PROCEEDINGS OF SPIE

SPIDigitalLibrary.org/conference-proceedings-of-spie

Front Matter: Volume 6594

, "Front Matter: Volume 6594," Proc. SPIE 6594, Lasers for Measurements and Information Transfer 2006, 659401 (23 January 2007); doi: 10.1117/12.726571

SPIE.

Event: Lasers for Measurements and Information Transfer 2006, 2006, St. Petersburg, Russian Federation

PROCEEDINGS OF SPIE

Lasers for Measurements and Information Transfer 2006

Vadim E. Privalov
Editor

6–8 June 2006
St. Petersburg, Russia

Sponsored by
SPIE Russia Chapter

Organized by
Academy of Engineering Sciences of Russia (Russia)
St. Petersburg State Polytechnical University (Russia)
Baltic State Technical University (Russia)
Russian Centre of High Technology (Russia)
Scientific Research Centre Reper (Russia)

Published by
SPIE—The International Society for Optical Engineering

Proceedings of SPIE—The International Society for Optical Engineering, 9780819467249, v. 6594

SPIE is an international technical society dedicated to advancing engineering and scientific applications of optical, photonic, imaging, electronic, and optoelectronic technologies.

The papers included in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. The papers published in these proceedings reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from this book:

Author(s), "Title of Paper," in *Lasers for Measurements and Information Transfer 2006*, edited by Vadim E. Privalov, Proceedings of SPIE Vol. 6594 (SPIE, Bellingham, WA, 2007) Article CID Number.

ISSN 0277-786X

ISBN 9780819467249

Published by

SPIE—The International Society for Optical Engineering

P.O. Box 10, Bellingham, Washington 98227-0010 USA

Telephone 1 360/676-3290 (Pacific Time) · Fax 1 360/647-1445

<http://www.spie.org>

Copyright © 2007, The Society of Photo-Optical Instrumentation Engineers

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of copying fees. The Transactional Reporting Service base fee for this volume is \$18.00 per article (or portion thereof), which should be paid directly to the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923. Payment may also be made electronically through CCC Online at <http://www.copyright.com>. Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher. The CCC fee code is 0277-786X/07/\$18.00.

Printed in the United States of America.

Contents

ix	Conference Committees
xi	Introduction

SESSION 1 LASERS AND MEASUREMENTS

- 659402 **Regular and stochastic small-scale phase heterogeneities of gas lasers active medium and their influence on optical resonator efficiency** [6594-01]
V. V. Lobachev, S. Yu. Strakhov, Institute of Laser Technique and Technologies (Russia) and Laser Systems Ltd. (Russia)
- 659403 **Modeling the process of nonlinear frequency conversion by focused beams** [6594-02]
N. VI. Andreeva, S. VI. Kruzhlov, Yu. M. Mokrushin, St. Petersburg State Polytechnical Univ. (Russia)
- 659404 **New He-Ne/J₂¹²⁷ lasers: standard - 2005** [6594-03]
P. S. Krylov, V. E. Privalov, St. Petersburg State Polytechnical Univ. (Russia)
- 659405 **The analysis of a technique of compensation of the sign-variable frequency modulation of a laser gyroscope** [6594-04]
V. N. Kuryatov, POLYUS Research and Development Institute (Russia); E. B. Badamshina, D. V. Lepeshkin, Moscow Power Engineering Institute (Russia)
- 659406 **Examination of polarization anisotropy of the interference dielectric mirrors** [6594-05]
V. N. Kuryatov, POLYUS Research and Development Institute (Russia); E. B. Badamshina, D. V. Lepeshkin, Moscow Power Engineering Institute (Russia)
- 659407 **Beams with inhomogenous polarization state** [6594-06]
A. L. Sokolov, D. S. Zozulya, Moscow Power Engineering Institute, Technical Univ. (Russia)
- 659408 **Influence of the rotor rotation rate instability on goniometer's random error of measurement** [6594-07]
N. V. Goncharov, Y. V. Filatov, St. Petersburg State Electrotechnical Univ. (Russia)
-

Pagination: Proceedings of SPIE follow an e-First publication model, with papers published first online and then in print and on CD-ROM. Papers are published as they are submitted and meet publication criteria. A unique, consistent, permanent citation identifier (CID) number is assigned to each article at the time of the first publication. Utilization of CIDs allows articles to be fully citable as soon they are published online, and connects the same identifier to all online, print, and electronic versions of the publication.

