is taken into account [A. Compant La Fontaine, Phys. Plasmas 25, 043301 (2018)]. The results obtained allow for benchmarks to test the accuracy of this model and to check that the dose is maximized for high-Z solid targets and thickness in the mm range in the relativistic interaction regime at ultrahigh laser intensity (>10(18) W/cm(2)). Published under license by AIP Publishing.

Accession Number: WOS:000509383600008

Record 29 of 50

By: Larder, B (Larder, B.); Gericke, DO (Gericke, D. O.); Richardson, S (Richardson, S.); Mabey, P (Mabey, P.); White, TG (White, T. G.); Gregori, G (Gregori, G.)

Title: Fast nonadiabatic dynamics of many-body quantum systems

Source: SCIENCE ADVANCES

Volume: 5

Issue: 11

Article Number: eaaw1634

DOI: 10.1126/sciadv.aaw1634

Document Type: Article

Published: NOV 2019

Abstract: Modeling many-body quantum systems with strong interactions is one of the core challenges of modern physics. A range of methods has been developed to approach this task, each with its own idiosyncrasies, approximations, and realm of applicability. However, there remain many problems that are intractable for existing methods. In particular, many approaches face a huge computational barrier when modeling large numbers of coupled electrons and ions at finite temperature. Here, we address this shortfall with a new approach to modeling many-body quantum systems. On the basis of the Bohmian trajectory formalism, our new method treats the full particle dynamics with a considerable increase in computational speed. As a result, we are able to perform large-scale simulations of coupled electron-ion systems without using the adiabatic Born-Oppenheimer approximation.

Accession Number: WOS:000499736100012

PubMed ID: 31803829

Record 30 of 50

By: Li, CK (Li, C. K.); Tikhonchuk, VT (Tikhonchuk, V. T.); Moreno, Q (Moreno, Q.); Sio, H (Sio, H.); D'Humieres, E (D'Humieres, E.); Ribeyre, X (Ribeyre, X.); Korneev, P (Korneev, Ph); Atzeni, S (Atzeni, S.); Betti, R (Betti, R.); Birkel, A (Birkel, A.); Campbell, EM (Campbell, E. M.); Follett, RK (Follett, R. K.); Frenje, JA (Frenje, J. A.); Hu, SX (Hu, S. X.); Koenig, M (Koenig, M.); Sakawa, Y (Sakawa, Y.); Sangster, TC (Sangster, T. C.); Seguin, FH (Seguin, F. H.); Takabe, H (Takabe, H.); Zhang, S (Zhang, S.); Petrasso, RD (Petrasso, R. D.)

Title: Collisionless Shocks Driven by Supersonic Plasma Flows with Self-Generated Magnetic Fields

Source: PHYSICAL REVIEW LETTERS

Volume: 123

Issue: 5

Article Number: 055002

DOI: 10.1103/PhysRevLett.123.055002

Document Type: Article

Published: JUL 29 2019

Abstract: Collisionless shocks are ubiquitous in the Universe as a consequence of supersonic plasma flows sweeping through interstellar and intergalactic media. These shocks are the cause of many observed astrophysical phenomena, but details of shock structure and behavior remain controversial because of the lack of ways to study them experimentally. Laboratory experiments reported here, with astrophysically relevant plasma parameters, demonstrate for the first time the formation of a quasiperpendicular magnetized collisionless shock. In the upstream it is fringed by a filamented turbulent region, a rudiment for a secondary Weibel-driven shock. This turbulent structure is found responsible for electron acceleration to energies exceeding the average energy by two orders of magnitude.

Accession Number: WOS:000479002200005

PubMed ID: 31491329

Record 31 of 50

By: Li, X (Li, X.); Rosmej, FB (Rosmej, F. B.); Lisitsa, VS (Lisitsa, V. S.); Astapenko, VA (Astapenko, V. A.)

Title: An analytical plasma screening potential based on the self-consistent-field ion-sphere model

Source: PHYSICS OF PLASMAS

Volume: 26

Issue: 3

Article Number: 033301

DOI: 10.1063/1.5055689

Document Type: Article

Published: MAR 2019

Abstract: The radial dependence of the free electron density within the ion sphere radius in finite temperature dense plasmas shows characteristic scaling laws that permit us to derive analytical plasma screening potentials. A generalized analytical approach is developed which shows good agreement with self-consistent quantum mechanical calculations. It is empirically discovered that anomalous strong scaling in the analytical model provides agreement with data obtained in a regime where the lattice structure still prevails.

Accession Number: WOS:000462916300059

Record 32 of 50

By: Mabey, P (Mabey, P.); Albertazzi, B (Albertazzi, B.); Michel, T (Michel, Th.); Rigon, G (Rigon, G.); Makarov, S (Makarov, S.); Ozaki, N (Ozaki, N.); Matsuoka, T (Matsuoka, T.); Pikuz, S (Pikuz, S.); Pikuz, T (Pikuz, T.); Koenig, M (Koenig, M.)

