Intl. Conference "Micro- to Nano-Photonics III ROMOPTO 2012"

September 3-6, 2012
Bucharest, Romania

PROGRAMME

Topics:

Lasers and Radiation Sources
Lasers in Materials Science
Nanophotonics and Quantum Optics
Non-linear and Information Optics
Biophotonics and Optics in Environment Research
Optoelectronics and Optical Components

ORGANIZED BY:

Romanian Academy - Division of Physics

National Institute for Laser, Plasma and Radiation Physics (NILPRP)

University of Bucharest - Faculty of Physics

"Politehnica" University of Bucharest

Romanian Physical Society - Division of Optics and Quantum Electronics, The Romanian Territorial Committee of ICO

SPIE - The International Society for Optics and Photonics, Bellingham, Washington USA - Cooperating organization

CO-SPONSORING INSTITUTIONS

Ministry of Education, Research, Youth and Sport

Foundation *"Fam. Menachem H. Elias"*, Romania

ICO - International Commission for Optics

ICTP - International Centre for Theoretical Physics, Trieste, Italy

OSA - Optical Society of America

European Optical Society

HIgh-technology SysTems and Equipment for RESearch, Industry and Science

Apel Laser

Micro- to Nano-Photonics III

ROMOPTO 2012

10th International Conference on Optics

PROGRAMME

September 3 - 6, 2012
Bucharest, ROMANIA

WELCOME TO "MICRO- TO NANO-PHOTONICS III. ROMOPTO-2012"

The conference "Micro- to Nano-Photonics III. ROMOPTO 2012" is **the tenth (jubiliary in a series of international conferences dedicated to optics and photonics**, held every three-year in Romania. The first three conferences were organized by **Acad. Ioan Ursu**, in collaboration with **Acad. A. M. Prokhorov**, under the name "Trends in Quantum Electronics". **The physicists celebrate wordwide 50 years of nonlinear optics, which became possible due to the advent of lasers. The Romanian optics community and our friends from abroad also celebrate now 50 years since the first He-Ne laser was constructed at the Institute of Atomic Physics Bucharest, in the Laboratory of Optical Methods in Nuclear Physics lead by Prof. Ion Agarbiceanu, a member of Romanian Academy.**

The topics of our conference are related to the modern micro- and nano-photonics and reflect the fast evolutions of optics and photonics providing essential technologies for new materials, information science and technology, biology and medicine, manufacturing, sensing and metrology. The results in these fields demonstrate the important role of photonics in the progress of modern society, in the 21 century.

The purpose of "ROMOPTO 2012" is to provide an opportunity for the optics scientists to discuss their newest results, to stimulate interdisciplinary research and to consider the perspective of applications. The position of our country, Romania, in the Central-East Europe plays an important role in the promotion of the scientific contacts in this region. In the national strategy in R&D, photonics plays an important role in basic research, development and innovation. An actual challenge for all of us is the financial and economic crisis, which has effects on the research funding, the participation in scientific meetings and many others. We follow with interest the new strategy of the EU in research, development and innovation, **Horizon 2020**, including partnerships in the new projects.

The organization of "ROMOPTO 2012" was possible thanks to the **actions and support of several national and international institutions**. We have to mention and thank the Romanian Academy, the Romanian Ministry of Education and Research and the National Agency for Science, Technology and Innovation, the National Institute of Laser, Plasma and Radiation Physics (NILPRP), the Bucharest University, the Foundation "Menahem H Elias", the University "Polytechnica"of Bucharest and the Division of Optics and Quantum Electronics of the Romanian Physical Society (which is a Territorial Committee of ICO and EOS). My gratitude is specially conveyed to Acad. Ionel Haiduc, the President of the Romanian Academy, Prof. Ecaterina Andronescu, the Minister of Education, Prof. Mircea Dumitru, the Rector of the Bucharest University, Prof. E. Barna, the Vice-rector, Prof. St. Antohe, the Dean of Faculty of Physics, Prof. V. Stanescu – Exec. Director of Foundation "M. H Elias".

We address our thanks to the **co-sponsoring institutions of this conference**: the International Commission for Optics (ICO), the « Abdus Salam » International Centre for Theoretical Physics (ICTP, Trieste, Italy), the International Society for Optics and Photonics (SPIE), Optical Society of America (OSA) and European Optical Society (EOS). Particularly, I express my entire gratitude to Prof. Mario Bertolotti, Dr. Eugene G. Arthurs, Prof. Christos Flyzanis, Prof. Anna Consortini, Prof. Gerd Leuchs, Prof. Francois Kajzar, Prof. Stefan Hell, Prof. Concita Sibilia, Dr. Costel Subran, Prof. Edmond Turcu, Prof. Angela Guzman, Prof. Th.Szoplik, Prof. Mircea Guina, Prof. Ion Tighineanu, Prof. Oleg Angelsky, Prof. Eugenio Fazio and Prof. G. von Bally (ICO), Prof. J. Niemela and Prof. G. Thompson (ICTP), for their important support to the conference "ROMOPTO 2012" and to our optics community.

I would like to express my thanks to the members of the international **Scientific Advisory Committee, Programme Committee and Organizing Committees of "ROMOPTO 2012"** for their hard work. Special address and thanks are to the local organizing team: Dr. Ion Morjan, General Director of NILPRP, Dr. Traian Dascalu, Deputy Director and OSA representative, Dr. R. Medianu, Dr. Adrian Petris, the coordinator of the Organizing Committee, Dr. Tatiana Bazaru (for conference Programme preparation), and Mariana Buzatu (for financial matters and social events) for their important efforts in all steps of conference organization, Dr. I. Dancus (for conference poster and Programme cover) Dr. Dipl.Eng. S. Popescu (for the design and updating the conference web site), Alexandra Olteanu (treasurer) and Petronela Doia (for preliminary information). The sponsorships by Romanian laser small companies "Apel Laser" - Director Dr. M. Udrea and "Hysteresis" – Director Catalin Trangla are also acknowledged.

By the efforts of the Scientific Advisory Committee, coordinated by Prof. M. Bertolotti and the Programme Committee, around 100 scientific papers by authors from 10 countries have been selected for presentation at "ROMOPTO 2012", in 9 plenary lectures, 25 invited lectures, 22 oral presentations and 44 posters. I express my entire gratitude to the members of these committees, referees, to the invited professors and to all participants for their high level work. Some of these papers, reviewed by an international referee board, will be published in a SPIE Proceedings volume, which hopefully will have a wide distribution and interest in the scientific world. The best papers will be invited for rapid publication in a special issue of "Romanian Reports in Physics" (with additional material and journal referee process). By a generous support, the **best student papers selected at this conference will be awarded by SPIE and OSA.**

Finally, I hope that the participants in "ROMOPTO 2012" will enjoy the scientific sessions, will meet here friends, will have the opportunity to start new scientific collaborations and will remember their visit in Romania, particularly, the trip to the Carpathian mountains.

