

# LASER AND PARTICLE BEAMS

Pulse Power, High Energy Densities, Hot Dense Matter, and Warm Dense Matter

---

**VOLUME 28, 2010**

**AUTHOR INDEX  
AND VOLUME 28 CONTENTS**

**CAMBRIDGE  
UNIVERSITY PRESS**

# Laser and Particle Beams

## Pulse Power, High Energy Densities, Hot Dense Matter, and Warm Dense Matter

### Editor in Chief:

DIETER H.H. HOFFMANN  
 Technical University Darmstadt  
 Nuclear Physics Institute  
 Radiation and Nuclear Physics Department  
 Schlossgartenstrasse 9  
 64289 Darmstadt, Germany

### Emeritus Editor in Chiefs:

HEINRICH HORA  
 University of New South Wales  
 Kensington 2033 NSW, Australia

G.H. MILEY

University of Illinois  
 Urbana, IL 61801, USA

### Associate Editors:

CLAUDE DEUTSCH  
 Laboratoire de Physique de Gaz et Plasmas  
 Université de Paris XI  
 Orsay 91405, Cedex France

B.G. LOGAN

Virtual National Laboratory for Heavy Ion Fusion  
 Lawrence Berkeley National Laboratory  
 Berkeley, CA 94720

BORIS YU. SHARKOV

Institute for Theoretical and Experimental Physics  
 117259 Moscow, Russia

### Editorial Board

M.M. Basko (Institute for Theoretical and Experimental Physics)  
 D. Batani (University of Milano Bicocca)  
 A. Caruso (ENEA Frascati)  
 M. Decroisette (Centre d'Etudes de Limeil-Valenton)  
 T. Desai (University of Milano, Bicocca)  
 S. Eliezer (SOREQ)  
 J. Honrubia (Universidad Politecnica)  
 K. Horioka (Tokyo Institute of Technology)  
 M. Kalal (Czech Technical University)  
 M.H. Key (Lawrence Livermore National Laboratory)  
 Hong Jin Kong (KAIST)  
 M. Kristiansen (Texas Technological University)  
 Y. Maron (Weizmann Institute of Science)  
 R.L. McCrory (University of Rochester)  
 G.A. Mesyats (Institute for Electrophysics)  
 S. Nakai (Osaka University)  
 A. Ng (Teikyo University of Technology)  
 A.A. Offenberger (University of Alberta)  
 A.R. Piriz (Universidad de Castilla-La Mancha)  
 M. Roth (Technical University)  
 D.D. Ryutov (Lawrence Livermore National Laboratory)  
 A.S. Shikanov (P.N. Lebedev Physical Institute)  
 N.A. Tahir (GSI)  
 V.F. Tarasenko (High Current Electronics Institute)  
 A.V. Zrodnikov (Institute of Physics and Power Engineering)

*Laser and Particle Beams* is an international journal that covers the generation, and the interaction with matter, of high intensity laser and particle beams. It also covers the physics of systems with high energy densities. Specific fields of interest include nuclear fusion, especially inertial confinement, magnetic confinement, diagnostics, material treatment, laboratory astrophysics, plasmas and spectroscopy at extreme conditions, physical properties of hot dense matter, warm dense matter, and intense particle beams and optical (laser) beams from the microwave to the X-ray region. The exploration of these fields and their new physics, including nonlinear and nonclassical phenomena, should find a forum in this journal.

As well as publishing original articles, the journal also publishes occasional review articles, surveys of research at particular laboratories, and reviews of recent books.

*Laser and Particle Beams* is indexed in Chemical Abstracts, Computerized Engineering Index, Current Contents, Engineering Index Monthly, Inspec, Mechanical Engineering Abstracts, Referativnyi Zhurnal, Science Citation Index, SCOPUS, Index of Scientific Reviews.

© Cambridge University Press, 2010. All rights reserved. No part of this publication may be reproduced, in any form or by any means, electronic, photocopy, or otherwise, without permission in writing from Cambridge University Press. For further information see <http://us.cambridge.org/information/rights/> or <http://www.cambridge.org/uk/information/rights/>

**Copying:** This journal is registered with the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923. Organizations in the USA who are also registered with C.C.C. may therefore copy material (beyond the limits permitted by sections 107 and 108 of US copyright law) subject to payment to C.C.C. of the per copy fee of US \$20.00. This consent does not extend to multiple copying for promotional or commercial purposes. Code 5/0263-0346/10 \$20.00.

ISI Tear Sheet Service, 3501 Market Street, Philadelphia, PA 19104, USA, is authorized to supply single copies of separate articles for private use only.

**Subscriptions:** *Laser and Particle Beams* (ISSN 0263-0346) is published in March, June, September, and December by Cambridge University Press, 32 Avenue of the Americas, New York, NY 10013-2473/Cambridge University Press, The Edinburgh Building, Shaftesbury Road, Cambridge CB2 8RU, UK. 2011 Annual rates for institutions print and electronic: US \$1386.00 in the USA, Canada, and Mexico; UK £729.00 + VAT elsewhere. Institutions electronic only: US \$1130.00 in the USA, Canada, and Mexico; UK £595.00 + VAT elsewhere. Institutions print only: US \$1252.00 in the USA, Canada, and Mexico; UK £651.00 + VAT elsewhere. Individuals print plus electronic: US \$233.00 in the USA, Canada, and Mexico; UK £129.00 + VAT elsewhere. Individuals print only: US \$217.00 in the USA, Canada, and Mexico; UK £123.00 + VAT elsewhere.

Orders, which must be accompanied by payment, may be sent to a bookseller, subscription agent, or direct to the publishers: Cambridge University Press, Journals Department, 32 Avenue of the Americas, New York, NY 10013-2473, USA; orders outside the US, Canada, or Mexico may be sent to Cambridge University Press, The Edinburgh Building, Shaftesbury Road, Cambridge CB2 8RU, England. Claims for missing issues should be made immediately after receipt of the next issue.

POSTMASTER: Send address changes in the US, Canada, and Mexico to *Laser and Particle Beams*, Cambridge University Press, 100 Brook Hill Drive, West Nyack, NY 10994-2133.

Periodicals Postage paid at New York, NY, and at additional mailing offices.