SPIE uses a six-digit CID article numbering system in which:

- The first four digits correspond to the SPIE volume number.
- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-2Z, etc.

The CID number appears on each page of the manuscript. The complete citation is used on the first page, and an abbreviated version on subsequent pages.

- 659409 **The laser-interference superlow-frequency hydrophone** [6594-08]
G. I. Dolgikh, S. S. Budrin, S. G. Dolgikh, S. V. Kovalev, A. A. Plotnikov, V. A. Chupin, V. A. Shvets, S. V. Yakovenko, V.I. Ilyichev's Pacific Oceanological Institute (Russia)
- 65940A **Laser interferometry-phasometry of nanodisplacement** [6594-09]
Zh. Zhelkobaev, V. V. Kalendin, M. A. Samorukov, P. A. Todua, Research Ctr. for Surface and Vacuum Investigation (Russia)
- 65940B **Laser measuring system in the state primary standard of pressure unit- Pascal** [6594-10]
Y. Kiselev, D.I. Mendeleyev Institute for Metrology (Russia)
- 65940C **Applicability of airborne lidars based on middle IR gas lasers for gas analysis of the atmosphere** [6594-11]
O. A. Romanovskii, Institute of Atmospheric Optics (Russia)
- 65940D **Lidar sounding of the atmospheric meteorological parameters** [6594-12]
O. A. Romanovskii, Institute of Atmospheric Optics (Russia)
- 65940E **Lidar LIF method in research problems of plants** [6594-13]
O. A. Romanovskii, Institute of Atmospheric Optics (Russia)
- 65940F **Explosives trace detection in the process of biometrical fingerprint identification for access control** [6594-14]
E. V. Bertseva, Laser Systems Ltd. (Russia); A. V. Savin, Baltic State Technical Univ. Voenmekh(Russia)
- 65940G **The analysis of techniques of processing a LIDAR signal based on the algorithms of correlation and regression analysis** [6594-15]
E. V. Bertseva, S. L. Druzhinin, Institute of Laser Technique and Technologies (Russia) and Laser Systems Ltd. (Russia); N. I. Pahomkova, Institute of Laser Technique and Technologies (Russia); S. Yu. Strakhov, Institute of Laser Technique and Technologies (Russia) and Laser Systems Ltd. (Russia)
- 65940H **Compact television measuring system with laser ranging device SHERNA for measurement and visual control of the glideslope-landing characteristics of airplanes and certification of the airport equipment in daytime and night conditions** [6594-16]
E. Bugaev, J. Bugaev, A. Suetenko, A. Bryuhoveckij, MPEI (Russia)
- 65940I **Lidar complex for remote parameter measurement of soiling an organic origin and their identifications (SHERNA-LIDAR)** [6594-17]
A. Bryuhoveckij, J. Bugaev, A. Suetenko, MPEI (Russia)
- 65940J **Optical characteristics of monocrystal silicon: current status of measurements** [6594-18]
S. N. Skovorodko, V. Ya. Mendelev, A. V. Kourilovich, Institute for High Temperatures (Russia)
- 65940K **Measurements of spatial-power characteristics of laser radiation by matrix photodetectors with accumulation** [6594-19]
A. V. Grishanov, V. N. Grishanov, The Samara State Aerospace Univ. (Russia)
- 65940L **Spatial structure of radiation, scattered rough surface, and dependence of performances of dynamic speckle on size of roughness** [6594-20]
V. I. Bronnikov, Scanning Lasers Ltd. (Russia)