Prof. Valentin I. Vlad,
Vicepresident of Romanian Academy,
Chairman of "ROMOPTO 2012"

TABLE OF CONTENTS

- Committees 1
- Conference Schedule 3
- Scientific Programme 5
  - Monday, September 3 5
  - Tuesday, September 4 12
  - Wednesday, September 5 21
  - Thursday, September 6 22
  - Poster Sections 29
    - Poster Section I 29
    - Poster Section II 31
    - Poster Section III 34
    - Poster Section IV 35
    - Poster Section V 38
    - Poster Section VI 42

KEY TOPICS:

Section I:	**LRS**	Lasers and Radiation Sources
Section II:	**LMS**	Lasers in Materials Science
Section III:	**NQO**	Nanophotonics and Quantum Optics
Section IV:	**NIO**	Non-linear and Information Optics
Section V:	**BOER**	Biophotonics and Optics in Environment Research
Section VI:	**OEOC**	Optoelectronics and Optical Components

MEETING INFORMATION:

Conference Chair:

Prof. Dr. Valentin I. Vlad

The Romanian Academy,
National Institute for Laser, Plasma and Radiation Physics, Department of Lasers,
Faculty of Physics, University of Bucharest

Phone: +40 (0) 21 457.44.67
Fax: +40 (0) 21 457.44.67; +40 (0) 21 457.42.43
E-mail: romopto@inflpr.ro

Period: September 3 (Monday) – September 6 (Thursday), 2012

Venue: The Conference will be hosted by the Romanian Academy, Bucharest, ROMANIA.

Language: The official language of the meeting is English, which will be used for all presentations and printed matters.

SCIENTIFIC ADVISORY COMMITTEE

Coord.: Mario Bertolotti	– Italy	Norbert Kroo	– Hungary
Gert von Bally	– Germany	Fredrik Laurell	– Sweden
Maria Calvo	– Spain	Falk Lederer	– Germany
Pierre Chavel	– France	Marian Marciniak	– Poland
Anna Consortini	– Italy	Joseph Niemela	– U.S.A.
Stelios Couris	– Greece	Aaron Peled	– Israel
Christopher Dainty	– Ireland, U.K	Ioan-Iovitz Popescu	– Romania
Christos Flytzanis	– France	Roberta Ramponi	– Italy
Costas Fotakis	– Greece	William Terrill Rhodes	– U.S.A.
Asher A. Friesem	– Israel	Bouchta Sahraoui	– France
Ari T. Friberg	– Sweden	Mordechai Segev	– Israel
Sergey V. Gaponenko	– Belarus	Concita Sibilia	– Italy
Mircea Guina	– Finland	Tomasz Szoplik	– Poland
Angela M. Guzman	– U.S.A.	Theo Tschudi	– Germany
Jean-Pierre Huignard	– France	Edmond Turcu	– U.K.
Elyahou Kapon	– Switzerland	Nikos Vainos	– Greece
Martti Kauranen	– Finland	Nikolay Zheludev	– U.K.
Yuri S. Kivshar	– Australia	Joseph Zyss	– France
Vitali Ivanovich Konov	– Russia	Maria Yzuel	– Spain

PROGRAMME COMMITTEE

Coord.: Valentin I. Vlad	– Romania	Aurelia Lupei	– Romania
Oleg Angelsky	– Ukraine	Voicu Lupei	– Romania
Stefan Antohe	– Romania	Emanuel Marom	– Israel
Dan Apostol	– Romania	Rares Medianu	– Romania
Eugene Arthurs	– U.S.A.	Aurelia Meghea	– Romania
Simion Astilean	– Romania	Ion N. Mihailescu	– Romania
Georges Boulon	– France	Dumitru Mihalache	– Romania
Dan Cojoc	– Italy	Ion Morjan	– Romania
Crina Cojocaru	– Spain	George Nemes	– U.S.A.
Valentin Craciun	– Romania	Mihai L. Pascu	– Romania
Razvan Dabu	– Romania	Adrian Petris	– Romania
Michael Damzen	– U.K.	Angela Piegari	– Italy
Traian Dascalu	– Romania	Adrian Podoleanu	– U.K.
Maria Dinescu	– Romania	Nicolae Puscas	– Romania
Eugenio Fazio	– Italy	Ileana Rau	– Romania
Stefan Frunza	– Romania	Roxana Savastru	– Romania
Constantin Grigoriu	– Romania	Dan Sporea	– Romania
Nikolai Gaponik	– Germany	George Stanciu	– Romania
Iancu Iova	– Romania	Viorica Stancalie	– Romania
Aurelian Isar	– Romania	Paul Sterian	– Romania
Alexei Kamshilin	– Finland	Costel Subran	– France
Isabelle Ledoux	– France	Takunori Taira	– Japan

ORGANIZING COMMITTEE

Coord: Adrian Petris

Treasurer: Alexandra Olteanu

Tatiana Bazaru Rujoiu
Mariana Buzatu
Ioan Dancus
Petronela Gheorghe
Adriana Nistorescu
Silviu Teodor Popescu
Cristian Stan
Gabriela Stan
Mircea Udrea

CONFERENCE SCHEDULE

Date	*Time*	*Aula Magna*	*Aula of the Library*
Sept. 3 Monday	08.00 – 09.00	**Registration**	
	09.00 – 09.45	**Opening session (*Aula Magna*)**	
	09.45 – 10.45	**Plenary Session 1 – (*Aula Magna*) – Chair: Valentin I. VLAD** **Mario BERTOLOTTI - "1962-2012 What does it mean fifty years in laser research?"**	
	10.45 – 11.00	***Coffee Break***	
	11.00 – 12.00	**Plenary Session 2 – (*Aula Magna*) – Chair: Gerd LEUCHS** **Eugene G. ARTHURS - "Photonics in an Era of Constraints"**	
	12.00 – 14.00	***Lunch***	
		NQO	***LRS***
		Chair: Anna CONSORTINI	**Chair: Mario BERTOLOTTI**
	14.00 – 14.30	I1. Angela GUZMAN	I1. Costel SUBRAN
	14.30 – 15.00	I2. Piotr WRÓBEL	I2. Nicolae ZAMFIR
	15.00 – 15.30	I3. George STANCIU	I3. Mihai MACOVEI
	15.30 – 15.45	O1. Iulia ANGHEL	I4. Constantin GRIGORIU
	15.45 – 16.00	O2. Ioan DANCUS	
	16.00 – 16.15	***Coffee Break***	
		NIO	***LMS***
		Chair: George NEMES	**Chair: Stefan ANTOHE**
	16.15 – 16.45	I1. Valentin I. VLAD	I1. Ion TIGHINEANU
	16.45 – 17.15	I2. Dumitru MIHALACHE	I2. Razvan DABU
	17.15 – 17.45	I3. Adrian PETRIS	I3. Valentin CRACIUN
	17.45 – 18.00	O1. Silviu T. POPESCU	O1. Camelia POPESCU
	18.00 – 19.00	**POSTER SESSION**	
	20.00	***Get Together Party***	
Sept. 4 Tuesday	09.00 – 10.00	**Plenary Session 3 (*Aula Magna*) – Chair: Christos FLYTZANIS** **Stefan W. HELL - "Nanoscopy with focused light"**	
	10.00 – 11.00	**Plenary Session 4 (*Aula Magna*)** **Gerd LEUCHS - "Time reversal symmetry – a powerful tool in optics"**	
	11.00 – 11.15	***Coffee Break***	
		NIO	***BOER***
		Chair: Dumitru MIHALACHE	**Chair: Oleg V. ANGELSKY**
	11.15 – 11.45	I4. Anna CONSORTINI	I1. Mihail Lucian PASCU
	11.45 – 12.00	I5. Emanuel MAROM	O1. Alexander G. USHENKO
	12.00 – 12.15		O2. Yuriy A. USHENKO
	12.15 – 12.30	O2. Petre Cătălin LOGOFĂTU	
	12.30 – 12.45	O3. Shoam SHWARTZ	
	12.45 – 14.00	***Lunch***	