Title: Characterization of high spatial resolution lithium fluoride X-ray detectors

Source: REVIEW OF SCIENTIFIC INSTRUMENTS

Volume: 90

Issue: 6

Article Number: 063702

DOI: 10.1063/1.5092265

Document Type: Article

Published: JUN 2019

Abstract: The response of lithium fluoride (LiF) crystal detectors to monochromatic X-rays is measured in the multi-kilo-electron-volt range. This response, as a function of the X-ray dose, is independent of photon energy with no saturation level found. The response, as a function of the incident energy flux, is found to increase for photons of lower energy due to the differing attenuation lengths of X-ray photons within the crystal. Small differences are seen between different confocal microscopes used to scan the data, suggesting the need for absolute calibration. The spatial resolution of the LiF is also measured (1.19-1.36 mu m) and is found to be independent of incident photon energy. Finally, a photometric study is performed in order to assess the feasibility of using these detectors at current X-ray free electron laser and laser facilities worldwide.

Accession Number: WOS:000474601100042

PubMed ID: 31255030

Record 33 of 50

By: Mabey, P (Mabey, P.); Albertazzi, B (Albertazzi, B.); Falize, E (Falize, E.); Michel, T (Michel, Th); Rigon, G (Rigon, G.); Som, LV (Som, L. Van Box); Polka, A (Polka, A.); Brack, FE (Brack, F-E); Kroll, F (Kroll, F.); Filippov, E (Filippov, E.); Gregori, G (Gregori, G.); Kuramitsu, Y (Kuramitsu, Y.); Lamb, DQ (Lamb, D. Q.); Li, C (Li, C.); Ozaki, N (Ozaki, N.); Pikuz, S (Pikuz, S.); Sakawau, Y (Sakawau, Y.); Tzeferacos, P (Tzeferacos, P.); Koenig, M (Koenig, M.)

Title: Laboratory study of stationary accretion shock relevant to astrophysical systems

Source: SCIENTIFIC REPORTS

Volume: 9

Article Number: 8157

DOI: 10.1038/s41598-019-44596-3

Document Type: Article

Published: MAY 31 2019

Abstract: Accretion processes play a crucial role in a wide variety of astrophysical systems. Of particular interest are magnetic cataclysmic variables, where, plasma flow is directed along the star's magnetic field lines onto its poles. A stationary shock is formed, several hundred kilometres above the stellar surface; a distance far too small to be resolved with today's telescopes. Here, we report the results of an analogous laboratory experiment which recreates this astrophysical system. The dynamics of the laboratory system are strongly influenced by the interplay of material, thermal, magnetic and radiative effects, allowing a steady shock to form at a constant distance from a stationary obstacle. Our results demonstrate that a significant amount of plasma is ejected in the lateral direction; a phenomenon that is under-estimated in typical magnetohydrodynamic simulations and often neglected in astrophysical models. This changes the properties of the post-shock region considerably and has important

implications for many astrophysical studies.

Accession Number: WOS:000469752800035

PubMed ID: 31148567

Record 34 of 50

By: Macchi, A (Macchi, Andrea); Grassi, A (Grassi, Anna); Amiranoff, F (Amiranoff, Francois); Riconda, C (Riconda, Caterina)

Title: Momentum absorption and magnetic field generation by obliquely incident light

Source: EUROPEAN PHYSICAL JOURNAL PLUS

Volume: 134

Issue: 9

Article Number: 420

DOI: 10.1140/epjp/i2019-12802-0

Document Type: Article

Published: SEP 2019

Abstract: The partial reflection of an electromagnetic (EM) wave from a medium leads to absorption of momentum in the direction perpendicular to the surface (the standard radiation pressure) and, for oblique incidence on a partially reflecting medium, also in the parallel direction. This latter component drives a transverse current and a slowly growing, quasi-static magnetic field in the evanescence "skin" layer. Through a simple model we illustrate how EM momentum is transfered to ions and estimate the value of the magnetic field which may be of the order of the driving EM wave field, i.e. up to several hundreds of megagauss for high-intensity laser-solid interactions.

Accession Number: WOS:000483741100004

Record 35 of 50

By: Malko, S (Malko, Sophia); Vaisseau, X (Vaisseau, Xavier); Perez, F (Perez, Frederic); Batani, D (Batani, Dimitri); Curcio, A (Curcio, Alessandro); Ehret, M (Ehret, Michael); Honrubia, J (Honrubia, Javier); Jakubowska, K (Jakubowska, Katarzyna); Morace, A (Morace, Alessio); Santos, JJ (Santos, Joao Jorge); Volpe, L (Volpe, Luca)

Title: Enhanced relativistic-electron beam collimation using two consecutive laser pulses

Source: SCIENTIFIC REPORTS

Volume: 9

Article Number: 14061

DOI: 10.1038/s41598-019-50401-y

Document Type: Article

Published: OCT 1 2019

Abstract: The double laser pulse approach to relativistic electron beam (REB) collimation in solid targets has been investigated at the LULI-ELFIE facility. In this scheme two collinear laser pulses are focused onto a solid target with a given intensity ratio and time delay to generate REBs. The magnetic field generated by the first laser-driven REB is used to guide the REB generated by a second delayed laser pulse. We show how electron beam collimation can be controlled by properly adjusting the ratio of focus size and the delay time between the two pulses. We found that the maximum of electron beam collimation is clearly dependent on the laser focal spot size ratio and related to the magnetic field dynamics. Cu-K-alpha and CTR imaging diagnostics were implemented to evaluate the collimation effects on the respectively low energy (<= 100 keV) and high energy (>= MeV) components of the REB.