## LASER AND PARTICLE BEAMS

### Author Index of Volume 28, 2010

*(Book Review authors are listed in italic; Issue number is in parentheses.)*

- Abdul-Hadi, J., (1) 69  
Acef, Ouali, (2) 253  
Afeyan, Bedros, (1) 129  
Agranat, M.V., (3) 393  
Ahaio, Zongqing, (4) 585  
Ahmed, H., (3) 451  
Andersson, Patrik U., (2) 313  
Ashitkov, S.Yu., (3) 393  
Audit, Edouard, (2) 253  
Azizi, N., (1) 3
- Badiei, Shahriar, (2) 313  
Badziak, J., (3) 497  
Badziak, J., (4) 575  
Ban, H.Y., (1) 83  
Barcikowski, S., (1) 45  
Bari, M.A., (2) 333  
Barriga-Carrasco, Manuel D., (2) 307  
Barroso, Patrice, (2) 253  
Batani, Dimitri, (2) 235  
Bauduin, Daniel, (2) 253  
Bieniosek, F.M., (1) 209  
Bigongiari, A., (3) 451  
Bom, Elouga, L.B., (1) 69  
Borghesi, M., (2) 277, (3) 451  
Borisenko, N.G., (3) 371  
Borodziuk, S., (3) 497  
Bret, Antoine, (3) 491  
Brown, C.D., (2) 277
- Cai, Hongbo, (4) 585  
Cai, Xinjing, (3) 443  
Cai, H.B., (2) 293, (4) 563  
Cai, Y., (1) 27  
Calamy, H., (3) 361  
Cao, Leifeng, (4) 585  
Cao, Lihua, (2) 293  
Cao, L.H., (4) 563  
Cecchetti, C.A., (2) 277  
Champion, Norbert, (2) 253  
Chang, C., (1) 185  
Chauhan, P., (4) 531  
Che, H.O., (1) 83  
Chefonov, O.V., (3) 393  
Chen, C.H., (1) 185, (3) 505  
Chen, M., (4) 563  
Chew, L.Y., (4) 563  
Chichkov, B.N., (1) 45  
Chodukowski, T., (3) 497
- Chuvatin, A.S., (3) 361  
Colombier, Jean Philippe, (2) 253
- D'Humieres, Galloudec E., (3) 513  
Dieckmann, M., (2) 277  
Ding, Yongkun, (4) 585  
Dongare, M.B., (2) 343  
Doria, D., (3) 451  
Dostal, Jan, (2) 253  
Dromey, B., (3) 451  
Du, Wenhe, (1) 91  
Dubroca, B., (1) 165  
Duclous, R., (1) 165  
Dzelzainis, T., (3) 451
- Faenov, A.Ya., (3) 393  
Fang, Ranran, (1) 157  
Fang, J.Y., (1) 185  
Feng, Tinggui, (1) 75  
Fischer, B., (1) 109  
Frolov, O., (1) 61  
Fronya, A.A., (3) 371  
Fu, Li-Bin, (2) 351  
Fuchs, J., (4) 575
- Ganeev, R.A., (1) 69  
Gao, Yihua, (1) 157  
Gao, W., (1) 179  
Garg, Vijay, (2) 327  
Gasilov, S.V., (3) 393  
Geloni, G.A., (4) 553  
George, Sony, (3) 387  
Ghoranneviss, M., (1) 3  
Gill, T.S., (1) 11, (4) 521  
Gilson, E.P., (4) 571  
Gondal, M.A., (2) 333  
González, Matthias, (2) 253  
Grisham, L.R., (4) 571  
Gross, S., (1) 109  
Gu, Peijun, (3) 421  
Gu, Yu-Qiu, (2) 351  
Gu, Yuqiu, (4) 585  
Gu, Y.J., (1) 83  
Gu, Y.Q., (2) 319  
Guan, Zhicheng, (3) 443
- Hüller, S., (3) 463  
Hörlein, R., (1) 215  
Habs, D., (1) 215
- Hasi, W.L.J., (1) 179  
He, Xian-Tu, (2) 351, (3) 421  
He, Xiantu, (1) 75  
He, W.M., (1) 179, 223  
He, X.T., (1) 3, (2) 293, (4) 563  
Hegelich, M., (1) 215  
Henestroza, E., (1) 209  
Henig, A., (1) 215  
Ho, Y.K., (1) 21, 83  
Hoarty, D., (2) 277  
Hobbs, P., (2) 277  
Hoffmann, D.H.H., (1) 1  
Holmlid, Leif, (2) 313  
Hong, Wei, (4) 585  
Hora, Heinrich, (2) 225  
Hora, H., (1) 3, 101  
Hu, Guang-Yue, (3) 399  
Hu, Y.M., (3) 505  
Huang, H.J., (1) 185  
Huo, Wenyi, (3) 421  
Huo, S.F., (3) 505
- Jabłoński, S., (4) 575  
Jakubczak, Krzysztof, (2) 253  
James, S., (2) 277  
Jha, Pallavi, (2) 245  
Ji, A., (4) 531  
Jiang, Weihua, (3) 443  
Jiang, Yijun, (1) 91  
Joshi, H.C., (1) 121  
Jung, D., (1) 215  
Jung, R., (2) 277
- Kaganovich, I., (4) 571  
Kamp, L.P.J., (4) 553  
Kar, S., (3) 451  
Kasperczuk, A., (3) 497  
Kaur, R., (1) 11, (4) 521  
Kawata, S., (1) 83, (2) 319  
Khare, Alike, (1) 149  
Kiefer, D., (1) 215  
Kim, A.A., (3) 361  
Kofler, H., (1) 109  
Kokshenev, V.A., (3) 361  
Kolacek, K., (1) 61  
Komarov, P.S., (3) 393  
Kong, Q., (1) 21, 83  
Kouhi, M., (1) 3  
Kourakis, I., (2) 277, (3) 479

