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CELEBRATING 50 YEARS OF THE LASER

New books on physics and related sciences

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Maiman T ***The Laser Odyssey*** (Preface by K Maiman; translated from English by M N Sapozhnikov) (Moscow: Pechatnye Traditsii, 2010) 224 pp. ISBN 978-5-91561-050-6. RFBR project 10-02-07043.

On 16 May 1960, Theodore Maiman created the world's first laser, having achieved the generation of coherent red light in a ruby crystal. Maiman won the laser race competing against the leading American industrial laboratories and universities, which were trying to be the first to generate coherent light after the invention of the microwave amplifier — the maser. Maiman's report about his achievement at a press conference in New York on 7 July 1960 caused a sensation, but was first met with disbelief by many scientists. However, the design of Maiman's ruby laser was so simple, elegant, and effective that several months later other laboratories were able to reproduce this laser and used this solution to create other types of lasers. In his autobiography, Theodore Maiman gives an engaging description of his childhood, years of study in American universities, and research work at the Hughes Laboratories in California, which led to his invention of the laser. Maiman is very frank about the intrigues of influential rival scientists on the East coast of the US, who for years have tried to play down the significance of his outstanding achievement. The year 2010 has been declared the International Year of the Laser, and the scientific community in many countries is celebrating the 50th anniversary of this wonderful scientific and technological achievement of the 20th century. Theodore Maiman's book has been translated into Russian to mark the half-century jubilee year of the creation of the first laser. The book opens with a foreword by Kathleen Maiman written specially for the Russian edition. (Pechatnye Traditsii LLC: 105120 Moscow, ul. Nizhnyaya Syromyatnicheskaya 11, korp. 2; tel. (7-495) 580-37-84; e-mail: info@printed-tradition.ru; URL: http://www.printed-tradition.ru)

This Is How It Had Been. Reminiscences of the Founders of National Laser Technology Pt. 2 (Moscow: LAS, 2010) 256 pp.

This volume is a collection of papers on the first steps in the USSR towards laser technology, its applications, and the people involved in this work, and on the formation and evolution of structures charged with organizing the practical implementation of laser technologies:
Krokhin O N: "50 years of quantum electronics";
Basov N G: Nobel Lecture "Semiconductor quantum generators";
Prokhorov A M: Nobel Lecture "Quantum electronics";
Leontovich A M: "How the first laser was created in Moscow";
Kryukov P G: "To the history of the ruby laser at P N Lebedev Physical Institute";
Mak A A, Mak An A: "Lasers at the S I Vavilov SOI — from the first ruby laser to the latest developments";
Alferov Zh I: "The history and future of semiconductor structures";
Petrash G G: "On the work on pulsed gas-discharge lasers at the LPI Optical Laboratory";
Kazaryan M A, Lyabin N A: "Copper vapor laser — record brightness in the visible spectrum";
Kudryavtsev E M: "And the winner is... On the race between FIAN and Avco Everett (US) to launch the first gas-dynamic CO_2 laser";
Stepanov V A: "Gas-discharge lasers in Ryazan";
Yugov V I: "Thirty-six years on the paths of laser devices and technologies";
Smirnov Yu I: "The development and implementation of laser technologies in the defense industry";
Kovalenko V S: "Laser technology: how it all began";
Apanasevich P A: "Pieces of the history of coherent and nonlinear optics conferences";
Fedorov A I: "Electric-discharge high-pressure lasers developed at the SO RAN IOA";
Minaev V P: "History of development of laser scalpels in the USSR";
Afonin Yu V, Krasheninnikov V I, Orishich A M, Shulyat'ev V B, Shikhalev E G: "Development of high-power industrial CO_2 lasers at the Siberian Branch of the RAS";
Soldatov V I: "On the discovery and application of continuous self-sustained contracted discharge in a gas flow";
Kashnikov G N, Mikheev L D, Nesterov R O, Cheremiskin V I: "Explosion-pumped XeF laser";
Artyushenko V: "From samples of IR fibers to diagnostic industrial facilities";
Sobolev V S: "Laser Doppler-based measuring systems";
Shikhalev E G: "Progress in laser technology in Novosibirsk";
Kul'chavenya E V: "Laser urology in Siberia";
Rogatkin D A: "Laboratory of medical physics research and laser technologies of the M F Vladimirskii Moscow Region Clinical Research Institute".
(Laser Association Publ.: 117485 Moscow, PO Box 27; (7-495) 333-00-22, (7-495) 334-47-80; e-mail: las@tsr.ru; URL: http://www.cislaser.com)