Accession Number: WOS:000488478700041

PubMed ID: 31575932

Record 36 of 50

By: Moreira, JCM (Mansur Moreira, Jose Cristiano)

Title: Raimundo Lulio and the medieval inter-religious dialogue (13th century)

Source: REVISTA CHILENA DE ESTUDIOS MEDIEVALES

Issue: 16

Pages: 52-58

Document Type: Article

Published: JUL-DEC 2019

Abstract: This proposal aims to demonstrate how Lulio establishes a dialogue between different forms of creed, based on reason and freeing himself from any argument based on religious authorities, their revelations or traditions. In this sense, the purpose of the proposal is to clarify how Lulio in the thirteenth century inaugurates the dialogue between different forms of creed: Judaism, Islam and Christianity, being considered the pioneer of ecumenism. Specifically in his book "Gentile and the Three Sages", the Illuminated Doctor considers only the necessary and universal reasons in order to establish a conclusion accepted by the various religions, and thus seeks a way that can safely lead to the knowledge of God that Transcends any human interpretations driven by culture, tradition or even religious sentiment. It is understood that his thinking is built on an exclusively rational system in the search for Truth on the following questions: what is the meaning and purpose of human existence, if the human being has an essence of his own, which is the origin and end of man, What is Good and Evil, how to direct human action and its relation to the Transcendent. From the pillars of the philosophical contribution of Raimundo Lulio, it will be shown that interreligious dialogue is only possible when each involved party places their faith "in parentheses". In this dialogue, the arguments should not be based on fideism or religious authority, but should be exclusively rational in nature.

Accession Number: WOS:000510503100007

Record 37 of 50

By: Marques, JR (Marques, J-R); Lancia, L (Lancia, L.); Gangolf, T (Gangolf, T.); Blecher, M (Blecher, M.); Bolanos, S (Bolanos, S.); Fuchs, J (Fuchs, J.); Willi, O (Willi, O.); Amiranoff, F (Amiranoff, F.); Berger, RL (Berger, R. L.); Chiaramello, M (Chiaramello, M.); Weber, S (Weber, S.); Riconda, C (Riconda, C.)

Title: Joule-Level High-Efficiency Energy Transfer to Subpicosecond Laser Pulses by a Plasma-Based Amplifier

Source: PHYSICAL REVIEW X

Volume: 9

Issue: 2

Article Number: 021008

DOI: 10.1103/PhysRevX.9.021008

Document Type: Article

Published: APR 12 2019

Abstract: Power amplification and pulse compression of short-pulse laser beams by three-wave nonlinear processes in a plasma was proposed by Malkin, Shvets, and Fisch [Phys. Rev. Lett. 82, 4448 (1999)] as a potential path to exceed the limits of the highly successful technique of chirped pulse amplification [D. Strickland and G. Mourou, Opt. Commun. 56, 219 (1985)] developed three decades ago. The parametric processes considered, Raman and Brillouin scattering, are notoriously difficult to control and to predict theoretically because of the dependence on plasma properties and other nonlinear processes. Previous experiments of backward Raman and Brillouin amplifiers have fallen far short of the predictions of simulations and theory and achieved only a very small energy transfer. In this paper, laser-plasma amplification of subpicosecond pulses above the Joule level is demonstrated with a large energy transfer and a very high efficiency, up to 20%, a major milestone for this scheme to become a solution for the next generation of ultrahigh-intensity lasers. In addition, three-dimensional simulations of the amplification process quantitatively match the experimental results and demonstrate the ability of predictive simulations for the optimization of experiments. The global behavior of the amplification process is reproduced, including the evolution of the spatial profile of the amplified seed, the pulse length of the amplified seed, and the influence of parasitic spontaneous Raman and Brillouin scattering.

Accession Number: WOS:000464752600001

Record 38 of 50

By: Massimo, F (Massimo, F.); Beck, A (Beck, A.); Derouillat, J (Derouillat, J.); Grech, M (Grech, M.); Lobet, M (Lobet, M.); Perez, F (Perez, F.); Zemzemi, I (Zemzemi, I); Specka, A (Specka, A.)