- Kovalchuk, B.M., (3) 361  
 Kowarsch, Nicolas, (1) 195  
 Kozlova, Michaela, (2) 253  
 Krishnan, M., (3) 361  
 Krousky, E., (3) 497  
 Kumar, Ajai, (1) 121, (3) 387  
 Kumar, Asheel, (3) 409  
 Kvalchuk, B.M., (4) 547  
 Kwan, J.W., (4) 571
- Lai, Dongxian, (1) 75, (3) 421  
 Lan, Ke, (1) 75, (3) 421  
 Lanz, Thierry, (2) 253  
 Lassalle, F., (3) 361  
 Lebius, H., (2) 229  
 Lei, An-Le, (3) 399  
 Lei, A.L., (2) 293  
 Lei, M.K., (3) 429  
 Lewis, C.L.S., (3) 451  
 Li, Guolin, (1) 35  
 Li, Ru-Xin, (3) 399  
 Li, Xin, (1) 75, (3) 421  
 Li, Zhihua, (1) 157  
 Li, J.W., (1) 185  
 Li, R.-X., (1) 27  
 Li, X.Z., (3) 505  
 Li, Y.T., (2) 333  
 Liang, T.Z., (1) 185  
 Liu, Bin, (2) 351  
 Liu, Jie, (2) 351  
 Liu, Jing, (1) 35  
 Liu, Lie, (3) 377  
 Liu, Ming-Ping, (2) 351  
 Liu, G.Z., (1) 185, (3) 505  
 Liu, J.-S., (1) 27  
 Liu, L., (1) 27  
 Lockyear, J., (2) 277  
 Lourenco, Stefanie, (1) 195  
 Lu, Z.W., (1) 179, (1) 223  
 Luiten, O.J., (4) 553
- Ma, Jing, (1) 91  
 Ma, Y.Y., (2) 319  
 Mahajan, R., (1) 11, (4) 521  
 Makita, M., (3) 451  
 Malekynia, B., (1) 3  
 Malviya, Amita, (2) 245  
 Mangio, A., (4) 575  
 Mao, Q.Q., (1) 83  
 Marlow, D., (3) 451  
 Masek, K., (3) 497  
 Mazhukin, V.I., (1) 45  
 Menéndez-Manjón, A., (1) 45  
 Meng, Xujun, (1) 75  
 Merkuliev, Yu.A., (3) 371  
 Meyer-Ter-Vehn, J., (1) 215  
 Miley, G.H., (1) 3  
 Mima, Kunioki, (4) 585  
 Mima, K., (2) 293  
 Mocek, Tomas, (2) 253  
 Monika, A., (4) 531  
 Morreeuw, J.-P., (1) 165  
 Morton, J., (2) 277  
 Muri, I., (1) 109
- Nampoori, V.P.N., (3) 387  
 Nasim, M.H., (2) 333
- Navare, S.T., (2) 343  
 Neff, S., (4) 539  
 Neri, F., (1) 53  
 Nersisyan, G., (3) 451  
 Ni, P., (1) 209  
 Nickles, P.V., (1) 215
- Osipov, M.V., (3) 371  
 Osmani, O., (2) 229  
 Ossi, P.M., (1) 53  
 Ovchinnikov, A.V., (3) 393  
 Ozaki, T., (1) 69
- Pandey, Binod K., (3) 409  
 Parys, P., (3) 497  
 Parys, P., (4) 575  
 Patil, S.D., (2) 343  
 Pedin, N.N., (4) 547  
 Perin, J.-P., (1) 203  
 Pfeifer, M., (3) 497  
 Pikuz, S.A., Jr., (3) 393  
 Pisarczyk, P., (3) 497  
 Pisarczyk, T., (3) 497  
 Polan, Jiri, (2) 253  
 Porzio, A., (3) 463  
 Prahlad, V., (1) 121  
 Presura, R., (4) 539  
 Prukner, V., (1) 61  
 Puzyrev, V.N., (3) 371
- Ramakrishna, B., (3) 451  
 Ren, Guoli, (3) 421  
 Renard-Le, N., (3) 513  
 Rethfeld, B., (2) 229  
 Riazzi, Z., (1) 101  
 Riley, D., (3) 451  
 Rohlena, K., (3) 497  
 Romagnani, L., (3) 451  
 Rus, Bedrich, (2) 253
- Sadighi, S.K., (1) 101, (2) 269  
 Sadighi-Bonabi, R., (1) 101, (2) 269  
 Sahakyan, A.T., (3) 371  
 Salahuddin, M., (2) 333  
 Sandner, W., (1) 215  
 Sarri, G., (2) 277, (3) 451  
 Scheid, Werner, (1) 195  
 Schleberger, M., (2) 229  
 Schmidt, J., (1) 61  
 Schnürer, M., (1) 215  
 Schreiber, J., (1) 215  
 Schwarz, E., (1) 109  
 Shabbir, Naz, G., (2) 333  
 Shafeev, G.A., (1) 45  
 Shao, F.Q., (2) 319  
 Sharma, Prerana, (2) 285  
 Sharma, A., (3) 479  
 Sharma, A.K., (2) 299  
 Sharma, P., (4) 531  
 Sharma, R.P., (2) 285, (4) 531  
 Shen, Baifei, (3) 399  
 Sheng, Z.M., (2) 293, (2) 333  
 Shoucri, Magdi, (1) 129  
 Shu, Ting, (1) 35  
 Shukla, Gaurav, (1) 149  
 Singh, Arvinder, (2) 263  
 Singh, Navpreet, (2) 263
- Singh, Rohtash, (2) 299  
 Singh, R.K., (1) 121, (3) 387  
 Skala, J., (3) 497  
 Skobelev, I.Yu., (3) 393  
 Smorenburg, P.W., (4) 553  
 Sokollik, T., (1) 215  
 Song, W., (3) 505  
 Starodub, A.N., (3) 371  
 Stehlé, Chantal, (2) 253  
 Steinke, S., (1) 215  
 Stepanov, A., (4) 571  
 Stevenson, R.M., (2) 277  
 Straus, J., (1) 61  
 Stupka, Michal, (2) 253  
 Sun, J., (3) 505  
 Szydowski, A., (4) 575
- Tajima, T., (1) 215  
 Takale, M.V., (2) 343  
 Tan, Liyang, (1) 91  
 Tang, C.X., (1) 185  
 Tauer, J., (1) 109  
 Tian, C.L., (2) 319  
 Tikhonchuk, V.T., (1) 165  
 Tripathi, V.K., (2) 299, 327, (3) 409  
 Trusso, S., (1) 53
- Ullschmied, J., (3) 497  
 Upadhyay, Ajay K., (2) 245
- Vasin, B.L., (3) 371
- Wang, Bing, (1) 35  
 Wang, Liming, (3) 443  
 Wang, Xinxin, (3) 443  
 Wang, C., (1) 27  
 Wang, P.X., (1) 21, 195  
 Wang, S.Y., (1) 179  
 Wang, W., (1) 21  
 Wang, W.-T., (1) 27  
 Wang, W.M., (2) 333  
 Wang, X.G., (4) 563  
 Wei, Hua, (1) 157  
 White, S., (3) 451  
 Willi, O., (2) 277  
 Wintner, E., (1) 109  
 Wu, Changshu, (3) 421  
 Wu, S.Z., (4) 563
- Xia, C.-Q., (1) 27  
 Xiao, R.Z., (3) 505  
 Xie, Bai-Song, (2) 351  
 Xie, Y.J., (1) 21  
 Xin, J.P., (3) 429  
 Xu, Junjie, (3) 415  
 Xu, Zhi-Zhan, (3) 399  
 Xu, H., (2) 319  
 Xu, Z.-Z., (1) 27
- Yakushev, O.F., (3) 371  
 Yan, X.Q., (1) 215  
 Yang, Fengxia, (1) 157  
 Yang, X.H., (2) 319  
 Yazdani, E., (1) 101  
 Yin, Y., (2) 319  
 Yu, Siyuan, (1) 91  
 Yu, Wei, (2) 293