Date	*Time*	*Aula Magna*	*Aula of the Library*
	14.00 – 15.00	**Plenary Session 5 (*Aula Magna*) – Chair: Francois KAJZAR** **Christos FLYTZANIS - "Gyro-photonic structures. Polarization state manipulation, filtering and storage in photonic structures"**	
	15.00 – 16.00	**Plenary Session 6 – (*Aula Magna*) – Chair: Ion MORJAN** **Edmond TURCU - "Laser-driven XUV beamline for femtosecond structural dynamics"**	
	16.00 – 17.00	**POSTER SESSION + *Coffee Break***	
		LRS	***OEOC***
		Chair: Costel SUBRAN	**Chair: Alexander G. USHENKO**
	17.00 – 17.30	I5. Antti HÄRKÖNEN	I1. Stefan ANTOHE
	17.30 – 17.45	I6. Serban GEORGESCU	O1. Roxana SAVASTRU
	17.45 – 18.00		O2. Julia VIKTOROVSKAYA
	18.00 – 18.15	I7. George NEMES	O3. Elena STANCU
	18.15 – 18.30		O4. Christina V. FELDE
	18.30 – 18.45	O1. Sorin MICLOŞ	
	18.45 – 19.00	O2. Ştefan A. AMARANDE	
Sept. 5 Wednesday	08.30 - 18.00	***Trip***	
	20.00	***Collegial Dinner***	
Sept. 6 Thursday	09.00 – 10.00	**Plenary Session 7 (*Aula Magna*) – Chair: Mircea GUINA** **Francois KAJZAR - „Deoxyribonucleic acid (DNA) – a new nanomaterial for applications in electronics and in photonics"**	
	10.00 – 11.00	**Plenary Session 8 (*Aula Magna*) – Chair: Maria DINESCU** **Concita SIBILIA - "Nonlinearity of chiral materials"**	
	11.00 – 11.15	***Coffee Break***	
		NQO	***LMS***
		Chair: Angela GUZMAN	**Chair: Eugenio FAZIO**
	11.15 – 11.45	I4. Oleg V. ANGELSKY	I4. Maria DINESCU
	11.45 – 12.00	I5. Aurelian ISAR	O2. Nicoleta TOSA
	12.00 – 12.15		O3. Eugen PAVEL
	12.15 – 12.30	O3. Tomasz STEFANIUK	
	12.30 – 14.00	***Lunch***	
	14.00 – 15.00	**Plenary Session 9 (*Aula Magna*) – Chair: Valentin CRACIUN** **Mircea GUINA - "Dilute-nitride based high efficiency solar cells: recent developments and future prospects"**	
		NIO	***BOER***
		Chair: Adrian PETRIS	**Chair: Mihail Lucian PASCU**
	15.00 – 15.30	I6. Nicolae ENAKI	I2. Maria ZORAN
	15.30 – 15.45	O4. Claudia Yu. ZENKOVA	O3. Dan SAVASTRU
	15.45 – 16.00	O5. Peter P. MAKSIMYAK	O4. Yuriy A. USHENKO
	16.00 – 16.15	O6. Tarak N. DEY	
	16.00 – 17.00	**CLOSING SESSION**	

LEGEND:

I. Lasers and Radiation Sources	*II. Lasers in Materials Science*	*III. Nanophotonics and Quantum Optics*	*IV. Non-linear and Information Optics*	*V. Biophotonics and Optics in Environment Research*	*VI. Optoelectronics and Optical Components*
LRS	***LMS***	***NQO***	***NIO***	***BOER***	***OEOC***

SEPTEMBER 3rd, MONDAY

Time	*Aula Magna*	*Aula of the Library*
08.00 – 09.00	**Registration**	
09.00 – 09.45	**Opening session (*Aula Magna*)**	
09.45 – 10.45	**Plenary Session 1 (*Aula Magna*)**	
	Chair: Valentin I. Vlad	
	Pl.1. 1962-2012 What does it mean fifty years in laser research? Mario Bertolotti *Sapienza Università di Roma,Via Antonio Scarpa, 16, I-00161 Roma, ITALY*	
10.45 – 11.00	***Coffee Break***	
11.00 – 12.00	**Plenary Session 2 (*Aula Magna*)**	
	Chair: Gerd Leuchs	
	Pl.2. Photonics in an Era of Constraints Eugene G. Arthurs *SPIE - The International Society for Optics and Photonics, Bellingham, Washington, USA* The economic crisis of 2008 has led to intense pressure on government budgets for science in much of "the west". While science based innovation is seen as the path to much needed economic growth, the causal linkage is not well understood and is the focus of a new science of science policy effort in the U.S. A recent study by the U.S. National Academy of Science and the work of the EU's Photonics21 platform are helping identify the extraordinary impact of photonics on global economic performance and on improved quality of life. This presentation will address aspects of the importance of photonics, and call on the photonics and entire scientific community to become much more vocal in communicating the value of science to society.	
12.00 – 14.00	***Lunch***	

	NQO	*LRS*
	Chair: Anna Consortini	**Chair: Mario Bertolotti**
14.00 – 14.30	**III.I.1. Non-Markovian quantum dynamics** Angela Guzman *CREOL, The College of Optics and Photonics, University of Central Florida,P.O. Box 162700, 4000 Central Florida Blvd., Orlando, FL 32816-2700, USA.* Quantum computing has been limited primarily by decoherence in the achievement of quantum logic operations of high fidelity. However, recent developments in the theory of the dynamics of quantum open systems present the quantum computing community with a new mindset: Rather than striving to completely isolate the quantum system from its environment, one is encouraged to consider the possibility of using a special class of environments with "memory" as an active means of feeding apparently lost information back into the system. A particular restricted class of controllable non-Markovian processes allows for the presence of active and/or structured environments, characterized by periods of a reverse flux of information from the environment into the system. I will first discuss the non-Markovian dynamics of a standard two-qubit quantum phase-gate based on controlled collisions between cold atoms trapped in spin-dependent optical lattices. Because of decoherence, the experimental realization of such a gate has been elusive. Replacement of the s-scattering approximation by the more realistic resonant dipole-dipole interaction with its inherent two-atom damping term leads to a strong reduction of the gate fidelity. However, the oscillatory (non-positive) character of the two-atom damping suggests non-Markovian dynamics in the restricted sense that can be used to engineer an optimal collision process with unit fidelity. This process involves the presence of an ancillary qubit, which serves as a repository of quantum coherence and has the ability of feeding coherence back into the two-qubit gate. At a characteristic distance of closest approach the fidelity of the two-qubit gate operation can be recovered. We thus conclude that basic decoherence-free building blocks for this type of gate should consist not of two but of at least three qubits.	**I.I.1. What if the laser hadn't been invented?** Costel Subran *President of the 50 years of the laser, SFO & CNOP* *UE Expert & Reviewer* More a 50 years of existence of the laser, since man has started to control light! The first ruby pulsed laser was born May 16, 1960. Within a few years an avalanche of different cw and pulsed lasers were developped, confirming the invention of a revolutionary source. They put in order the light, controlled its amplitude, phase, frequency and polarization and imposed its directionality. The laser became an essential tool in our society, a widely used technology, a societal and economic factor of progress. Can we imagine a world without lasers nowadays? They opened the way to photonics. Photonics, as a field, began with the invention of the laser. And what if the laser hadn't been invented? How to raise the interest of the young people for photonics?