- 65940M **Laser interferometer for toroidal surfaces control** [6594-21]
M. M. Trukhin, B. A. Chunin, FOCUS Inc. (Russia)
- 65940N **Testing of KGSS-0180 laser glass for platinum micro-inclusions** [6594-22]
D. I. Dmitriev, V. I. Arbuzov, K. V. Dukelsky, A. A. Zhilin, I. V. Ivanova, V. N. Pasunkin, Yu. I. Pestov, V. S. Sirazetdinov, A. V. Charukhchev, V. S. Shashkin, Research Institute for Complex Testing of Opto-Electronic Devices (Russia)
- 65940O **Probability density of intensity fluctuations for laser beams disturbed by turbulent aero-engine exhaust** [6594-23]
I. V. Ivanova, D. I. Dmitriev, V. S. Sirazetdinov, Research Institute for Complex Testing of Opto-Electronic Devices (Russia)
- 65940P **Measurements of laser-induced damage thresholds for KGSS 0180 neodymium glass surface** [6594-24]
V. S. Sirazetdinov, D. I. Dmitriev, I. V. Ivanova, V. N. Pasunkin, A. V. Charukhchev, Research Institute for Complex Testing of Opto-Electronic Devices (Russia)
- 65940Q **Estimation of accuracy of definition of following period of laser pulses by optoelectronic system** [6594-25]
L. A. Glushchenko, V. M. Tosenko, V. V. Janchuk, Research Institute for Complex Testing of Optoelectronic Devices and Systems (Russia)
- 65940R **Measuring of an embedded linear birefringence in spun optical fibers** [6594-26]
S. K. Morshnev, M. V. Ryabko, Y. K. Chamorovskii, Institute of Radio-engineering and Electronics (Russia)
- 65940S **A silica optical fiber with an expanding conical end** [6594-27]
A. A. Makovetskii, A. A. Zamyatin, Institute of Radio Engineering and Electronics (Russia)
- 65940T **Polarization properties of multimode optical fibers** [6594-28]
D. Kiesewetter, St. Petersburg State Polytechnical Univ. (Russia)
- 65940U **Depolarization features of wideband radiation in spun optical fibers with a high birefringence** [6594-29]
V. P. Gubin, S. K. Morshnev, N. I. Starostin, A. I. Sazonov, Yu. K. Chamorovsky, V. A. Isaev, The Institute of Radio Engineering and Electronics (Russia)
- 65940V **Realization of a condition of super-regenerative amplification of USP in a laser system with an electromechanical shutter** [6594-30]
B. V. Anikeev, E. V. Khaydukov, V. N. Khramov, I. N. Mitrakhovich, M. N. Sedov, Volgograd State Univ. (Russia)
- 65940W **Quantitative analysis of composition of organic compounds by CARS spectroscopy method** [6594-31]
B. V. Anikeev, S. A. Kutsenko, I. N. Ulchenko, Volgograd State Univ. (Russia)
- 65940X **Research of a radiation spectrum of a near-surface laser plasma** [6594-32]
B. V. Anikeev, E. V. Khaydukov, V. N. Khramov, A. V. Sevost'yanov, R. Sh. Zatrudina, Volgograd State Univ. (Russia)

- 65940Y **Determination of a light-reactive impulse of a target at laser-plasma action by the use of a mechanotron** [6594-33]
B. V. Anikeev, I. R. Garmash, V. N. Khramov, E. N. Skachkova, Volgograd State Univ. (Russia)
- 65940Z **Research of a pulse chirp in the injection-seeding system with a master STRML-laser** [6594-34]
B. V. Anikeev, R. Sh. Zatrudina, N. A. Kravchenko, Volgograd State Univ. (Russia)

