

Saratov Fall Meeting 2018

Laser Physics, Photonic Technologies and Molecular Modeling

Vladimir L. Derbov

Editor

24–28 September 2018

Saratov, Russian Federation

Sponsored by

Russian Foundation for Basic Research (Russian Federation) • Russian Academy of Sciences (Russian Federation) • SPIE • OSA—The Optical Society • IEEE – The Photonics Society • Russian Technology Platform “The Medicine of the Future” (Russian Federation) • Russian Technology Platform “Photonics” (Russian Federation) • European Technology Platform “Photonics21” • EPIC – European Photonics Industry Consortium • LLC SPE “Nanostructured Glass Technology” (Russian Federation) • RME “INJECT” LLC (Russian Federation) • LLC SPE Nanostructured Glass Technology (Russian Federation) • BioVitrum, Ltd. (Russian Federation) • LLC SPE OESSP (Russian Federation)

Published by

SPIE

Volume 11066

Proceedings of SPIE, 1605-7422, V. 11066

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

The papers 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. Additional papers and presentation recordings may be available online in the SPIE Digital Library at SPIDigitalLibrary.org.

The papers 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 these proceedings:

Author(s), "Title of Paper," in *Saratov Fall Meeting 2018: Laser Physics, Photonic Technologies, and Molecular Modeling*, edited by Vladimir L. Derbov, Proceedings of SPIE Vol. 11066 (SPIE, Bellingham, WA, 2019) Seven-digit Article CID Number.

ISSN: 1605-7422
ISSN: 2410-9045 (electronic)

ISBN: 9781510628229
ISBN: 9781510628236 (electronic)

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA
Telephone +1 360 676 3290 (Pacific Time) · Fax +1 360 647 1445

SPIE.org

Copyright © 2019, 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 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/19/\$18.00.

Printed in the United States of America by Curran Associates, Inc., under license from SPIE.

Publication of record for individual papers is online in the SPIE Digital Library.

**SPIE. DIGITAL
LIBRARY**

SPIDigitalLibrary.org

Paper Numbering: *Proceedings of SPIE* follow an e-First publication model. A unique citation identifier (CID) number is assigned to each article at the time of publication. Utilization of CIDs allows articles to be fully citable as soon as they are published online, and connects the same identifier to all online and print versions of the publication. SPIE uses a seven-digit CID article numbering system structured as follows:

- The first five 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.

Contents

vii	<i>Authors</i>
ix	<i>Conference Committee</i>
xi	<i>Introduction</i>
xiii	<i>Organizers</i>

LASER SYSTEMS AND PHOTONIC TECHNOLOGIES

11066 02	Nonlinear dynamics of intracavity difference-frequency generator pumped by a dual-wavelength semiconductor disk laser: model of single-mode optical fields with strong time-delay feedback [11066-3]
11066 03	Femtosecond thulium-doped fiber-ring laser for mid-IR spectroscopic breath analysis [11066-8]
11066 04	Analysis of steady-state stability and quasiperiodic oscillations in intracavity optical parametric oscillator pumped by semiconductor disk laser [11066-39]
11066 05	Analysis of temporal dynamics of two-wavelength MEMS-VCSEL with optical injection for difference frequency generation [11066-40]
11066 06	Suppression of transverse spatio-temporal instabilities in broad-area lasers emission by external optical injection [11066-53]
11066 07	Optimization of parameters in a modified laser triangulation method [11066-13]
11066 08	Numerical and experimental selection of optimal parameters in the interferometric method of measuring the thickness of the cornea [11066-14]
11066 09	Autodyne interferometry of distance by injected current modulation of laser diode [11066-26]
11066 0A	Spectral and polarization characteristics of a broadband vacuum photosensor with tunnel emission from a metal nanoscale blade [11066-46]
11066 0B	Development of an original technology for manufacturing of RF antennas on flexible substrates [11066-55]
11066 0C	Resistive thin-film coatings as an alternative to classical slow wave structures in millimeter-wave vacuum electron devices [11066-54]

NONLINEAR OPTICS, BEAMS, AND PULSE PROPAGATION

- 11066 OD **Nonsatationary elliptically polarized normal modes of electromagnetically induced transparency** [11066-6]
- 11066 OE **Phase-matched conditions for waves interactions on photo-induced susceptibility gratings** [11066-20]
- 11066 OF **Analysis of harmonic's generation in susceptibility gratings** [11066-9]
- 11066 OG **Squeezed solitons via soliton fission in dispersion variable fibers** [11066-50]
- 11066 OH **The propagation of ultrashort laser pulses in phototropic media** [11066-43]
- 11066 OI **The conditions for the propagation of soliton-like pulses in nonlinear media with reverse saturable absorption** [11066-47]