14.30 – 15.00	**III.I.2. Fabrication technology of high resolution SNOM probes** Piotr Wróbel, Tomasz Stefaniuk, Tomasz Szoplik *University of Warsaw, Faculty of Physics, Pasteura 7, 02-093 Warszawa, Poland* We present a fabrication method of high resolution aperture SNOM probes with tapered silica fiber core and Al coating. The crux of the method is that core-metal coating interface is corrugated. Radially polarized light propagates in the core up to a grating of axially symmetric grooves along the probe length, which enhance photon-to-plasmon coupling. A strong evanescent field allows for reduction of aperture diameter, which together with skin depth of metal used for coating decides upon resolution. Probes are made of multimode Ge-doped silica fibres, which are hydrogenated to increase their photosensitivity. In the cores Bragg gratings are recorded with UV light transmitted through sinusoidal phase masks. Modulation of optical density is transformed to azimuthal grooves in the Turner etching process. Corrugated fibre tips are coated with aluminum. **Keywords:** SNOM, Bragg grating, aperture metal-coated probes, corrugated tapered probes, resolution.	**I.I.2. Extreme Light Infrastructure – Nuclear Physics (ELI-NP)** Nicolae-Victor Zamfir *National Institute for Physics and Nuclear Engineering (IFIN-HH), Bucharest, Romania* ELI Nuclear Physics, one of the 4 pillars of ELI, will be built in Bucharest-Magurele, Romania. It is meant as an unique research facility to investigate the impact of very intense electromagnetic radiation (Extreme Light) on matter with specific focus on nuclear phenomena and their applications. The extreme light is realized at ELI-NP in two ways: by very high optical laser intensities and by the very short wavelength beams on γ-ray domain. The Gamma Beam System, based on Compton backscattering of a laser beam on electron beam accelerated by a warm LINAC, will produce variable energy gamma beam (E_γ = 0.2 – 19.5 MeV) with a very good bandwidth (in the 10^{-3} domain) and with very high brilliance (peak brilliance higher than 10^{21} photons/mm^2/mrad^2/s/(0.1% BW). This combination allows for stand-alone experiments with a state-of-art high-intensity laser, standalone high resolution γ-beam experiments or combined experiments of both photon sources. The description of the future ELI-NP facility and of the planned experiments will be presented.
15.00 – 15.30	**III.I.3. Imaging of the Rayleigh toroid in a photonic quantum ring laser by using laser scanning microscopy techniques** R. Hristu, S. G. Stanciu, D. E. Tranca and G. A. Stanciu *Center for Microscopy-Microanalysis and Information Processing, University Politehnica of Bucharest, 313 Splaiul Independentei Street, sect. 6, Bucharest, Romania* A confocal laser scanning microscope modified to acquire optical beam induced current images and two-photon excited photoluminescence is used to investigate a novel type of semiconductor lasers – photonic quantum ring lasers. We compare the lasing and the photoinduced current images of the structures. Using two-photon excited photoluminescence microscopy, we were able to image the laser structures when optically excited and	**I.I.3. Multi-atom effects in laser fields** Mihai Macovei, Ni Cui, Fernando Oster, Karen Z. Hatsagortsyan, Christoph H. Keitel *Max-Planck-Institute for Nuclear Physics, Saupfercheckweg 1, D-69117, Heidelberg, Germany* We shall present our resent results on laser-atom manipulation in various systems. In particular, a method will be discussed in order to control the annihilation dynamics of a dense gas of positronium atoms employing superradiance and subradiance regimes of the cooperative spontaneous emission. We report a maximum lifetime increase by a factor of about two hundred for para- and by a factor of about hundred for ortho-positronium. The developed techniques will be explored to extreme

	compare the results with previously obtained images on electrically pumped photonic quantum ring lasers. We also propose a method to evaluate the Rayleigh band on the circumference of these structures.	ultraviolet regimes where superradiant pulses are successfully generated. We shall show that laser fields are convenient tools to control the collective processes in those frequency regimes. Finally, the feasibility of generating correlated photon pairs at variable frequencies will be discussed.
15.30 – 15.45	**III.O.1. Periodic arrays of nanostructures in silicon by near-field enhanced laser irradiation in liquid precursors** I. Anghel[1], M. Enculescu[2], M. Filipescu[1], M. Zamfirescu[1] and M. Ulmeanu[1*] *[1]Laser Department, National Institute for Laser, Plasma and Radiation Physics, Atomistilor Str. 409, P. O. Box MG-36, 077125 Magurele-Bucharest, Romania* *[2]National Institute of Material Physics, Atomistilor Str. 105bis, P. O. Box MG-7, 077125 Magurele-Bucharest, Romania* A simple approach to fabricate periodic arrays of different types of nanostructures on silicon (Si) substrate is reported. In the process, a single pulse from a 200 fs laser at 387 nm wavelength was applied on a self-assembled mono or double layer of 700 nm or 300 nm diameter silica spheres on an (100) Si wafer. The surface was irradiated at normal incidence by immersing the substrates in a glass container filled with different liquid precursors. The influence of the medium on the near-field interactions for both mono and double layered system is investigated.	**I.I.4. The Centre for Advanced Laser Tehnologies (Cetal) - Opportunity for Cutting-Edge Research in Photonics** Constantin Grigoriu *National Institute for Laser, Plasma and Radiation Physics, 409 Atomistilor Str., Bucharest-Magurele, R-077125, Jud. Ilfov, Romania* The CETAL, the first centre for research in photonics in Romania and South-Eastern Europe is dedicated to the forefront of fundamental and applied research and to strengthen the technological capabilities of SMEs. The centre deals with research in the field of laser beam-matter interaction at the radiation density over 10^{20} W/cm^2, (laser system 10^{15} W/25 fs). A suite of equipment will allow the exploratory research activities with applications in material processing and synthesis, from macro to micro and down to the nanoscale level, or for the evaluation and application of optical radiation over the spectral domain 180 nm - 1 mm.
15.45 – 16.00	**III.O.2. Nonlinear optical properties of DNA samples characterized by high sensitivity I-Scan** I. Dancus[1], V. I. Vlad[1], A. Petris[1], I. Rau[2], F. Kajzar[2], A. Meghea[2], A. Tane[2] *[1] National Institute for Laser, Plasma and Radiation Physics, Dept. of Lasers, 409 Atomistilor Str., PO Box MG-36, 077125 Bucharest-Magurele, Romania* *[2] POLITEHNICA University of Bucharest, Department of Applied Physical Chemistry and Electrochemistry, 78126 Bucharest, Romania* In this presentation, we show our preliminary results in investigation of the nonlinear optical properties of dye sensitized DNA. We are measuring the nonlinear refractive indices of the DNA and DNA with	