Title: Efficient start-to-end 3D envelope modeling for two-stage laser wakefield acceleration experiments

Source: PLASMA PHYSICS AND CONTROLLED FUSION

Volume: 61

Issue: 12

Article Number: 124001

DOI: 10.1088/1361-6587/ab49cf

Document Type: Article

Published: DEC 2019

Abstract: Three dimensional particle in cell simulations of laser wakefield acceleration require a considerable amount of resources but are necessary to have realistic predictions and to design future experiments. The planned experiments for the Apollon laser also include two stages of plasma acceleration, for a total plasma length of the order of tens of millimeters or centimeters. In this context, where traditional 3D numerical simulations would be computationally very expensive, we present the results of the application of a recently proposed envelope method, to describe the laser pulse and its interaction with the plasma without the need to resolve its high frequency oscillations. The implementation of this model in the code Smilei is described, as well as the results of benchmark simulations against standard laser simulations and applications for the design of two stage Apollon experiments.

Accession Number: WOS:000492971600001

Record 39 of 50

By: Mazzotta, Z (Mazzotta, Zeudi); Ranc, L (Ranc, Lucas); Lebas, N (Lebas, Nathalie); Le Blanc, C (Le Blanc, Catherine); Zou, JP (Zou, Ji Ping); Martin, L (Martin, Luc); Mathieu, F (Mathieu, Francois); Druon, F (Druon, Frederic); Papadopoulos, D (Papadopoulos, Dimitris)

Book Group Author(s): IEEE

Title: Thermally induced spatiotemporal aberrations in high average power ultrashort compressors

Source: 2019 CONFERENCE ON LASERS AND ELECTRO-OPTICS (CLEO)

Book Series Title: Conference on Lasers and Electro-Optics

Document Type: Proceedings Paper

Published: 2019

Abstract: We study the heating effects of the gratings of an ultrashort pulse compressor using a kW laser diode as thermal source. Based on wavelength-dependent wavefront measurements we evaluate the spatiotemporal impact on the compressed pulses. (C) 2019 The Author(s)

Conference Title: Conference on Lasers and Electro-Optics (CLEO)

Conference Date: MAY 05-10, 2019

Conference Location: San Jose, CA

Sponsor(s): IEEE; AdValue Photon; Amer Elements; Class5 Photon; Coherent; GoFoton; Light Convers; LightTrans; MKS; OZ Opt Online; Santec; ThorLabs; UQDevices; YSL Photon

Accession Number: WOS:000482226300173

Record 40 of 50

By: McIlvenny, A (McIlvenny, A.); Doria, D (Doria, D.); Romagnani, L (Romagnani, L.); Ahmed, H (Ahmed, H.); Martin, P (Martin, P.); WIlliamson, SDR (WIlliamson, S. D. R.); Ditter, EJ (Ditter, E. J.); Ettlinger, O (Ettlinger, O.); Hicks, GS (Hicks, G. S.); McKenna, P (McKenna, P.); Najmudin, Z (Najmudin, Z.); Neely, D (Neely, D.); Kar, S (Kar, S.); Borghesi, M (Borghesi, M.)

Title: Absolute calibration of microchannel plate detector for carbon ions up to 250 MeV

Source: JOURNAL OF INSTRUMENTATION

Volume: 14

Article Number: C04002

DOI: 10.1088/1748-0221/14/04/C04002

Document Type: Article; Proceedings Paper

Published: APR 2019

Abstract: A 375TW 40fs pulse was used at the ASTRA GEMINI facility located at the Rutherford Appleton

Laboratory U.K. for investigating novel ion acceleration regimes employing ultrathin foil targets. An online detection system consisting of a Thomson Parabola Spectrometer (TPS) Microchannel Plate (MCP) was used to determine maximum energies and spectra per species. The response of the MCP was calibrated for absolute particle (carbon) number per steradian using CR-39 up to 21 MeV/nucleon. This calibration provides a useful reference for a widely used diagnostic arrangement.

Conference Title: 5th International Conference on Frontiers in Diagnostics Technologies

Conference Date: OCT 03-05, 2018

Conference Location: Rome, ITALY

Sponsor(s): INFN Frascati

Accession Number: WOS:000463841000001

Record 41 of 50

By: Milluzzo, G (Milluzzo, G.); Scuderi, V (Scuderi, V.); Alejo, A (Alejo, A.); Amico, AG (Amico, A. G.); Booth, N (Booth, N.); Borghesi, M (Borghesi, M.); Cirrone, GAP (Cirrone, G. A. P.); Cuttone, G (Cuttone, G.); Doria, D (Doria, D.); Green, J (Green, J.); Kar, S (Kar, S.); Korn, G (Korn, G.); Larosa, G (Larosa, G.); Leanza, R (Leanza, R.); Margarone, D (Margarone, D.); Martin, P (Martin, P.); McKenna, P (McKenna, P.); Petringa, G (Petringa, G.); Pipek, J (Pipek, J.); Romagnani, L (Romagnani, L.); Romano, F (Romano, F.); Russo, A (Russo, A.); Schillaci, F (Schillaci, F.)