QUANTUM OPTICS AND ENTANGLED STATES

- 11066 OJ **Entanglement in a detuned double Jaynes-Cumming model** [11066-5]
- 11066 OK **Entanglement of two dipole-coupled qubits interacting with a detuned cavity thermal field** [11066-24]
- 11066 OL **Symmetry, coherent states, and control of quantum dynamics** [11066-51]
- 11066 OM **Quantum fluctuations of pump and Stokes pulses in Raman amplifier** [11066-19]
- 11066 ON **Influence of atomic coherence on entanglement between dipole-coupled Jaynes-Cummings and isolated atom** [11066-23]
- 11066 OO **Entanglement between two atoms taking into account a Stark shift** [11066-42]

ELECTRODYNAMICS OF LASER AND PHOTONIC SYSTEMS

- 11066 OP **Finslerian representation of the Maxwell equations** [11066-57]
- 11066 OQ **Constrained Hamiltonian approach to the Maxwell theory** [11066-58]
- 11066 OR **Numerical modeling of leaky electromagnetic waves in planar dielectric waveguides** [11066-59]
- 11066 OS **Advantages and limitations of the matrix record of the Wentzel-Kramers-Brillouin solution in the problem of the distribution of electromagnetic waves in planar structures** [11066-22]

- 11066 OT **Reflection of light by a planar inhomogeneous gyrotropic layer with torsion** [11066-11]
- 11066 OU **Numerical analysis of eikonal equation** [11066-56]
- 11066 OV **Backward plasmon-polaritons in multilayered dissipative structures** [11066-18]

ADVANCED POLARIZATION AND CORRELATION TECHNOLOGIES

- 11066 OW **Low-coherence reflectometry of the foamed polymer matrices** [11066-28]
- 11066 OX **A comparison of different phase scattering functions in modeling wave radiative transfer applied to the tissues with complex structures and dynamics** [11066-33]
- 11064 OY **Low-coherence reflectometry in applications to media structure characterization** [11066-34]
- 11066 OZ **Structure diagnostics of dispersive two-phase systems using speckle correlation technique** [11066-31]
- 11066 10 **High-speed visualization of aluminum nanopowder combustion in air** [11066-2]
- 11066 11 **Signal detrending in low-coherence reflectometry: physical basis and simulation results** [11066-32]
- 11066 12 **Line field swept source optical coherence tomography system with compensation of chromatic aberrations** [11066-170]

SOURCES AND APPLICATIONS OF TERAHERTZ RADIATION

- 11066 13 **Spectra of mode loss in THz quantum cascade laser with double metal waveguide based on Au, Cu and Ag** [11066-38]
- 11066 14 **Amplification of optical and THz surface plasmon-polaritons by electron beams** [11066-12]
- 11066 15 **Numerical simulation of the THz lasing in the cavity with graphene-based hyperbolic medium** [11066-21]
- 11066 16 **Amplification of terahertz plasma waves in tapered metal-insulator-graphene heterostructure** [11066-35]
- 11066 17 **Excitation of plasmon resonances in periodic double-layer graphene-based PT system** [11066-10]
- 11066 18 **Experimental and numerical study of electromagnetic parameters of planar slow-wave structures for millimeter-wave vacuum electronic devices** [11066-52]

SPECTROSCOPY AND MOLECULAR MODELING

- 11066 19 **On rotational-vibrational spectrum of diatomic beryllium molecule** [11066-1]
- 11066 1A **IR spectrum of arginine: experimental research and molecular modeling** [11066-158]
- 11066 1B **The fine structure constant logarithmic contributions to the fine shift of the energy levels, vanishing in the limit $m_2 \rightarrow m_1$** [11066-45]
- 11066 1C **Molecular modeling of ascorbic acid electronic spectra in solutions of different polarity** [11066-29]
- 11066 1D **In vivo optical clearing of human skin under the effect of aqueous solutions of some monosaccharides** [11066-165]
- 11066 1E **Theoretical analysis of environmental influence on the electronic spectra of tryptophanic residues in albumin** [11066-36]
- 11066 1F **Effect of hydrogen bond on vibrational spectra of fullerene-glycine and fullerene-phenylalanine** [11066-37]
- 11066 1G **The description of the multiphoton ionization of an atom in the framework of a path integral approach** [11066-4]
- 11066 1H **Novel ligands based on bipyridine: synthesis, stability constants and luminescence properties of europium complexes** [11066-41]

LOW-DIMENSIONAL STRUCTURES

- 11066 1I **The influence of temperature-time annealing, fluxes and surface treatment of grains on the optical-luminescent properties of crystalline phosphorus $Y_2O_3:Eu$** [11066-15]
- 11066 1J **Nonmonotonic entropy evolution of carriers in graphene generated by strong laser field** [11066-17]
- 11066 1K **Perspectives of application of 2D-matrix of graphene nanoblister for hydrogen storage** [11066-44]
- 11066 1L **Electronic properties of graphen-carbon nanotube films** [11066-48]