	cetyltrimethylammonium (CTMA) surfactant, doped with Rhodamine 610, Disperse Red 1 and Nile Blue dyes, at different concentrations and dissolved in water and butanol, respectively. The measurements are done using the I-Scan method with a femtosecond laser at 1030nm as light source. The interesting behavior of the refractive index changes in these samples, due to the excitation of high-order nonlinearities using femtosecond pulses, is shown.	
16.00 – 16.15	***Coffee Break***	
	NIO	***LMS***
	Chair: George NEMES	**Chair: Stefan Antohe**
16.15 – 16.45	**IV.I.1. Nonlinear Optics – A retrospective selection of results** Valentin I. Vlad *National Institute for Laser, Plasma and Radiation Physics, Magurele-Bucharest, Romania* *Romanian Academy-CASP and Bucharest University-Faculty of Physics* *E-mail: v_i_vlad@acad.ro* I present an overview of the main achievements in nonlinear optics, after 50 years of research. Finally, I show a short personal selection of results in nonlinear optics obtained in the small research laboratory headed by me at the National Institute for Laser, Plasma and Radiation Physics, Department of Lasers, some of them in collaboration with prestigious colleagues from European optics laboratories.	**II.I.1. Focusing elements based on photonic metamaterials consisting of nanotubular structures and multilayer rods** Ion Tighineanu *Academy of Sciences and Technical University of Moldova, Chisinau, Moldova* New trends in the development of photonic metamaterials based on two dimensional periodic and quasi-periodic structures are reported. We present the results of exploration of focusing properties of flat and concave lenses assembled from metallized titania nanotubes, metallized nanoperforated semiconductor membranes and inhomogeneous dielectric rods. In particular, photonic crystal based concave lenses assembled from multilayer dielectric rods approximating a fish-eye profile of the refractive index are shown to exhibit negative effective refractive index and good focusing properties at definite frequencies, in some cases the focusing characteristics being accompanied by super-resolution. The tolerance of focusing performances to disorder is analysed.
16.45 – 17.15	**IV.I.2. Linear and nonlinear light bullets: recent developments** Dumitru Mihalache *Horia Hulubei National Institute for Physics and Nuclear Engineering, P.O. Box MG-6, 077125 Magurele, Romania* *E-mail: Dumitru.Mihalache@nipne.ro*	**II.I.2. Materials micro-processing using femtosecond lasers** Razvan Dabu, Marian Zamfirescu, Magdalena Ulmeanu, Florin Jipa *National Institute for Laser, Plasma and Radiation Physics, Str. Atomistilor 409, 077125 Bucharest, Romania* *E-mail: razvan.dabu@inflpr.ro*

	The spatiotemporal optical solitons (alias nonlinear "light bullets") are nondiffracting and nondispersing wavepackets propagating in nonlinear optical media. The three-dimensional spatiotemporal solitons are localized (self-guided) in two transverse (spatial) dimensions and in the direction of propagation due to the balance of anomalous group-velocity dispersion of the medium in which they form and nonlinear self-phase modulation. The formation of fully three-dimensional spatiotemporal optical solitons in two-dimensional photonic lattices was reported in recent experiments. Also, linear light bullets, which are robust and versatile localized wave packets combining Bessel beams in the transverse plane with temporal Airy pulses have been reported experimentally. A brief up-to-date survey of recent theoretical and experimental studies of the formation, stability and robustness of linear and nonlinear light bullets in various physical settings is given.	Nonlinear optical phenomena which dominate the interaction of tightly focused femtosecond laser beams with materials are discussed. Different femtosecond laser based techniques for material processing such as laser ablation, two-photon photo-polymerization, laser induced forward transfer, near-field laser lithography, and material surface nano-structuring are described. For the computer controlled micro-processing of materials, near-infrared Ti:sapphire femtosecond lasers, with nano-Joule/micro-Joule pulse energy, were coupled with direct laser writing workstations. Laser fabricated micro-nanostructures and their applications to electronics, microfluidics, photonics, and biology are presented.
17.15 – 17.45	**IV.I.3. Modeling reflection scan on media with high-order optical nonlinearities** A. Petris, V. I. Vlad *National Institute for Laser, Plasma and Radiation Physics, Dept. of Lasers, 409 Atomistilor Str., PO Box MG-36, 077125 Bucharest-Magurele, Romania* We present our analytical model of reflection Z-scan and I-scan in media with high-order optical nonlinearities. Expressions for the normalized reflectance in open aperture reflection Z-scan and I-scan are derived and their consequences are discussed. A simulation using our formulas and data from literature for high-order nonlinear refractive indices of As_2S_3 is performed. Our experimental results of reflection Z-scan on nano-patterned silicon-on-insulator excited with fs pulses are well explained in the frame of this model.	**II.I.3. Superhard nanostructured TiN and ZrC thin films and multilayers grown by pulsed laser deposition** D. Craciun[1], G. Socol[1], S. Niculaie[1], G. Dorcioman[1], E. McCumiskey[2], M. Hanna[2], C. R. Taylor[2], G. Bourne[3], E. Lambers[4], and V. Craciun[1, 4] *[1]National Institute for Laser, Plasma, and Radiation Physics, Bucharest, Romania* *[2]Mechanical and Aerospace Engineering, University of Florida, Gainesville, USA* *[3]Metallurgical and Materials Engineering, Colorado School of Mines, Golden, USA* *[4]Major Analytical Instrumentation Center, University of Florida, Gainesville, USA* From vacuum electronics and nuclear engineering to MEMS devices there is a growing demand for very hard and wear resistant thin films exhibiting special electronic and optical properties. Pulsed laser deposition is one of the best techniques to grow such films for scientific and technological investigations. In this presentation the growth of superhard ZrC and TiN thin films by PLD is discussed. The use of a high laser fluence for ablation generated energetic species that bombarded the substrate and film during growth, resulting in the deposition of very dense, adherent, nanostructured and micro-stressed films, which exhibited extremely high hardness values.

17.45 – 18.00	**IV.O.1. Characterisation of soliton waveguides writing process in $LiNbO_3$ crystals at 405 nm wavelength** S.T. Popescu[1], A Petris[1], V. I. Vlad[1], E. Fazio[2] *[1]National Institute for Laser, Plasma and Radiation Physics, Dept. of Lasers, 409 Atomistilor Str., PO Box MG-36, 077125 Bucharest-Magurele, Romania* *[2] University of Rome "La Sapienza", Dept. of Fundamental and Applied Sciences for Engineering, Via A. Scarpa 16, I-00161, Rome, Italy* Soliton waveguides in $LiNbO_3$ can be recorded very fast with a low-cost laser diode at 405 nm. We characterized the writing process considering the following recording parameters: input beam intensity, electric field (external and internal) and beam polarization. The writing process at 405 nm is compared with the writing process at 532 nm for the same $LiNbO_3$ crystal. Good guiding properties of femtosecond pulses at 1550 nm in the recorded soliton waveguides are demonstrated (with peak intensities seven orders of magnitude higher than the recording intensity).	**II.O.1. Biomaterial coatings synthesized by MAPLE for drug delivery applications** C. Popescu[1], R. Cristescu[*1], G. Dorcioman[1], I.N. Mihailescu[1], M. Jelinek[2,3], D.B. Chrisey[4] *[1]National Institute for Laser, Plasma and Radiation Physics, MG-36, RO-77125, Bucharest, Romania* *[2]Institute of Physics of ASCR, Na Slovance 2, 182 21 Prague 8, Czech Republic* *[3]Czech Technical University in Prague, Faculty of Biomedical Engineering, nam. Sitná 3105, Kladno 272 01, Czech Republic* *[4]Rensselaer Polytechnic Institute, School of Engineering, Departments of Materials Science & Biomedical Engineering, Troy, 12180-3590, NY, USA* *E-mail: rodica.cristescu@inflpr.ro* The precise control of drug release and biodegradable coating in terms of diffusion kinetics and multilayer geometry is highly requested to maintain drug levels within a desired therapeutic range within the affected regions and prevent side effects. We report on thin film deposition of biopolymers by MAPLE for advanced drug delivery systems. We identified the best possible compromise between the parameters of laser processing and characteristics of biopolymer thin films in terms of porosity and similar composition with those of raw material. We have shown the helpful ability to use different MW polymers which have different degradation times too.
18.00 – 19.00	**POSTER SESSION**	
20.00	***Get Together Party***	