- Yu, Yongli, (3) 415  
Yu, M.Y., (2) 293, 319  
Yu, T.P., (2) 319  
Yuan, Chengwei, (1) 35, (3) 377
- Zaka-Ul-Islam, M., (3) 451  
Zavestovskaya, Irina N., (3) 437  
Zeng, Bin, (3) 415  
Zepf, M., (3) 451  
Zhang, Bao-Han, (2) 351  
Zhang, Baohan, (4) 585
- Zhang, Duanming, (1) 157  
Zhang, Hua, (2) 351  
Zhang, Jun, (1) 35  
Zhang, Qiang, (3) 377  
Zhang, J., (2) 333  
Zhang, L.G., (3) 505  
Zhang, L.J., (3) 505  
Zhang, Q.Y., (1) 185, (3) 505  
Zhang, X.P., (1) 21  
Zhang, X.W., (3) 505  
Zheng, L., (1) 21
- Zherlitsyn, A.A., (4) 547  
Zhou, Weimin, (4) 585  
Zhou, C.T., (4) 563  
Zhu, Jun, (1) 35  
Zhu, C.Y., (1) 223  
Zhu, X.P., (3) 429  
Zhu, X.X., (1) 185  
Zigler, A., (3) 393  
Zou, Xiaobin, (3) 443



# LASER AND PARTICLE BEAMS

Pulse Power, High Energy Densities, Hot Dense Matter, and Warm Dense Matter

Volume 28

March 2010

Number 1

## CONTENTS

	Editorial from the Editor-in-Chief
	<i>Laser and Particle Beams</i> in 2010
D.H.H. HOFFMANN	1
B. MALEKYNIA, H. HORA, N. AZIZI, M. KOUHI, M. GHORANNEVISS, G.H. MILEY, AND X.T. HE	3
T.S. GILL, R. MAHAJAN, AND R. KAUR	11
Y.J. XIE, W. WANG, L. ZHENG, X.P. ZHANG, Q. KONG, Y.K. HO, AND P.X. WANG	21
L. LIU, C.-Q. XIA, J.-S. LIU, W.-T. WANG, Y. CAI, C. WANG, R.-X. LI, AND Z.-Z. XU	27
GUOLIN LI, TING SHU, CHENGWEI YUAN, JUN ZHU, JING LIU, BING WANG, AND JUN ZHANG	35
A. MENÉNDEZ-MANJÓN, S. BARCIKOWSKI, G.A. SHAFEEV, V.I. MAZHUKIN, AND B.N. CHICHKOV	45
F. NERI, P.M. OSSI, AND S. TRUSSO	53
K. KOLACEK, V. PRUKNER, J. SCHMIDT, O. FROLOV, AND J. STRAUS	61
T. OZAKI, L.B. ELOUGA BOM, J. ABDUL-HADI, AND R.A. GANEEV	69
XIN LI, KE LAN, XUJUN MENG, XIANTU HE, DONGXIAN LAI, AND TINGUI FENG	75
Q.Q. MAO, Q. KONG, Y.K. HO, H.O. CHE, H.Y. BAN, Y.J. GU, AND S. KAWATA	83
WENHE DU, LIYING TAN, JING MA, SIYUAN YU, AND YIJUN JIANG	91
R. SADIGHI-BONABI, H. HORA, Z. RIAZI, E. YAZDANI, AND S.K. SADIGHI	101
E. SCHWARZ, S. GROSS, B. FISCHER, I. MURI, J. TAUER, H. KOFLER, AND E. WINTNER	109
AJAI KUMAR, R.K. SINGH, V. PRAHLAD, AND H.C. JOSHI	121
MAGDI SHOUCRI AND BEDROS AFEYAN	129
GAURAV SHUKLA AND ALIKA KHARE	149
RANRAN FANG, DUANMING ZHANG, HUA WEI, ZHIHUA LI, FENGXIA YANG, AND YIHUA GAO	157
R. DUCLOUS, J.-P. MORREEUW, V.T. TIKHONCHUK, AND B. DUBROCA	165
W. GAO, Z.W. LU, S.Y. WANG, W.M. HE, AND W.L.J. HASI	179
	Collective stopping power in laser driven fusion plasmas for block ignition
	Relativistic and ponderomotive effects on evolution of laser beam in a non-uniform plasma channel
	Field structure and electron acceleration in a slit laser beam
	Generation of attosecond X-ray pulses via Thomson scattering of counter-propagating laser pulses
	Simultaneous operation of X band gigawatt level high power microwaves
	Influence of beam intensity profile on the aerodynamic particle size distributions generated by femtosecond laser ablation
	Propagation of laser generated plasmas through inert gases
	A potential environment for lasing below 15nm initiated by exploding wire in water
	Evidence of strong contribution from neutral atoms in intense harmonic generation from nanoparticles
	Study on Au + U + Au sandwich Hohlraum wall for ignition targets
	Radiative reaction effect on electron dynamics in an ultra intense laser field
	Measurements of angle-of-arrival fluctuations over an 11.8 km urban path
	Generation of plasma blocks accelerated by nonlinear forces from ultraviolet KrF laser pulses for fast ignition
	Laser-induced optical breakdown applied for laser spark ignition
	Effect of magnetic field on the expansion dynamics of laser-blow-off generated plasma plume: Role of atomic processes
	Studies of the interaction of an intense laser beam normally incident on an overdense plasma
	Spectroscopic studies of laser ablated ZnO plasma and correlation with pulsed laser deposited ZnO thin film properties
	Improved two-temperature model and its application in femtosecond laser ablation of metal target
	Reduced multi-scale kinetic models for the relativistic electron transport in solid targets: Effects related to secondary electrons
	Measurement of stimulated Brillouin scattering threshold by the optical limiting of pump output energy