Laser Technologies of Materials Processing: Modern Problems of Fundamental Research and Development of Applications (Ed. V Ya Panchenko) (Moscow: Fizmatlit, 2009) 664 pp. ISBN 978-5-9221-1023-5.

The volume reflects the current status, main results, and trends in the field of basic research, applied research, and

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industrial applications of laser technologies of materials processing (laser stereolithography, selective laser sintering, cutting, welding, surface treatment, and nondestructive subsurface diagnostics), as well as the current status of research, development, manufacturing, and applications of modern dedicated industrial lasers for technologies of macroprocessing of materials. The main emphasis is placed on a detailed presentation of the results of the work at the RAS Institute of Laser and Information Technologies (IPLIT RAN in *Russ. abbr.*) performed during the last 10–15 years. The monograph was prepared within the framework of the research program conducted at the IPLIT RAN. (Publishing Company ''Fiziko-matematicheskaya literatura'' MAIK ''Nauka/Interperiodika'': 117997 Moscow, ul. Profsoyuznaya 90; tel. (7-495) 334-74-21; fax: (7-495) 334-76-20; e-mail: fizmat@maik.ru; URL: http:// www.fml.ru/)

The Dawn of the Laser Era in the USSR. Collected papers (Compiled by S N Bagaev, K L Vodop'yanov, E M Dianov, O N Krokhin, A A Manenkov, P P Pashinin, I A Shcherbakov) (Moscow: FIAN, 2010) 161 pp. ISBN 978-5-902622-18-5.

This volume was compiled through the joint effort of the Russian journal *Quantum Electronics and Proceedings of the IOFAN*. Included in this collection are 25 early priority publications by Soviet scientists of results obtained prior to 1972. The papers were selected by a competent commission of laser physics experts. All the included papers have been reproduced in essentially the same form in which they were published almost half a century ago. (RAS P N Lebedev Physical Institute: 119991 Moscow, Leninskii prosp. 53; URL: http://www.lebedev.ru)

FIAN Optical Department: Early Work on Laser Development (Moscow: FIAN, 2010) 105 pp.

2010 is the year separated by half a century from the year of the creation of the world's first laser. Nikolai Gennadievich Basov organized at FIAN at the beginning of 1959 a research project known as Photon; the direction of research had been formulated in the title of the project ''Application of quantum systems to the generation, amplification, and detection of optical radiation''. In April 1960, N G Basov provided State support for this program — that is, an appropriate governmental Resolution. At that time, N G Basov and his colleagues already possessed key ideas for starting work on semiconductor lasers. The Photon theme expanded the range of search of materials for optical quantum generators by including luminescent crystals and gases in the range. Experienced personnel — 'experts in optics' — were included in this effort; today, we know them as brilliant researchers and outstanding scientists who made significant contributions to the body of modern science. Researchers of the laboratories of optical orientation performed a number of pioneering investigations for creating a laser. This collection offers several papers concerning these priority achievements which should be characterized as either 'first in the world' or 'first in the USSR'. Some papers were written by participants in the work, while others were written by witnesses of their work. In some cases, the papers are accompanied with copies of the original publications because they are hard to access or would be of historical interest. It was in the framework of the Photon project that the first work among those pioneering achievements (to be described in the text) had been completed. This was the creation of the first ruby laser in the USSR. (RAS P N Lebedev Physical Institute: 119991 Moscow, Leninskii prosp. 53; URL: http://www.lebedev.ru)

Kryukov P G *Ultrashort-Pulse Lasers and Their Applications* (Moscow: Intellekt, 2010) (to be published).