SEPTEMBER 4th, TUESDAY

<table>
<tr><th>Time</th><th>Aula Magna</th><th>Aula of the Library</th></tr>
<tr><td>09.00 – 10.00</td><td colspan="2">Plenary Session 3 (Aula Magna)</td></tr>
<tr><td></td><td colspan="2">Chair: Christos Flytzanis</td></tr>
<tr><td></td><td colspan="2">Pl.3. Nanoscopy with focused light

Stefan W. Hell

Max Planck Institute for Biophysical Chemistry
E-mail: hell@nanoscopy.de

Since the 19th century it has been widely accepted that a light microscope cannot see details that are finer than half the wavelength of light (>200 nm). However, in the 1990s it was discovered that this diffraction barrier can be overcome, such that fluorescent features can be resolved virtually down to molecular dimensions. Here we discuss the simple yet powerful physical principles that allowed us to break the diffraction resolution limit, with emphasis on STED microscopy. Besides, we exemplify the relevance of this rapidly emerging 'optical nanoscopy' to various fields, in particular the material and the life sciences, where the interior of cells and tissues can now be investigated non-invasively at the nanoscale [1-3].

1. Hell, S. W. Far-field optical nanoscopy, in Single Molecule Spectroscopy in Chemistry (ed A. Gräslund, Rigler, R., Widengren, J.) 365 - 398 (Springer, 2009).
2. Grotjohann, T. et al. Diffraction-unlimited all-optical imaging and writing with a photochromic GFP. Nature 478, 204-208 (2011).
3. Wildanger, D., Maze, J. R. & Hell, S. W. Diffraction unlimited all-optical recording of electron spin resonances. Phys Rev Lett 107, 017601 (2011)</td></tr>
<tr><td>10.00 – 11.00</td><td colspan="2">Plenary Session 4 (Aula Magna)</td></tr>
<tr><td></td><td colspan="2">Pl.4. Time reversal symmetry – a powerful tool in optics

Gerd Leuchs

Max Planck Institute for the Science of Light, Erlangen and Department of Physics,
University of Erlangen-Nürnberg, Germany
E-mail: gerd.leuchs@mpl.mpg.de</td></tr>
<tr><td>11.00 – 11.15</td><td colspan="2">Coffee Break</td></tr>
</table>

	NIO	*BOER*
	Chair: Dumitru Mihalache	**Chair: Oleg V. Angelsky**
11.15 – 11.45	**IV.I.4. New and old intensity statistics from large receiving apertures in the atmosphere** Anna Consortini *Università degli Studi di Firenze, Dipartimento di Fisica e Astronomia, Via G. Sansone 1, Sesto Fiorentino – Firenze 50019 Italy* *E-mail: anna.consortini@unifi.it* Three different histograms of the instantaneous Stehl ratio, measured from three Adaptive Optics Telescopes, were recently published (Applied Optics, November 2010) by Gladysz et al. in a paper on the use of the probability density function (PDF) of adaptive optics for exoplanets detection. These PDF present values of the skewness coefficients of different signs. Surprising they are the same kind of histograms that we found, measuring the time evolution of the intensity at the focus of a large lens collecting an atmospherically degraded laser beam, many years ago. We gave a theoretical explanation (Ciolli, Consortini et al., Applied Optics, May 1977) and suggest here a similar one.	**V.I.1. Combined laser techniques used to fight multiple resistance to drug treatment developed by bacteria** Mihail Lucian Pascu *National Institute for Laser, Plasma and Radiation Physics, Laser Department, P.O. Box MG-36, Str. Atomistilor nr. 409, 077125 Magurele, Romania* *E-mail: mihai.pascu@inflpr.ro* Two kinds of results: 1.Modifications of the molecular structures of medicine by selective exposure to laser radiation. This may lead to long lived reaction products that are efficient in inhibiting the development of bacteria which acquired resistance to multidrug treatment, such as *Staphylococcus Aureus*. 2. Production of microdroplets/nanodroplets by unresonant interaction of the laser beams with pendant droplets, used as transport vectors of the modified drugs to targets, such as tissues or bacteria. Comments about the combination of the resonant and unresonant interaction of the laser beams with liquid samples are made in view of applications in lab-on-a-chip devices.
11.45 – 12.00	**IV.I.5. Two-dimensional template for characterization of imaging systems** Harel Haim and Emanuel Marom *Faculty of Engineering, Tel Aviv University, Tel Aviv 69978, Israel* It is common practice to utilize a template based on 1D spatial features for characterizing imaging systems. The mostly used template is the USAF Resolution target. We show that the correct characterization of optical systems needs templates that contain 2D features, such as a checkerboard pattern. Imaging capabilities (spatial frequency cut-off and image contrast) are reduced in such case. The novel chess-bar template presented here allows simultaneous measurements of 1D as well as 2D characteristics.	**V.O.1. Polarization-singular structure of phase-inhomogeneous layers for diagnostics and classification of their optical properties** A.G. Ushenko, A.V. Dubolazov *Chernivtsi National University, Correlation Optics Dept., Chernivtsi, Ukraine, 5800; E-mail: yuriyu@gmail.com* This work is aimed at ascertaining the possibilities to diagnose and classify phase-inhomogeneous layers (PhIL) of various types (surface-scattering, subsurface-scattering and bulk-scattering ones) by determination values and ranges for changing the statistical (moments of the 1-st to 4-th orders), correlation (autocorrelation functions) and fractal (logarithmic dependences for power spectra) parameters that characterize coordinate distributions for polarization-singular states in PhIL laser images. *Keywords*: polarization, polarization singularity, scattering

12.00 – 12.15		**V.O.2. Polarization-phase filtering of laser images of biological liquids** Yu.A. Ushenko[1], M.Sidor[2] [1]*Chernivtsi National University, Correlation Optics Dept., Chernivtsi, Ukraine, 58002* [2]*Chernivtsi National University, Optics and Spectroskopy Dept., Chernivtsi, Ukraine, 58002* *E-mail: yuriyu@gmail.com* Our work is aimed at searching the possibilities to perform diagnostics and differentiation of structures inherent to liquid-crystal networks of blood plasma with various pathologies (health - breast cancer) by using the method to determine the coordinate distributions of phase shifts (phase maps) between orthogonal components of laser radiation amplitudes with the following statistical, fractal and singular analyses of these distributions. *Keywords*: polarization, Fourier plane, birefringence, spatial-frequency selection
12.15 – 12.30	**IV.O.2. Reflectance and transmittance of a uniaxial thin film with the optic axis perpendicular to the surface** Petre Cătălin Logofătu *National Institute for Laser, Plasma and Radiation Physics, 409 Atomiştilor Str., Măgurele, Ilfov, 077125, Romania* This paper produce formulae for the power reflection and transmission coefficients of a uniaxial thin film sandwiched between two isotropic media and the necessary intermediate formulae of the field reflection and transmission coefficients at the planar interfaces between the isotropic and the uniaxial media in explicit form. The formulae obtained are tested successfully using the criteria of conservation of energy and the conservation of the form of the equations for time reversal.	