Title: A new energy spectrum reconstruction method for time-of-flight diagnostics of high-energy laser-driven protons

Source: REVIEW OF SCIENTIFIC INSTRUMENTS

Volume: 90

Issue: 8

Article Number: 083303

DOI: 10.1063/1.5082746

Document Type: Article

Published: AUG 2019

Abstract: The Time-of-Flight (TOF) technique coupled with semiconductorlike detectors, as silicon carbide and diamond, is one of the most promising diagnostic methods for high-energy, high repetition rate, laser-accelerated ions allowing a full on-line beam spectral characterization. A new analysis method for reconstructing the energy spectrum of high-energy laser-driven ion beams from TOF signals is hereby presented and discussed. The proposed method takes into account the detector's working principle, through the accurate calculation of the energy loss in the detector active layer, using Monte Carlo simulations. The analysis method was validated against well-established diagnostics, such as the Thomson parabola spectrometer, during an experimental campaign carried out at the Rutherford Appleton Laboratory (UK) with the high-energy laser-driven protons accelerated by the VULCAN Petawatt laser. Published under license by AIP Publishing.

Accession Number: WOS:000483885600005

PubMed ID: 31472608

Record 42 of 50

By: Nghiem, PAP (Nghiem, P. A. P.); Alesini, D (Alesini, D.); Aschikhin, A (Aschikhin, A.); Assmann, RW (Assmann, R. W.); Audet, T (Audet, T.); Beck, A (Beck, A.); Chance, A (Chance, A.); Chen, M (Chen, M.); Chiadroni, E (Chiadroni, E.); Cianchi, A (Cianchi, A.); Clarke, JA (Clarke, J. A.); Couprie, ME (Couprie, M. E.); Croia, M (Croia, M.); Cros, B (Cros, B.); Dattoli, G (Dattoli, G.); Del Dotto, A (Del Dotto, A.); Delerue, N (Delerue, N.); Dorda, U (Dorda, U.); Pousa, AF (Pousa, A. Ferran); Ferrario, M (Ferrario, M.); Fonseca, RA (Fonseca, R. A.); Ghaith, A (Ghaith, A.); Giribono, A (Giribono, A.); Gizzi, LA (Gizzi, L. A.); Helm, A (Helm, A.); Hidding, B (Hidding, B.); Hooker, SM (Hooker, S. M.); Ibison, MG (Ibison, M. G.); Jaroszynski, DA (Jaroszynski, D. A.); Kruchinin, KO (Kruchinin, K. O.); Labate, L (Labate, L.); Lee, P (Lee, P.); Li, X (Li, X.); Li, FY (Li, F. Y.); Libov, V (Libov, V.); Marchetti, B (Marchetti, B.); de la Ossa, AM (de la Ossa, A. Martinez); Marx, D (Marx, D.); Massimo, F (Massimo, F.); Mathieu, F (Mathieu, F.); Maynard, G (Maynard, G.); Mazzotta, Z (Mazzotta, Z.); Mehrling, TJ (Mehrling, T. J.); Molodozhentsev, AY (Molodozhentsev, A. Y.); Mosnier, A (Mosnier, A.); Mostacci, A (Mostacci, A.); Najmudin, Z (Najmudin, Z.); Nguyen, F (Nguyen, F.); Niknejadi, P (Niknejadi, P.); Espinos, DO (Espinos, D. Oumbarek); Pattathil, R (Pattathil, R.); Pompili, R (Pompili, R.); Romeo,

S (Romeo, S.); Rossi, AR (Rossi, A. R.); Schaper, L (Schaper, L.); Sheng, ZM (Sheng, Z. M.); Shpakov, V (Shpakov, V.); Silva, LO (Silva, L. O.); Silva, T (Silva, T.); Simon, C (Simon, C.); Specka, A (Specka, A.); Stella, A (Stella, A.); Streeter, MJV (Streeter, M. J. V.); Svystun, EN (Svystun, E. N.); Symes, D (Symes, D.); Terzani, D (Terzani, D.); Toci, G (Toci, G.); Tomassini, P (Tomassini, P.); Vaccarezza, C (Vaccarezza, C.); Vieira, JM (Vieira, J. M.); Vujanovic, M (Vujanovic, M.); Walczak, R (Walczak, R.); Walker, PA (Walker, P. A.); Weikum, MK (Weikum, M. K.); Welsch, CP (Welsch, C. P.); Weng, SM (Weng, S. M.); Wiggins, SM (Wiggins, S. M.); Wolfenden, J (Wolfenden, J.); Yoffe, S (Yoffe, S.); Zhu, J (Zhu, J.)