SESSION 2 LASERS FOR INFORMATION TRANSFER

- 659410 **Electromagnetic signals and spectral measurements** [6594-35]
O. D. Moskaletz, St. Petersburg State Univ. of Aerospace Instrumentation (Russia)
- 659411 **Acoustooptical pulsar processor: application of frequency scale calibration** [6594-36]
N. A. Esepkina, A. P. Lavrov, S. A. Molodyakov, St. Petersburg State Polytechnical Univ. (Russia); V. V. Oreshko, Pushchino Radio Astronomy Observatory FIAN (Russia)
- 659412 **Output plane interference pattern handling at the two-channel acoustooptical processor of pulsars' radioemission** [6594-37]
A. P. Lavrov, E. V. Dmitriev, St. Petersburg State Polytechnical Univ. (Russia)
- 659413 **Computer modeling of the wavelet transform image correlator** [6594-38]
I. U. Fedorov, K. L. Khohlov, O. B. Leonov, G. A. Starikov, Baltic State Technical Univ. (Russia)
- 659414 **Acoustooptoelectronic receiver** [6594-39]
S. A. Rogov, E. T. Aksenov, M. G. Vysotsky, V. P. Kaasik, S. V. Rozov, St. Petersburg State Polytechnical Univ. (Russia)
- 659415 **Design geometry of identifiers protective Fourier-holograms** [6594-40]
V. K. Erokhovets, United Institute of Informatics Problems (Belarus)
- 659416 **Determination of 3D objects parameters from synthesized multi-frequency optical holograms** [6594-41]
V. P. Titov, V. Karazin National Univ. of Kharkov (Ukraine); T. V. Bogdanova, NII Laser Technology (Ukraine)
- 659417 **The processing of the radar images for the purpose of airborne information-measuring complexes effectiveness increase** [6594-42]
V. A. Rogozhin, Y. V. Petrov, N. V. Sotnikova, D.F. Ustinov Baltic State Technical Univ. Voenmekh (Russia)
- 659418 **Analysis coherent signal processing methods in synthetic aperture radar on small-scale viewing angles under voluntary movement aircraft** [6594-43]
S. N. Anikin, M. V. Vishentsev, A. S. Stukalova, D.F. Ustinov Baltic State Technical Univ. Voenmekh (Russia)
- 659419 **Adaptive antenna array with monopulse totally different directional diagram** [6594-44]
A. S. Popov, Baltic State Technical Univ. Voenmekh (Russia)
- 65941A **Additive basis for multivector information** [6594-45]
V. I. Tarkhanov, A. Ebanga, St. Petersburg State Polytechnical Univ. (Russia)

- 65941B **Spectroscopic diagnostics of bacteriorhodopsin nonlinear photoresponse** [6594-46]
N. M. Kozhevnikov, A. V. Koklyushkin, A. E. Korolev, St. Petersburg State Polytechnical Univ. (Russia)
- 65941C **Laser-optical method of stimulation of cell metabolism and its biomedical applications** [6594-47]
M. M. Asimov, Institute of Physics (Belarus); R. M. Asimov, Applied Systems (Belarus);
A. N. Rubinov, Institute of Physics (Belarus); S. A. Mamilov, S. S. Esmen, Yu. S. Plakisy, Institute of Applied Problems of Physics and Biophysics (Ukraine)
- 65941D **Influence of glucose solution on the erythrocyte scattering properties** [6594-48]
E. K. Naumenko, B.I. Stepanov Institute of Physics (Belarus)
- 65941E **The deformed state influence on the IR absorptivity of tantalum surface** [6594-49]
G. P. Anastasiady, St. Petersburg Institute of Mechanical Engineering (Russia);
A. P. Gagarin, V. S. Makin, FGUP Research Institute for Complex Testing of Optoelectronic Devices (Russia); P. Kohns, Diospec (Germany)
- 65941F **The polymer films laser damage resistance at its laser ablation destruction studies** [6594-50]
P. V. Charty, Novorossiysk Polytechnic Institute, Kuban State Technological Univ. (Russia);
V. E. Privalov, St. Petersburg Polytechnical Univ. (Russia); V. G. Shemanin, E. I. Voronina, Novorossiysk Polytechnic Institute, Kuban State Technological Univ. (Russia)
- 65941G **Photodetectors for fast images recognition on structures with Shottky barriers** [6594-51]
P. G. Kasheninov, A. V. Kichaev, A. A. Tomasov, A.F. Ioffe Physico-Technical Institute (Russia); V. K. Sokolov, Baltic State Technical Univ. Voenmekh (Russia)
- 65941H **About polarization of display's optical radiation** [6594-52]
L. B. Kochin, M. V. Popikov, D. I. Savchenko, D.F. Ustinov Baltic State Technical Univ. Voenmekh (Russia)
- 65941I **Virtual-optic technology for manuscript expertise** [6594-53]
A. M. Chmutin, Volgograd State Univ. (Russia); O. V. Rvacheva, Volgograd State Medical Univ. (Russia)
- 65941J **Influence of external and technological stresses on photoacoustic images of Vickers indented ceramics and metals** [6594-54]
K. L. Muratkov, A. L. Glazov, A.F. Ioffe Physical-Technical Institute (Russia)
- 65941K **Determination of IR lens transmission coefficient** [6594-55]
O. A. Lebedev, V. S. Nujin, V. E. Sabinin, Research and Development Institute of Complex Testing of Opto-Electronic Devices (Russia); S. K. Savelyev, Baltic State Technical Univ. (Russia); S. V. Solk, Research and Development Institute of Complex Testing of Opto-Electronic Devices (Russia)
- 65941L **Requirements to the light sources and photodetectors used for design of optical tomographs** [6594-56]
K. L. Khohlov, V. K. Sokolov, O. V. Leonov, Baltic State Technical Univ. (Russia)