12.30 – 12.45	**IV.O.3. Laguerre-Gaussian spatial multiplexing and demultiplexing for free space optical communication** S. Shwartz, M. A. Golub, and S. Ruschin *Tel Aviv University, Department of Electrical Engineering, Tel Aviv, Israel* *E-mail: Shoamsh@gmail.com* Computer generated multichannel diffractive optical elements matched to several Laguerre-Gaussian transverse modes of laser beam enabled us to demonstrate demultiplexing and signal recovery of independent channels propagating in free space. Phase only computer generated holograms of orthogonal Laguerre-Gaussian modes were designed by resorting to the mathematical tool of generating functions, fabricated and provided quality correlation peaks in our experiments.	
12.45 – 14.00	***Lunch***	
14.00 – 15.00	**Plenary Session 5 (*Aula Magna*)** **Chair: Francois Kajzar** **Pl.5. Gyro-photonic structures. Polarization state manipulation, filtering and storage in photonic structures** Christos Flytzanis *Laboratoire Pierre Aigrain, Ecole Normale Supérieure,* *Paris 75231 Cedex 05, France* *E-mail: christos.flytzanis@lpa.ens.fr* We review the main features and material aspects of the polarization state sensitive photonic structures with particular emphasis on the magneto-photonic and chiro-photonic ones. We briefly analyze the relevant photonic bands and mode configuration in such structures and assess the additional photonic functionalities of such structures.	

15.00 – 16.00	**Plenary Session 6 (*Aula Magna*)**	
	Chair: Ion Morjan	
	Pl.6. Laser-driven XUV beamline for femtosecond structural dynamics I.C.E. Turcu[1], C.M. Cacho[1], W.A. Bryan[2,1], G.R.A.J. Nemeth[2], J.C. Petersen[3,4], N. Dean[3], A. Cavalleri[4,3], S. Kaiser[4], A. Simoncig[4], A.L. Cavalieri[4], S.S. Dhesi[5], L. Poletto[6], P. Villoresi[6,7], F. Frassetto[6], E. Springate[1] *[1]Central Laser Facility, STFC Rutherford Appleton Laboratory, Harwell-Oxford Campus, Didcot, OX11 0QX, UK* *[2]Department of Physics, Swansea University, UK* *[3]Department of Physics, Oxford University, Clarendon Laboratory, Oxford, UK* *[4]Max Planck Research Department for Structural Dynamics, University of Hamburg, Centre for Free Electron Laser Science, Hamburg,Germany* *[5]Physical Science Division, Diamond Light Source, Harwell-Oxford Campus, Didcot, OX11 0QX, UK* *[6]LUXOR, CNR-INFM, Padova, Italy* *[7]DEI-University of Padova, Italy* *E-mail: Edmond.Turcu@stfc.ac.uk* A new laser-driven XUV beamline provides femtosecond pump and probe beams for time-resolved studies in condensed matter. The beamline offers a unique combination of capabilities optimised for the new technique of ultrafast time-resolved angle resolved photoemission spectroscopy (TR-ARPES). The beamline was used to map the time- and momentum-dependent electronic structure of photoexcited 1*T*- TaS_2 crystal. The splitting of the sub-bands at the Brillouin zone boundary melts in less than 30fs, which is before the lattice has time to respond. This indicates that electronic correlations may play an important role in establishing the charge order.	
16.00 – 17.00	**POSTER SESSION + *Coffee Break***	
	LRS	***OEOC***
	Chair: Costel Subran	**Chair: Alexander G. Ushenko**
17.00 – 17.30	**I.I.5. Recent developments of 2 µm GaSb-based disk laser** A. Härkönen[1], J. Paajaste[1], J.-P. Alanko[1], R. Koskinen[1], S. Suomalainen[1], C. Grebing*, G. Steinmeyer[2,1] and M. Guina[1] *[1]Optoelectronics Research Centre, Tampere University of Technology, Korkeakoulunkatu 3, FI-33720 Tampere, Finland* *[2]Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy, Max-Born-Straße 2 A, D-12489 Berlin, Germany* **currently with Physikalisch-Technische Bundesanstalt (PTB),Bundesallee 100, D-38116 Braunschweig, Germany*	**VI.I.1. Progress in Photovoltaic Cells Based on Polymer/Fullerene Bulk-Heterojunctions and Hybrid Organic/Inorganic Structures** Stefan Antohe *University of Bucharest, Faculty of Physics, P.O.Box: MG-11, Bucharest-Magurele, 077125, Romania* *E-mail: santohe@solid.fizica.unibuc.ro* In this work are summarized the electrical and photoelectrical properties of the organic photovoltaic cells based on the polymeric thin films and hybrid inorganic/organic structures.

	We review the recent development of GaSb-based semiconductor disk laser, particularly from the aspect of high average power and ultra-short pulse generation. GaSb disk lasers are particularly interesting, because they can emit high brightness radiation in the 2–3 μm spectral window, important to environmental monitoring, LIDAR, IR-counter measures and many other applications. Here we demonstrate that these lasers are capable of producing not only multiwatt average power, but also sub-ps pulses.	We report two kind of prepared and characterized structures: i) hybrid structures based on nanostructured ZnO electrode, photosensitized by CuPC; ii) hybrid structures based on CdTe nanowires arrays/ZnPc or TPyP. Three types of hybrid structures based on nanostructured ZnO were prepared: a) Nanostructured ZnO thin films/CuPc; b) ZnO nanowires array/CuPc; c) ZnO nanotubes array/CuPc. EQE of ZnO wire arrays/CuPc structures was 4 time larger than that of ZnO nanostructured film/CuPc structures and EQE of ZnO nanotubes arrays/CuPc structures was about one order of magnitude higher than that of ZnO nanostructured film/CuPc structures. For second type, hybrid cells based on the heterostructure at the interface between wire arrays of CdTe, and the organic film ZnPc and TPyP, were produced and characterized. EQE of CdTe nws/CdTe (200nm)/ZnPc structures was two order of magnitude higher than in the case of CdTe nws/ZnPc. Currently, work is in progress to improve the efficiency of these structures, by optimizing the density of the nanowire or nanotube arrays, and improving the quality of the inorganic/organic interfaces. *Keywords:* nanostructured materials for photovoltaic applications, "Bulk Heterojunction" photovoltaic cells, hybrid inorganic/organic photovoltaic cells.
17.30 – 17.45	**I.I.6. Upconversion luminescence in $La_3Ga_{5.5}Ta_{0.5}O_{14}$ codoped with Er^{3+} and Yb^{3+}** S. Georgescu, A. M. Voiculescu, C. Matei, A. G. Stefan, O. Toma *National Institute for Laser, Plasma and Radiation Physics, 409 Atomistilor Street, Măgurele, Ilfov, 077125, Romania* Blue (440 – 490 nm, transitions $^4F_{3/2,5/2,7/2} \rightarrow {}^4I_{15/2}$), violet (410 nm, $^2H_{9/2} \rightarrow {}^4I_{15/2}$) and near ultraviolet (380 nm, $^4G_{11/2} \rightarrow {}^4I_{15/2}$) upconversion luminescence in Er:Yb:$La_3Ga_{5.5}Ta_{0.5}O_{14}$ (langanite – LGT) ceramic sample, synthesized by solid state reaction in air, was obtained by pumping at 973 nm. Yb^{3+} – Er^{3+} energy transfer processes accounting for population of the emitting levels are discussed. The measured lifetimes of the emitting and intermediate Er^{3+} levels are compared with the radiative lifetimes estimated with the Judd-Ofelt theory.	**VI.O.1. Numerical Simulation of Distributed Feed-Back Fiber Laser Sensors** Roxana Savastru[1], Dan Savastru[1], Ion Lăncrănjan[2], Sorin Micloş[1] *[1]National Institute of R&D for Optoelectronics - INOE 2000, 409 Atomistilor St., Magurele, Ilfov, RO-077125, Romania;* *[2]Advanced Study Center-INCAS, 220 Iuliu Maniu Blvd., Bucharest, RO-061126, Romania;* Various aspects of distributed feedback fiber laser sensors, their interaction with environment and their possible applications are investigated by numerically solving coupled-mode equations system describing the laser field propagation. The developed numerical analysis has the aim to better understand the DFB-FL itself and its interaction with environment in order to be operated as a sensor. The main idea consists in finding out how various environment parameters modify the