Book Group Author(s): IOP

Title: EuPRAXIA, A STEP TOWARD A PLASMA-WAKEFIELD BASED ACCELERATOR WITH HIGH BEAM QUALITY

Source: 10TH INTERNATIONAL PARTICLE ACCELERATOR CONFERENCE

Book Series Title: Journal of Physics Conference Series

Volume: 1350

Article Number: 012068

DOI: 10.1088/1742-6596/1350/1/012068

Document Type: Proceedings Paper

Published: 2019

Abstract: The EuPRAXIA project aims at designing the world's first accelerator based on advanced plasma-wakefield techniques to deliver 5 GeV electron beams that simultaneously have high charge, low emittance and low energy spread, which are required for applications by future user communities. Meeting this challenging objective will only be possible through dedicated effort. Many injection/acceleration schemes and techniques have been explored by means of thorough simulations in more than ten European research institutes. This enables selection of the most appropriate methods for solving each particular problem. The specific challenge of generating, extracting and transporting high charge beams, while maintaining the high quality needed for user applications, are being tackled using innovative approaches. This article highlights preliminary results obtained by the EuPRAXIA collaboration, which also exhibit the required laser and plasma parameters.

Conference Title: 10th International Particle Accelerator Conference (IPAC)

Conference Date: MAY 19-24, 2019

Conference Location: Melbourne, AUSTRALIA

Accession Number: WOS:000526100000067

Record 43 of 50

By: Oks, E (Oks, E.); Dalimier, E (Dalimier, E.); Angelo, P (Angelo, P.)

Title: Effects of ultraintense magnetic fields due to relativistic laser-plasma interactions on Langmuir-wave-caused dips in x-ray spectral line profiles

Source: SPECTROCHIMICA ACTA PART B-ATOMIC SPECTROSCOPY

Volume: 157

Pages: 1-5

DOI: 10.1016/j.sab.2019.05.004

Document Type: Article

Published: JUL 2019

Abstract: GigaGauss (GG) or even multi-GG magnetic fields are expected to develop during relativistic laser-plasma interactions. In our previous paper we proposed a method for measuring GG magnetic fields based on the phenomenon of Langmuir-wave-cased dips (L-dips) in x-ray line profiles. The L-dips were observed in several experimental spectroscopic studies of relativistic laser-plasma interactions. Ultra-strong magnetic fields affect the separation of the L-dips from one another, so that this separation can be used to measure such fields. In the present paper we provide some new results concerning the effect of the ultra-strong magnetic fields on the separation between the L-dips. But the primary focus of the present paper is at another effect of the GG magnetic fields on the L-dips: we study how these ultra-intense magnetic fields affect the halfwidth of the L-dips. One of the results turns out to be counterintuitive: for the case of the two-quantum resonance, the halfwidth of the L-dips is a non-monotonic function of the magnetic field. By advancing the results of the previous work, the present paper expands the possibilities for measuring super-strong magnetic fields up to similar to 10 GG expected to arise during

relativistic laser-plasma interactions.

Accession Number: WOS:000472222500002

Record 44 of 50

By: Papadopoulos, DN (Papadopoulos, D. N.); Zou, JP (Zou, J. P.); Le Blanc, C (Le Blanc, C.); Ranc, L (Ranc, L.); Druon, F (Druon, F.); Martin, L (Martin, L.); Freneaux, A (Freneaux, A.); Beluze, A (Beluze, A.); Lebas, N (Lebas, N.); Chabanis, M (Chabanis, M.); Bonnin, C (Bonnin, C.); Accary, JB (Accary, J. B.); Garrec, BL (Garrec, B. L.); Mathieu, F (Mathieu, F.); Audebert, P (Audebert, P.)

Book Group Author(s): IEEE

Title: First commissioning results of the Apollon laser on the 1 PW beam line

Source: 2019 CONFERENCE ON LASERS AND ELECTRO-OPTICS (CLEO)

Book Series Title: Conference on Lasers and Electro-Optics

Document Type: Proceedings Paper

Published: 2019

Abstract: The Apollon 10 PW laser has recently demonstrated its capacity of generating > 1 PW pulses with < 22 fs duration. The complete commissioning results of the 1 PW beam line will be presented in this work. (c) 2019 The Author(s)

Conference Title: Conference on Lasers and Electro-Optics (CLEO)

Conference Date: MAY 05-10, 2019

Conference Location: San Jose, CA

Sponsor(s): IEEE; AdValue Photon; Amer Elements; Class5 Photon; Coherent; GoFoton; Light Convers; LightTrans; MKS; OZ Opt Online; Santec; ThorLabs; UQDevices; YSL Photon

