PROCEEDINGS OF SPIE

International Workshop on

Quantum Optics 2007

Vitaly V. Samartsev
Editor

18–22 September 2007
Samara, Russia

Organized by
E.K. Zavoisky Kazan Physical-Technical Institute (Russia)
Samara Branch of the Lebedev Physical Institute (Russia)
Samara State University (Russia)
Autonomous Nonprofit Organization LISVA

In collaboration with
Branch of General Physics and Astronomy of the Russian Academy of Sciences
RFBR—Russian Foundation for Basic Research
SPIE
OSA—The Optical Society of America (USA)
Dynasty Fund for Nonprofit Programs
Ministry of Education and Sciences of the Samara Region (Russia)
SOK Companies Association
Megaphone Povolzhie

Published by
SPIE

Volume 7024

Proceedings of SPIE, 0277-786X, v. 7024

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 *International Workshop on Quantum Optics 2007*, edited by Vitaly V. Samartsev, Proceedings of SPIE Vol. 7024 (SPIE, Bellingham, WA, 2008) Article CID Number.

ISSN 0277-786X
ISBN 9780819472373

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

Printed in the United States of America.

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

SPIEDigitalLibrary.org

Paper Numbering: 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. Numbers in the index correspond to the last two digits of the six-digit CID number.

Contents

Conference Committees

Program Committee

Conference Chair

Vitaly V. Samartsev, E.K. Zavoisky Kazan Physical-Technical Institute (Russia)

Scientific Secretary

Eugenie K. Bashkirov, Samara State University (Russia)

Members

A. V. Andreev, M.V. Lomonosov Moscow State University (Russia)
M. V. Chekhova, M.V. Lomonosov Moscow State University (Russia)
A. V. Gorokhov, Samara State University (Russia)
V. L. Derbov, Saratov State University (Russia)
S. P. Kotova, Samara Branch of the Lebedev Physical Institute (Russia)
S. Kroll, Technological Institute of Lund (Sweden)
O. N. Krokhin, P.N. Lebedev Institute of Physics (Russia)
S. P. Kulik, M.V. Lomonosov Moscow State University (Russia)
A. V. Masalov, P.N. Lebedev Institute of Physics (Russia)
I. S. Osad'ko, P.N. Lebedev Institute of Physics (Russia)
A. N. Penin, M.V. Lomonosov Moscow State University (Russia)
A. K. Rebane, Montana State University (USA)
N. N. Rubtsova, Institute of Semiconductor Physics, Siberian Branch (Russia)
V. G. Volostnikov, Samara Branch of the Lebedev Physical Institute (Russia)
G. R. Welch, OSA representative, Texas (USA)
N. V. Znamensky, Russian Research Centre, Kurchatov Institute (Russia)

Organizing Committee

Cochairs

V. V. Samartsev, E.K. Zavoisky Kazan Physical-Technical Institute (Russia)
A. V. Gorokhov, Samara State University (Russia)
S. P. Kotova, Samara Branch of the Lebedev Physical Institute (Russia)

Members

E. K. Bashkirov, Samara State University (Russia)
E. I. Akopov, Russian SPIE Chapter (Russia)
K. N. Afanasiev, Samara Branch of the Lebedev Physical Institute (Russia)
A. A. Biruykov, Samara State University (Russia)
M. V. Dolgopolov, Samara State University (Russia)
V. V. Ivakhnik, Samara State University (Russia)
A. A. Kalachev, E.K. Zavoisky Kazan Physical-Technical Institute (Russia)
A. F. Krutov, Samara State University (Russia)
A. I. Maimistov, Moscow Engineering Physics Institute (Russia)
T. G. Mitrofanova, E.K. Zavoisky Kazan Physical-Technical Institute (Russia)
S. A. Moiseev, E.K. Zavoisky Kazan Physical-Technical Institute (Russia)
A. L. Petrov, Samara Branch of the Lebedev Physical Institute (Russia)
I. I. Popov, Mari State University (Russia)
S. V. Sazonov, Russian Research Centre, Kurchatov Institute (Russia)
M. Kh. Salakhov, Kazan State University (Russia)
K. M. Salikhov, E.K. Zavoisky Kazan Physical-Technical Institute (Russia)
S. A. Samagin, Samara Branch of the Lebedev Physical Institute (Russia)
T. N. Saptsina, Samara Branch of the Lebedev Physical Institute (Russia)
V. A. Sautenkov, Texas A&M University (USA)
G. P. Yarovoi, Samara State University (Russia)
V. I. Yukalov, Joint Institute for Nuclear Research (Russia)

Introduction

This volume contains a selection of invited and contributed research papers presented at the International Workshop on Quantum Optics 2007 held 18–22 September, 2007, at the sanatorium "Forest Pearl" in the vicinities of Samara, a well-known educational, scientific, and cultural center of Russia. IWQO'07 was organized by Samara State University, the Samara Branch of the Lebedev Physical Institute of the Russian Academy of Sciences, and by the Zavoisky Physical-Technical Institute of the Kazan Scientific Center of the Russian Academy of Sciences. The main aim of this workshop was to discuss the modern art of investigations on the following broad topics: entangled states in optics, effects of quantum interference, problems of quantum memory, quantum imaging, polarization tomography of quantum states of light, femtosecond coherent spectroscopy, superradiance and photon echo, quantum teleportation, and actual problems of gamma-optics.

Now quantum optics is the important scientific direction of modern physics. The Einstein-Podolsky-Rosen paradox, teleportation, microlasers, vacuum fluctuations, quantum beats, coherent and squeezed states of light, entangled state of particles, field-field and photon-photon interferometry, photon antibunching, biphotons, quantum memory, laser cooling, superradiance and optical transient phenomena, and femtosecond coherent spectroscopy are the most important scientific problems of quantum optics. 136 papers were presented, including 30 invited papers. About 140 scientists from Russia, Belarus, the United States, and Germany presented their recent achievements at IWQO'07.

The IWQO'07 program included papers devoted to entangled states in optics, methods of protected coding of information in optical lines, quantum storage on subradiant states in an extended atomic ensemble, an electromagnetically induced transparency, cooperative superfluorescence in nanoclusters, quantum absorption of atoms on a surface, generalized poissonian photon distribution in a single nanoparticle fluorescence, interaction of ultrashort optical pulses with carbon nanotubes, experiments on ultrafast spectroscopy and femtosecond echo-spectroscopy, single molecule spectroscopy, and the various problems of gamma-optics.

The proceedings of IWQO'07 will be of interest to a broad spectrum of the international technical and scientific community since the area of quantum optics has prospective technical use.

Vitaly V. Samartsev