The book deals with the problem of obtaining laser radiation in the form of ultrashort pulses whose duration approaches the time length of one period of the light wave, i.e., they last a few femtoseconds. This is one of the most important and potentially useful fields in modern laser physics. The author outlines a brief history of the research which led to the creation of femtosecond lasers and discusses principles of lasing that make it possible to generate pulses of femtosecond duration and amplify their power to the petawatt level. Methods of measuring the length of such short laser pulses are presented. Descriptions are given of specific laser systems. The author treats some of the most striking applications to research, engineering, and medicine, based both on the extremely short duration of laser pulses and at ultrahigh intensity of laser radiation. Among other aspects, the book outlines the latest application of femtosecond lasers — precise measurements of optical frequencies and the possibility of creating compact high-precision optical clocks. The book is intended for students and postgraduates studying laser physics, as well as for specialists working in this field. (Izdatel'skii dom ''Intellekt'': 141700 Dolgoprudnyi, Moscow region, Promyshlennyi proezd 14; tel. (7-495) 408-76-81; e-mail: lfs@id-intellect.ru; URL: http://www.id-intellect.ru/)

Zemlyanov A A et al. *Femtosecond Atmospheric Optics* (Executive editors S N Bagaev, G G Matvienko) (Novosibirsk: SB RAS Publishing House, 2010) 238 pp. ISBN 978-5-7692-1150-8.

This monograph, written by a team of authors, presents a new field of research in atmospheric optics. It outlines experimental and theoretical studies in the creation of modern laser systems which generate terawatt-level femtosecond pulses, and their application to meteorology, atmospheric optics, and hydrooptics. The monograph contains extensive material based on modern approaches and new ideas invoked to study the interaction of femtosecond radiation with the atmospheric environment, when not only the linear and nonlinear optical effects but also manifestations of the dependence of optical properties of the atmosphere on the duration of ultrashort pulses are taken into account. Processes of the formation of filaments and the generation of supercontinuum glow accompanying the propagation of terawatt femtosecond laser beams through the atmosphere are analyzed in detail. Directional broadband radiation of the supercontinuum is discussed from the standpoint of applications to probing the atmosphere using so-called white light lidars. The book is intended for experts in laser physics, atmospheric optics, and spectroscopy, as well as for postgraduate students and undergraduates majoring in the appropriate specialties. (Publishing House of the Siberian Branch of the RAS: 630090, PO Box 187, Novosibirsk, Morskoi pr. 2; tel. (7-3832) 30-84-66; fax (7-3832) 33-37-55; URL: http://www.sibran.ru/)

Tarasov L V ***Fourteen Lectures on Lasers*** 2nd ed., revised (Moscow: URSS, 2011) 176 pp. ISBN 978-5-397-01693-3.

This book is an introductory course of lectures on lasers. The course was presented by the author at the Moscow State Institute of Electronics and Mathematics (MIEM in *Russ. abbr.*) for students majoring in the specialty 'Electronic devices'. The book outlines the principles of laser physics and the basic information on lasers. Different types of lasers, lasing modes, intracavity and extracavity methods of controlling laser beams are described in a systematic way (with classification based on lasing media and pumping methods). The book is intended for students of technical colleges and anyone who needs an introduction into laser technologies. (URSS Publ. Group: 117312 Moscow, prosp. 60-letiya Oktyabrya 9, office 203 at the Institute of Systems Analysis of the RAS; tel./fax (7-499) 135-44-23; e-mail: urss@URSS.ru; URL: http://urss.ru/)

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