C. CHANG, G.Z. LIU, J.Y. FANG, C.X. TANG, H.J. HUANG, C.H. CHEN, Q.Y. ZHANG, T.Z. LIANG, X.X. ZHU, AND J.W. LI	185	Field distribution, HPM multipactor, and plasma discharge on the periodic triangular surface
STEFANIE LOURENCO, NICOLAS KOWARSCH, WERNER SCHEID, AND P.X. WANG	195	Acceleration of electrons and electromagnetic fields of highly intense laser pulses
J.-P. PERIN	203	Cryogenic systems for LMJ cryotarget and HiPER application
F.M. BIENIOSEK, E. HENESTROZA, AND P. NI	209	Funnel cone for focusing intense ion beams on a target
S. STEINKE, A. HENIG, M. SCHNÜRER, T. SOKOLLIK, P.V. NICKLES, D. JUNG, D. KIEFER, R. HÖRLEIN, J. SCHREIBER, T. TAJIMA, X.Q. YAN, M. HEGELICH, J. MEYER-TER-VEHN, W. SANDNER, AND D. HABS	215	Efficient ion acceleration by collective laser-driven electron dynamics with ultra-thin foil targets
C.Y. ZHU, Z.W. LU, AND W.M. HE	223	Erratum A composite phase conjugator based on Brillouin-enhanced four-wave mixing combining with stimulated Brillouin amplification

# LASER AND PARTICLE BEAMS

Pulse Power, High Energy Densities, Hot Dense Matter, and Warm Dense Matter

Volume 28

June 2010

Number 2

## CONTENTS

### Guest Editorial

HEINRICH HORA	225	Dieter H.H. Hoffmann at 60 Years
O. OSMANI, H. LEBIUS, B. RETHFELD, AND M. SCHLEBERGER	229	Energy dissipation in insulators induced by swift heavy ions: A parameter study
DIMITRI BATANI	235	Short-pulse laser ablation of materials at high intensities: Influence of plasma effects
PALLAVI JHA, AMITA MALVIYA, AND AJAY K. UPADHYAY	245	Wakefield effects on the evolution of symmetric laser pulses in a plasma channel
CHANTAL STEHLÉ, MATTHIAS GONZÁLEZ, MICHAELA KOZLOVA, BEDRICH RUS, TOMAS MOCEK, OUALI ACEF, JEAN PHILIPPE COLOMBIER, THIERRY LANZ, NORBERT CHAMPION, KRZYSZTOF JAKUBCZAK, JIRI POLAN, PATRICE BARROSO, DANIEL BAUDUIN, EDOUARD AUDIT, JAN DOSTAL, AND MICHAL ŠTUPKA	253	Experimental study of radiative shocks at PALS facility
ARVINDER SINGH AND NAVPREET SINGH	263	Optical guiding of a laser beam in an axially nonuniform plasma channel
S. K. SADIGHI AND R. SADIGHI-BONABI	269	The evaluation of transmutation of hazardous nuclear waste of $^{90}\text{Sr}$ , into valuable nuclear medicine of $^{89}\text{Sr}$ by ultraintense lasers
M. BORGHESI, G. SARRI, C. A. CECCHETTI, I. KOURAKIS, D. HOARTY, R. M. STEVENSON, S. JAMES, C. D. BROWN, P. HOBBS, J. LOCKYEAR, J. MORTON, O. WILLI, R. JUNG, AND M. DIECKMANN	277	Progress in proton radiography for diagnosis of ICF-relevant plasmas
PRERANA SHARMA AND R. P. SHARMA	285	Generation of Longmuir turbulence and stochastic acceleration in laser beat wave process
WEI YU, LIHUA CAO, M. Y. YU, A. L. LEI, Z. M. SHENG, H. B. CAI, K. MIMA, AND X. T. HE	293	Focusing of intense laser pulse by a hollow cone
ROHTASH SINGH, A. K. SHARMA, AND V. K. TRIPATHI	299	Relativistic self-distortion of a laser pulse and ponderomotive acceleration of electrons in an axially inhomogeneous plasma

MANUEL D. BARRIGA-CARRASCO	307	Full conserving dielectric function for plasmas at any degeneracy
SHAHRIAR BADIEI, PATRIK U. ANDERSSON, AND LEIF HOLMLID	313	Laser-driven nuclear fusion D+D in ultra-dense deuterium: MeV particles formed without ignition
X. H. YANG, Y. Y. MA, F. Q. SHAO, H. XU, M. Y. YU, Y. Q. GU, T. P. YU, Y. YIN, C. L. TIAN, AND S. KAWATA	319	Collimated proton beam generation from ultraintense laser-irradiated hole target
VIJAY GARG AND V. K. TRIPATHI	327	Resonant third harmonic generation of an infrared laser in a semiconductor wave guide
M. A. BARI, Z. M. SHENG, W. M. WANG, Y. T. LI, M. SALAHUDDIN, M. H. NASIM, G. SHABBIR NAZ, M. A. GONDAL, AND J. ZHANG	333	Optimization for deuterium ion acceleration in foam targets by ultra-intense lasers
S. D. PATIL, M. V. TAKALE, S. T. NAVARE, AND M. B. DONGARE	343	Focusing of Hermite-cosh-Gaussian laser beams in collisionless magnetoplasma
BIN LIU, HUA ZHANG, LI-BIN FU, YU-QIU GU, BAO-HAN ZHANG, MING-PING LIU, BAI-SONG XIE, JIE LIU, AND XIAN-TU HE	351	Ion jet generation in the ultraintense laser interactions with rear-side concave target