Author Index

Conference Committees

Conference Chair

Sergey N. Bagaev, Institute Astrophysica (Russia)

Conference Cochair

Vladimir N. Ochkin, P.N. Lebedev Physical Institute (Russia)

Organizing Committee

Chair

Vadim E. Privalov, Baltic State Technical University (Russia)

Members

Edmund I. Akopov, SPIE Russia Chapter (Russia)
Vladimir I. Balobun, Baltic State Technical University (Russia)
Anatoliy S. Boreisho, Institute of Laser Technique and Technologies (Russia)
Jean-Mary Chartier, Bureau International des Poids et Mesures (France)
Yuriy V. Chugui, Technological Design Institute (Russia)
Grigoriy I. Dolgikh, Pacific Oceanological Institute (Russia)
Alexandr B. Fedortsov, Nord-West Polytechnical Institute (Russia)
Alexandr E. Fotiadi, St. Petersburg State Polytechnical University (Russia)
Valeriy S. Ivanov, St. Petersburg State University (Russia)
Igor G. Ivanov, Rostov State University (Russia)
Nikolay M. Kohzevnikov, St. Petersburg State Polytechnical University (Russia)
Ivan B. Kovsh, Laser Association (Russia)
Vladimir N. Kuryatov, Institute Polus (Russia)
Gennadiy S. Kruglik, Belarus State Technical University (Belarus)
Evgeniy L. Latush, Rostov State University (Russia)
Vitaliy A. Lopota, St. Petersburg State Polytechnical University (Russia)
Vladislav Ja. Panchenko, Centre of Technological Lasers (Russia)
Igor V. Puchkov, Scientific Research Centre Reper (Russia)
Ivan A. Shcherbakov, A.M. Prokhorov General Physics Institute (Russia)
Anatoliy N. Soldatov, Tomsk State University (Russia)
Vladimir A. Stepanov, Ryazan State Pedagogical University (Russia)
Valeriy V. Tuchin, Saratov State University (Russia)

Introduction

We have regularly held conferences on lasers and modern instrumentation since 1991. The reports from conferences have been published in the proceedings of SPIE. Authors of these papers have been from many different nations, from both inside and outside of Russia. The number of topics discussed at the conferences has increased over time, and it was thus decided that a conference on lasers for measurements and information transfer would be held in 2000. The topics included instability and disturbance in the physics of lasers, frequency control and power radiation of lasers, measurements of the parameters of radiation of lasers, the use of lasers as measurement tools, the formation and transfer of optical information, and the optical technology.

More than 90 presentations were given at the conference, which was held June 6-8, 2006. The authors of these presentations were from many different institutions and universities, from places such as Russia, Belarus, Ukraine, Germany, and Kamerun. Fifty-six of the papers from this conference are included in this proceedings volume.

The volume is separated into two sessions: the first, Lasers and Measurements, contains 34 papers on the laser physics, frequency control of the laser radiation, and the use of lasers as tools of measurement. The second session, Lasers for Information Transfer, contains 22 reports on the formation of optical information, and optical technology including biological.

We hope this conference will be held again in the future, and that the number of participants will increase. The next conference is planned for June 5-7, 2007. Please send proposals to:

Baltic State Technical University
St. Petersburg, Russia, 190005
Telephone (812) 555-76-47;
faxes (812) 222-20-65;

or e-mail vep29@bstu.spb.su.

Vadim E. Privalov