Accession Number: WOS:000482226302016

Record 45 of 50

By: Pasley, J (Pasley, John); Andrianaki, G (Andrianaki, Georgia); Baroutsos, A (Baroutsos, Andreas); Batani, D (Batani, Dimitri); Benis, EP (Benis, Emmanouil P.); Borghesi, M (Borghesi, Marco); Clark, E (Clark, Eugene); Cook, D (Cook, Donna); D'Humieres, E (D'Humieres, Emmanuel); Dimitriou, V (Dimitriou, Vasilios); Dromey, B (Dromey, Brendan); Ehret, M (Ehret, Michael); Fitilis, I (Fitilis, Ioannis); Grigoriadis, A (Grigoriadis, Anastasios); Kar, S (Kar, Satya); Kaselouris, E (Kaselouris, Evaggelos); Klimo, O (Klimo, Ondrej); Koenig, M (Koenig, Michel); Kosma, K (Kosma, Kyriaki); Koundourakis, G (Koundourakis, George); Kucharik, M (Kucharik, Milan); Lavery, A (Lavery, Aveen); Limpouch, J (Limpouch, Jiri); Orphanos, Y (Orphanos, Yannis); Papadogiannis, NA (Papadogiannis, Nektarios A.); Petrakis, S (Petrakis, Stelios); Riley, D (Riley, Dave); Rivetta, MS (Rivetta, Maria Serena); Pascual, LT (Pascual, Laura Tejada); Santos, JJ (Santos, Joao Jorge); Skoulakis, A (Skoulakis, Alexandros); Tazes, I (Tazes, Ioannis); Tikhonchuk, V (Tikhonchuk, Vladimir); Trela, J (Trela, Jocelain); Tsitou, C (Tsitou, Calliope); Volpe, L (Volpe, Luca); White, S (White, Steven); Yeung, M (Yeung, Mark); Tatarakis, M (Tatarakis, Michael)

Title: Innovative Education and Training in high power laser plasmas (PowerLaPs) for plasma physics, high power laser-matter interactions and high energy density physics - theory and experiments

Source: HIGH POWER LASER SCIENCE AND ENGINEERING

Volume: 7

Article Number: e23

DOI: 10.1017/hpl.2019.7

Document Type: Editorial Material

Published: APR 25 2019

Abstract: The Erasmus Plus programme 'Innovative Education and Training in high power laser plasmas', otherwise known as PowerLaPs, is described. The PowerLaPs programme employs an innovative paradigm in that it is a multi-centre programme where teaching takes place in five separate institutes with a range of different aims and styles of delivery. The 'in class' time is limited to four weeks a year, and the programme spans two years. PowerLaPs aims to train students from across Europe in theoretical, applied and laboratory skills relevant to the pursuit of research in laser-plasma interaction physics and inertial confinement fusion (ICF). Lectures are intermingled with laboratory sessions and continuous assessment activities. The programme, which is led by

workers from the Technological Educational Institute (TEI) of Crete, and supported by co-workers from the Queen's University Belfast, the University of Bordeaux, the Czech Technical University in Prague, Ecole Polytechnique, the University of Ioannina, the University of Salamanca and the University of York, has just completed its first year. Thus far three Learning Teaching Training (LTT) activities have been held, at the Queen's University Belfast, the University of Bordeaux and the Centre for Plasma Physics and Lasers (CPPL) of TEI Crete. The last of these was a two-week long Intensive Programme (IP), while the activities at the other two universities were each five days in length. Thus far work has concentrated upon training in both theoretical and experimental work in plasma physics, high power laser-matter interactions and high energy density physics. The nature of the programme will be described in detail and some metrics relating to the activities carried out to date will be presented.

Accession Number: WOS:000465532100001

Record 46 of 50

By: Peng, H (Peng, H.); Riconda, C (Riconda, C.); Grech, M (Grech, M.); Su, JQ (Su, J-Q); Weber, S (Weber, S.)

Title: Nonlinear dynamics of laser-generated ion-plasma gratings: A unified description

Source: PHYSICAL REVIEW E

Volume: 100

Issue: 6

Article Number: 061201

DOI: 10.1103/PhysRevE.100.061201

Document Type: Article

Published: DEC 24 2019

Abstract: Laser-generated plasma gratings are dynamic optical elements for the manipulation of coherent light at high intensities, beyond the damage threshold of solid-state-based materials. Their formation, evolution, and final collapse require a detailed understanding. In this paper, we present a model to explain the nonlinear dynamics of high-amplitude plasma gratings in the spatially periodic ponderomotive potential generated by two identical counterpropagating lasers. Both fluid and kinetic aspects of the grating dynamics are analyzed. It is shown that the adiabatic electron compression plays a crucial role as the electron pressure may reflect the ions from the grating and induce the grating to break in an X-type manner. A single parameter is found to determine the behavior of the grating and distinguish three fundamentally different regimes for the ion dynamics: completely reflecting, partially reflecting or passing, and crossing. Criteria for saturation and lifetime of the grating as well as the effect of finite ion temperature are presented.

Accession Number: WOS:000504639100002

PubMed ID: 31962450

Record 47 of 50

By: Peng, H (Peng, H.); Marques, JR (Marques, J-R); Lancia, L (Lancia, L.); Amiranoff, F (Amiranoff, F.); Berger, RL (Berger, R. L.); Weber, S (Weber, S.); Riconda, C (Riconda, C.)