# LASER AND PARTICLE BEAMS

**Pulse Power, High Energy Densities, Hot Dense Matter, and Warm Dense Matter**

**Volume 28**

**September 2010**

**Number 3**

## CONTENTS

A. S. CHUVATIN, A. A. KIM, V. A. KOKSHENEV, B. M. KOVALCHUK, F. LASSALLE, H. CALAMY, AND M. KRISHNAN	361	Design criteria and validation of a vacuum load current multiplier on a mega-ampere microsecond inductive storage generator
A. N. STARODUB, N. G. BORISENKO, A. A. FRONYA, YU. A. MERKULIEV, M. V. OSIPOV, V. N. PUZYREV, A. T. SAHAKYAN, B. L. VASIN, AND O. F. YAKUSHEV	371	Aerogel foil plasma: Forward scattering, back scattering, and transmission of laser radiation
QIANG ZHANG, CHENGWEI YUAN, AND LIE LIU	377	Design of a dual-band power combining architecture for high-power microwave applications
AJAI KUMAR, SONY GEORGE, R. K. SINGH, AND V. P. N. NAMPOORI	387	Influence of laser beam intensity profile on propagation dynamics of laser-blow-off plasma plume
S. A. PIKUZ, JR., O. V. CHEFONOV, S. V. GASILOV, P. S. KOMAROV, A. V. OVCHINNIKOV, I. YU. SKOBELEV, S. YU. ASHITKOV, M. V. AGRANAT, A. ZIGLER, AND A. YA. FAENOV	393	Micro-radiography with laser plasma X-ray source operating in air atmosphere
GUANG-YUE HU, BAIFEI SHEN, AN-LE LEI, RU-XIN LI, AND ZHI-ZHAN XU	399	Transition-Cherenkov radiation of terahertz generated by super-luminous ionization front in femtosecond laser filament
ASHEEL KUMAR, BINOD K. PANDEY, AND V. K. TRIPATHI	409	Charged particle acceleration by electron Bernstein wave in a plasma channel
JUNJIE XU, YONGLI YU, AND BIN ZENG	415	Extension of harmonic cut-off in a waveform controlled laser field by prolonging the recombining period
KE LAN, PEIJUN GU, GUOLI REN, XIN LI, CHANGSHU WU, WENYI HUO, DONGXIAN LAI, AND XIAN-TU HE	421	An initial design of hohlraum driven by a shaped laser pulse
J. P. XIN, X. P. ZHU, AND M. K. LEI	429	Significance of time-of-flight ion energy spectrum on energy deposition into matter by high-intensity pulsed ion beam
IRINA N. ZAVESTOVSKAYA	437	Laser-assisted metal surface micro- and nanostructurization



XINJING CAI, XIAOBIN ZOU, XINXIN WANG, LIMING WANG, ZHICHENG GUAN, AND WEIHUA JIANG	443	Over-volted breakdown and recovery of short nitrogen spark gaps
T. DZELZAINIS, G. NERSISYAN, D. RILEY, L. ROMAGNANI, H. AHMED, A. BIGONGIARI, M. BORGHESI, D. DORIA, B. DROMEY, M. MAKITA, S. WHITE, S. KAR, D. MARLOW, B. RAMAKRISHNA, G. SARRI, M. ZAKA-UL-ISLAM, M. ZEPF AND C. L. S. LEWIS	451	The TARANIS laser: A multi-Terawatt system for laser-plasma investigations
S. HÜLLER AND A. PORZIO	463	Order statistics and extreme properties of spatially smoothed laser beams in laser-plasma interaction
A. SHARMA AND I. KOURAKIS	479	Spatial evolution of a $q$ -Gaussian laser beam in relativistic plasma
ANTOINE BRET	491	Collisional and collisionless beam plasma instabilities
A. KASPERCZUK, T. PISARCZYK, J. BADZIAK, S. BORODZIUK, T. CHODUKOWSKI, P. PARYS, J. ULLSCHMIED, E. KROUSKY, K. MASEK, M. PFEIFER, K. ROHLENA, J. SKALA, AND P. PISARCZYK	497	Interaction of two plasma jets produced successively from Cu target
R. Z. XIAO, X. W. ZHANG, L. J. ZHANG, X. Z. LI, L. G. ZHANG, W. SONG, Y. M. HU, J. SUN, S. F. HUO, C. H. CHEN, Q. Y. ZHANG, AND G. Z. LIU	505	Efficient generation of multi-gigawatt power by a klystron-like relativistic backward wave oscillator
N. RENARD-LE GALLOUDEC AND E. D'HUMIERES	513	New micro-cones targets can efficiently produce higher energy and lower divergence particle beams

# LASER AND PARTICLE BEAMS

Pulse Power, High Energy Densities, Hot Dense Matter, and Warm Dense Matter

Volume 28

December 2010

Number 4

## CONTENTS

T. S. GILL, R. MAHAJAN, AND R. KAUR	521	Relativistic and ponderomotive effects on evolution of dark hollow Gaussian electromagnetic beams in a plasma
R. P. SHARMA, A. MONIKA, P. SHARMA, P. CHAUHAN, AND A. JI	531	Interaction of high power laser beam with magnetized plasma and THz generation
S. NEFF AND R. PRESURA	539	Simulation of shock waves in flyer plate impact experiments
B. M. KOVALCHUK, A. A. ZHERLITSYN, AND N. N. PEDIN	547	Plasma-filled diode in the electron accelerator on base of a pulsed linear transformer
P. W. SMORENBURG, L. P. J. KAMP, G. A. GELONI, AND O. J. LUITEN	553	Coherently enhanced radiation reaction effects in laser-vacuum acceleration of electron bunches
C. T. ZHOU, S. Z. WU, H. B. CAI, M. CHEN, L. H. CAO, X. G. WANG, L. Y. CHEW, AND X. T. HE	563	Hot electron transport and heating in dense plasma core by hollow guiding
L. R. GRISHAM, E. P. GILSON, I. KAGANOVICH, J. W. KWAN, AND A. STEPANOV	571	Experimental program for the Princeton Ion Source Test Facility
J. BADZIAK, S. JABŁOŃSKI, P. PARYS, A. SZYDŁOWSKI, J. FUCHS, AND A. MANCIC	575	Production of high-intensity proton fluxes by a $2\omega$ Nd:glass laser beam
WEIMIN ZHOU, YUQIU GU, WEI HONG, LEIFENG CAO, ZONGQING ZHAO, YONGKUN DING, BAOHAN ZHANG, HONGBO CAI, AND KUNIOKI MIMA	585	Enhancement of monoenergetic proton beams <i>via</i> cone substrate in high intensity laser pulse-double layer target interactions
	593	AUTHOR INDEX
	597	Contents for Volume 28