Title: Plasma optics in the context of high intensity lasers

Source: MATTER AND RADIATION AT EXTREMES

Volume: 4

Issue: 6

Special Issue: SI

Article Number: 065401

DOI: 10.1063/1.5091550

Document Type: Article

Published: NOV 2019

Abstract: The use of plasmas provides a way to overcome the low damage threshold of classical solid-state based optical materials, which is the main limitation encountered in producing and manipulating intense and energetic laser pulses. Plasmas can directly amplify or alter the characteristics of ultra-short laser pulses via the three-wave coupling equations for parametric processes. The strong-coupling regime of Brillouin scattering (sc-SBS) is of

particular interest: recent progress in this domain is presented here. This includes the role of the global phase in the spatio-temporal evolution of the three-wave coupled equations for backscattering that allows a description of the coupling dynamics and the various stages of amplification from the initial growth to the so-called self-similar regime. The understanding of the phase evolution allows control of the directionality of the energy transfer via the phase relation between the pulses. A scheme that exploits this coupling in order to use the plasma as a wave plate is also suggested. (C) 2019 Author(s).

Accession Number: WOS:000512299700007

Record 48 of 50

By: Perez, F (Perez, F.); Grech, M (Grech, M.)

Title: Oblique-incidence, arbitrary-profile wave injection for electromagnetic simulations

Source: PHYSICAL REVIEW E

Volume: 99

Issue: 3

Article Number: 033307

DOI: 10.1103/PhysRevE.99.033307

Document Type: Article

Published: MAR 29 2019

Abstract: In an electromagnetic code, a wave can be injected in the simulation domain by prescribing an oscillating field profile at the domain boundary. The process is straightforward when the field profile has a known analytical expression (typically, paraxial Gaussian beams). However, if the field profile is known at some other plane, but not at the boundary (typically, nonparaxial beams), some preprocessing is needed to calculate the field profile after propagation back to the boundary. We present a parallel numerical technique for this propagation between an arbitrary tilted plane and a given boundary of the simulation domain, implemented in the Maxwell-Vlasov particle-in-cell code SMILEL.

Accession Number: WOS:000462926100015

PubMed ID: 30999544

Record 49 of 50

By: Peter, E (Peter, E.); Pakter, R (Pakter, R.); Rizzato, FB (Rizzato, F. B.); Marini, S (Marini, S.)

Title: Thermal effects in a triplet and beam interaction in a plasma

Source: PHYSICS OF PLASMAS

Volume: 26

Issue: 11

Article Number: 113101

DOI: 10.1063/1.5125272

Document Type: Article

Published: NOV 2019

Abstract: The dynamics of three interacting waves fulfilling the frequency and wavenumber matching conditions can be dramatically modified if a charged particle beam is added to the system. Energy is exchanged not only among the waves but also between the particles of the beam and the waves. In the present work, a model that includes these interactions is revisited, allowing a more realistic case where the beam has an initial velocity distribution. This study aims to present the role of this thermal effect over the system at the beginning of the dynamics and after the breakdown of the laminar regime of the particle beam. Published under license by AIP Publishing.

Accession Number: WOS:000507884800001

Record 50 of 50

By: Poirier, M (Poirier, M.); Bastiani-Ceccotti, S (Bastiani-Ceccotti, S.); Blenski, T (Blenski, T.); Comet, M (Comet, M.); Esnault, C (Esnault, C.); Gilleron, F (Gilleron, F.); Gilles, D (Gilles, D.); Pain, JC (Pain, J-C); Reverdin, C (Reverdin, C.); Thais, F (Thais, F.)

Title: Extreme-UV absorption processes in a laser-produced mid-Z plasma: Measurements and theoretical interpretation

Source: HIGH ENERGY DENSITY PHYSICS

Volume: 33

Article Number: 100706

DOI: 10.1016/j.hedp.2019.100706

Document Type: Article

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Abstract: A good knowledge of absorption properties of plasmas at temperature of few tens of eV is essential in several domains such as astrophysics and inertial fusion science. For instance the description of stellar envelopes or the analysis of beta-Cephei pulsation requires an accurate determination of the Rosseland absorption coefficient, which strongly depends on the radiative properties of plasmas in the extreme-UV (XUV) range. Contrary to measurements in X-ray range, the literature on the absorption properties of plasmas of mid-Z elements in XUV domain is less abundant. Furthermore the theoretical interpretation of such spectra represents a theoretical challenge since this energy range involves transition arrays from n equal 3 to 3 with an approximately half-open 3d subshell and possibly other open spectator subshells which contain a huge number of lines. The aim of this paper is to describe an experiment recently performed on the LULI 2000 laser facility mostly devoted to measurements of the absorption in the 60 - 180 eV spectral region in a copper plasma at a temperature of 10 to 30 eV and a density of few mg/cm(3). The experimental scheme is based on an indirect heating of multilayer thin foils by two gold cavities irradiated by two nanosecond doubled-frequency beams with an energy of several hundreds of J. This scheme allows one to obtain moderate temperature- and density-gradients and ensures conditions close to local thermodynamic equilibrium. The self-emission of cavities in XUV range is tentatively eliminated by the use of a time-dependent detection. A preliminary interpretation of these measurements is proposed. This analysis relies on three different codes: the hybrid code SCO-RCG, the Flexible Atomic Code in detailed or configuration-average mode, and the HULLAC code in level or configuration mode. A partial agreement is obtained between theory and experiment, though the account for temperature gradients is probably necessary to accurately describe the present measurements.

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