# LASER AND PARTICLE BEAMS

Pulse Power, High Energy Densities, Hot Dense Matter, and Warm Dense Matter

## INSTRUCTIONS FOR AUTHORS

### AIMS AND SCOPE

*Laser and Particle Beams* is an international journal that covers the generation, and the interaction with matter, of high intensity laser and particle beams. It also covers the physics of systems with high energy densities. Specific fields of interest include nuclear fusion, especially inertial confinement, magnetic confinement, diagnostics, material treatment, laboratory astrophysics, plasmas and spectroscopy at extreme conditions, physical properties of hot dense matter and intense particle beams and optical (laser) beams from the microwave to the X-ray region. The exploration of these fields and their new physics, including nonlinear and nonclassical phenomena, should find a forum in this journal.

As well as publishing original articles, the journal also publishes occasional review articles, surveys of research at particular laboratories and reviews of recent books.

### ORIGINALITY AND COPYRIGHT

To be considered for publication in *Laser and Particle Beams* a manuscript cannot have been published previously, nor can it be under review for publication elsewhere. Papers with multiple authors are reviewed with the assumption that all authors have approved the submitted manuscript and concur in its submission to *Laser and Particle Beams*. A Transfer of Copyright Agreement must be executed before an article can be published. Government authors whose articles were created in the course of their employment must so certify in lieu of copyright transfer. Authors are responsible for obtaining written permission from the copyright owners to reprint any previously published material included in their article.

### MANUSCRIPT SUBMISSION AND REVIEW

Manuscripts must be written in English. All manuscripts will be referred to acknowledged experts in the subject. Only those receiving favorable recommendations from the referees will be accepted for publication. Manuscripts may be sent to any Board member, an Associate Editor, or the Editor at:

Dieter H.H. Hoffmann  
Technical University Darmstadt Radiation  
and Nuclear Physics  
Schlossgartenstrasse 9  
64289 Darmstadt, Germany  
phone: +49 (0) 6159-71 2694  
fax: +49 (0) 6159-71 2888  
E-mail: LPB-editor@gsi.de

An original and two copies should be submitted with the author's full postal address, phone, fax, and email address, position and affiliations. Authors are urged to send in their final manuscripts on disks as well as hard copy. The manuscript can be submitted on disk in Microsoft Word (MAC or IBM) or in any form of TeX. This increases the speed at which the manuscript can be prepared for publication (typeset). Saving your document in any other format will not be helpful to the typesetter. (You may email the manuscript and figures to our office, and if I can download it, I will save it on disk for you.)

### MANUSCRIPT PREPARATION AND STYLE

Paper should be type in *double* spacing throughout, including tables, footnotes, references and legends to tables and figures. One side of the paper, only, should be used and there should be a margin of at least 2.5 cm all around. The position of tables and figures should be clearly indicated, in sequence, in the text. Tables, footnotes and legends to figures should be typed separately. Where it is essential for clear cross-referencing, particularly in mathematically-orientated material, paragraphs and subparagraphs may be numbered, and the decimal system should be used, i.e. 1.1.1., 1.1.2., etc. A short running title of not more than 40 characters (including spaces) should be indicated if the full title is longer than this. The name of the laboratory where the work has been carried out should be indicated on the title page and the full postal address for the despatch of proofs and offprints should be included on a separate page. Minor corrections to the manuscript may be

typed or neatly printed in ink; retyping is required for significant changes. Numbers should be spelled out when they occur at the beginning of a sentence; use Arabic numerals elsewhere.

### MANUSCRIPT ELEMENTS AND ORDER

Unless there are obvious and compelling reasons for variation (e.g. review articles, Symposium Reports), manuscripts should be organized as follows:

**Title page.** This is page 1. The title should be concise, informative, and free of abbreviations, chemical formulae, technical jargon, and esoteric terms. This page should include (a) the article's full title, (b) names and affiliations of all authors, (c) the name, mailing address, and telephone number of the corresponding author, (d) the address for reprint requests if different from that of the corresponding author; (e) a short title of 50 characters or less, and (f) a list of the number of manuscript pages, number of tables, and number of figures.

**Abstract and keywords page.** This is page 2 and should include (a) the article's full title, (b) an abstract of no more than 300 words, and (c) up to 5 keywords or phrases that reflect the content and major thrust of the article. The abstract should give a succinct account of the objective, methods, results, and significance of the subject matter.

**Introduction.** This section begins on page 3 and should clearly state the objective of the research in the context of previous work bearing directly on the subject. An extensive review of the literature is not usually appropriate.

**Citations in text.** Customary abbreviations will be accepted and the authors are recommended to employ *Système Internationale* (SI/metric) units. Special and unusual symbols should be clearly identified, especially if handwritten. Spell out acronyms at first use, but use only acronyms thereafter. All equipment supplies and products stated in the article should have the manufacturer name and location identified at first mention.

**Tables.** Tables should be numbered consecutively with Arabic numerals and each should be typed double-spaced on a separate sheet. All tables are to be grouped together after the references. A short explanatory title and column headings should make the table intelligible without reference to the text. All tables must be cited and their approximate positions indicated in the text.

**Figures and legends.** Figures should be supplied no larger than  $8 \times 10^4$  (approx.  $200 \times 250$  mm) and must be camera-ready. Explanation and keys should, as far as possible, be placed in the legends. Photographs for halftone reproduction must be a white glossy paper. Figures should be composed to occupy a single column (8.3 cm) or two columns (17 cm) after reduction. Diagrams and illustrations must have a professional appearance and be typed or drawn with sharp, black lettering to permit reduction. To assure legibility, letters, numbers, and symbols on figures should have a minimum height of 1 mm when reduced. Figures should be separate and not incorporated into the text copy.

Artwork should normally be in black and white; if authors have color figures, the publisher will provide a price quotation for the additional production costs. All figures must be identified on the back with the short title of the paper, figure number, and figure orientation (top or bottom). Preferably, figures should be mounted on heavy sheets of the same size as the manuscript. Two complete sets of figures should be carefully packaged in protective envelopes, one to accompany each copy of the manuscript. Each figure must be cited and its approximate position clearly indicated within the text.

Figures must be numbered consecutively with Arabic numerals and be accompanied by a descriptive caption typed double-spaced on a separate sheet. The captions, collected at the end of the manuscript, should concisely describe the figure and identify any symbols and/or calibration bars.

**References.** Entries should be listed alphabetically by lead author at the end of the paper. All authors' names should be included, followed by the year of publication, the full title of the journal, volume, issue number, and inclusive page

numbers. For books, the full title should be given, followed by the editors, volume number (if any), page numbers, publisher and place of publication. Citations in the text should read: Brown and Smith (1973), but (Brown & Smith, 1973). Where there are more than two authors the citation should read: Brown et al. (1973). The conventional Brown (1973a), Brown (1973b) should be used where more than one paper by the author(s) has appeared in the same year. Brief examples:

#### Journal

BRUNEL, F. (1987). Not-so-resonant, resonant absorption. *Phys. Rev. Lett.* **59**, 52–55.

#### Magazine

SEGRE, M.A. & PITTS, B.D. (1992, Sept.). Physics of Laser Plasma Interactions. *Fusion Energy* **A13**, 98–109.

#### Chapter in an Edited Book

LANGDON, C.D., FRAY, E. & GLENN, J. (1993). Plasma equilibrium in a magnetic field. In *Reviews of Plasma Physics* (Gold, H. and Yen, S., Eds.), Vol. 2, pp. 45–78. New York: Elsevier.

#### Entire Book

ARNOLD, C.D., FRAY, E. & GLENN, J. (1993). *Physics of Gravitating Systems* (Gray, H. and Quinn, S., Eds.). New York: John Wiley & Sons.

#### Proceedings

CLIFFE, K.A., KOBINE, J.J. & MULLN, T. (1992). The role of anomalous modes in the Taylor flow problem. *Proc. Roy. Soc. London A* **439**, 341–357.

#### Proceedings with Publisher Noted

MITTAL, S. & FRAY, F. (1989). Laser driven instabilities in nuclear plasmas. *Proc. Eleventh Int. Joint Conf. of Laser Produced Plasmas*, pp. 1395–1401. Los Altos, CA: Morgan Kaufmann.

#### Report

BIRNEY, A.J. & HALL, M.M. (1981). Early identification of flaws in Machine Design. Report No. 81–1501. Cambridge, MA: Massachusetts Institute of Technology.

#### Thesis

LEE, M.C. & RIEDEL, J.D. (1991). *Shock generation in a realistic equation of state model*. PhD Thesis. Stanford, CA: Stanford University Press.

The alphabetical list of references begins a new page, and must be typed double-spaced. Each in-text citation must have a corresponding reference and vice versa. List works by different authors who are cited within the same parentheses in chronological order, beginning with the earlier work. Journal titles should not be abbreviated. Only published articles and articles in press should appear in this list. Responsibility for the accuracy of references cited lies with the authors.

**Author biographies.** Brief author biographies will be printed at the end of each book review; they should not exceed 100 words for each author.

### COPYEDITING AND PAGE PROOFS

The publisher reserves the right to copyedit manuscripts to conform to the style of *Laser and Particle Beams*. The corresponding author will receive page proofs for final proof-reading. No rewriting of the final accepted manuscript is permitted at the proof stage, and substantial changes may be charged to the authors.

### OFFPRINTS

The corresponding author will receive 25 free article offprints. A form will accompany the page proofs allowing orders for complete copies of the issue and for the purchase of additional offprints. Offprint requirements of all coauthors should be included on this form. Orders received after issue printing will be subject to a 50% reprint surcharge.

# LASER AND PARTICLE BEAMS

Pulse Power, High Energy Densities, Hot Dense Matter, and Warm Dense Matter

Volume 28

December 2010

Number 4

## CONTENTS

- T. S. GILL, R. MAHAJAN, AND R. KAUR 521 Relativistic and ponderomotive effects on evolution of dark hollow Gaussian electromagnetic beams in a plasma
- R. P. SHARMA, A. MONIKA, P. SHARMA, P. CHAUHAN, AND A. JI 531 Interaction of high power laser beam with magnetized plasma and THz generation
- S. NEFF AND R. PRESURA 539 Simulation of shock waves in flyer plate impact experiments
- B. M. KOVALCHUK, A. A. ZHERLITSYN, AND N. N. PEDIN 547 Plasma-filled diode in the electron accelerator on base of a pulsed linear transformer
- P. W. SMORENBURG, L. P. J. KAMP, G. A. GELONI, AND O. J. LUITEN 553 Coherently enhanced radiation reaction effects in laser-vacuum acceleration of electron bunches
- C. T. ZHOU, S. Z. WU, H. B. CAI, M. CHEN, L. H. CAO, X. G. WANG, L. Y. CHEW, AND X. T. HE 563 Hot electron transport and heating in dense plasma core by hollow guiding
- L. R. GRISHAM, E. P. GILSON, I. KAGANOVICH, J. W. KWAN, AND A. STEPANOV 571 Experimental program for the Princeton Ion Source Test Facility
- J. BADZIAK, S. JABŁOŃSKI, P. PARYS, A. SZYDŁOWSKI, J. FUCHS, AND A. MANCIC 575 Production of high-intensity proton fluxes by a  $2\omega$  Nd:glass laser beam
- WEIMIN ZHOU, YUQIU GU, WEI HONG, LEIFENG CAO, ZONGQING ZHAO, YONGKUN DING, BAOHAN ZHANG, HONGBO CAI, AND KUNIOKI MIMA 585 Enhancement of monoenergetic proton beams *via* cone substrate in high intensity laser pulse-double layer target interactions
- 593 AUTHOR INDEX
- 597 Contents for Volume 28

### Cambridge Journals Online

For further information about this journal please go to the journal website at:  
[journals.cambridge.org/lpb](http://journals.cambridge.org/lpb)



CAMBRIDGE  
UNIVERSITY PRESS