		coefficients of coupled-mode equations describing the laser field propagation through the DFB-FL structure.
17.45 – 18.00		**VI.O.2. Energy Kinds in Quasimonochromatic Field** I. I. Mokhun*, Yu. K. Galushko, K. S. Kharytonova and Ju. Yu. Viktorovskaya *Department of Correlation Optics, Chernivtsi University, 2 Kotsubynsky Str., Chernivtsi, 58012, Ukraine* **E-mail: mokhun@itf.cv.ua* The relations for the components of the Poynting vector of the quasimonochromatic wave were obtained. It is shown that in this case the behavior of transversal Poynting component may be defined similarly to the coherent case. *Keywords*: Poynting vector, quasimonochromatic wave, stokes parameters, angular momentum.
18.00 – 18.15	**I.I.7. Testing optics and measuring beams at ISO standards requirements: ISOTEST Project** George Nemeş[1,2], Aurel Stratan[1], Constantin Fenic[1], Alexandru Zorilă[1,3], Laurenţiu Rusen[1], Săndel Simion[1], Constantin Blănaru[1], Liviu Neagu[1] *[1]Laser Department, National Institute for Laser, Plasma, and Radiation Physics, 409 Atomistilor Str., Măgurele 077125, Romania* *[2]ASTiGMAT™, 3409 Pecky Cedar Ct., Sacramento, CA 95827, USA; gnemes@astigmat-us.com* *[3]"Politehnica" University of Bucharest, 313 Splaiul Independentei, Bucharest 060042, Romania* The major objectives and several original results of the ISOTEST project are presented. ISOTEST is a three-year project started in June 2010, sponsored by the National Authority for Scientific Research**,** Romania. It has four main objectives: developing methods/devices for laser beam diagnostics; developing automated equipment for testing the laser-induced damage threshold of various optics and materials; implementing and improving related ISO procedures; accreditation to perform tests according to ISO standards and dissemination of the results and of the opportunities	**VI.O.3. Multimode optical fiber study for a new radiation dosimeter development** Eugenia Badita, Elena Stancu, Florea Scarlat, Catalin Vancea, Anca Scarisoreanu* *National Institute for Laser, Plasma & Radiation Physics (INFLPR), 409 Atomistilor Str., Magurele Ilfov, Romania* *E-mail: a_m_mihalache@yahoo.com* This paper presents the experimental results on preliminary study of the physical proprieties of the multimode optical fiber in radiation field delivered by electron linear accelerator (INFLPR). This study is based on the physical degradation effect of the optical fiber due to electron beam exposure measured through dependence of the exposure dose in electron beam and radiation induced attenuation. Optical fiber attenuations were measured before, during and after electron beam exposure. Results show a greater attenuation for multimode optical fiber of lower wavelength.

18.15 – 18.30	offered by the developed facilities. Several original results obtained are: defining new relevant and measurable quantities, refining some existing quantities, and developing methods to measure them (effective spot area; effective pulse length; clip-level spot area); developing a new method for spatial beam characterization; developing circuitry and software for automated test stations; developing new zoom optics for adjusting the spot size on samples, and for spatial beam characterization.	**VI.O.4. Spectral manifestations of polarization action of narrow slit** Ch.V. Felde, M.V. Oleksyuk, P.V. Polyanskii *Correlation Optics Dept, Chernivtsi National University, Chernivtsi, Ukraine* *E-mail: polyanskii@itf.cv.ua* It is known that narrow slit in metallic screen of width less than ten wavelengths of the probing beam causes considerable polarization effect being acting similarly to linear polarizer. In this paper we demonstrate spectral consequence of the polarization action of narrow slit manifesting itself in spectral filtering that consists in suppressing of red domain of forward-diffracted polychromatic radiation. We apply for the first time the novel Berry's chromascopic technique to demonstrate color modifications for this case. It is shown that chromascopic analysis of *colors* importantly complements standard *spectral* estimations of polarization and frequency modifications of polychromatic radiation induced by a narrow slit.
18.30 – 18.45	**I.O.1. Analysis of bulk and nanostructured passive Q-switches materials for Erbium laser oscillators** Sorin Micloş[1], Ion Lăncrănjan[2], Roxana Savastru[1], Dan Savastru[1] *[1]National Institute of R&D for Optoelectronics - INOE 2000, 409 Atomistilor St., Magurele, Ilfov, RO-077125, Romania;* *[2]Advanced Study Center-INCAS, 220 Iuliu Maniu Blvd., Bucharest, RO-061126, Romania;* Numerical simulation results obtained in investigating the generation of laser pulses with 1550 nm wavelength generated by an Er^{3+} or Er^{3+}-Yb^{3+} laser or fiber laser oscillator operated in passive optical Q-switching regime are presented. Three types of passive optical Q-switch cell are investigated: the usual one based on Co^{2+} or UO^{2} embedded in different hosts; the second consisting of Co^{2+} nano-crystals and the third one composed of carbon nanotubes (CNT) or graphene. The spectroscopic characteristics of these Q-switch cells are analyzed and correlated with criteria obtained with a numerical simulation procedure based on solving a rate equation system.	

18.45 – 19.00	**I.O.2. Influence of energy transfer upconversion on thermal lens of high gain Nd:YVO_4 bounce laser amplifier** Ştefan A. Amarande *Lasers, National Institute for Lasers, Plasma and Radiation Physics, Atomiştilor 409, 077125 Bucharest, Romania* *E-mail: stefan.amarande@inflpr.ro* Detrimental thermal effects affecting optical performances of a high gain Nd:YVO_4 bounce laser amplifier are investigated numerically. Thermally induced lens is stronger due to the increase of the fractional thermal loading with the pump irradiance which is caused by the Auger energy-transfer upconversion (ETU). For intense pumping, the focal length of the thermal lens (TL) is comparable to the length of the laser crystal. Possible ways to alleviate deleterious influence of the Auger ETU on the TL of the bounce laser amplifier are discussed and compared.	

SEPTEMBER 5th, WEDNESDAY

Time	
08.30 – 18.00	***Trip***
20.00	***Collegial Dinner***

SEPTEMBER 6th, THURSDAY

Time	*Aula Magna*	*Aula of the Library*
09.00 – 10.00	**Plenary Session 7 (*Aula Magna*)**	
	Chair: Mircea Guina	
	Pl.7. Deoxyribonucleic acid (DNA) – a new nanomaterial for applications in electronics and in photonics Francois Kajzar *Faculty of Applied Chemistry and Materials Science, University Politehnica Bucharest,Romania* *and* *Université d'Angers, Institut des Sciences et Technologies Moléculaires d'Angers,MOLTECH Anjou - UMR CNRS 6200;* *Equipe Interaction Moléculaire Optique non linéaire et Structuration MINOS 2, Bd Lavoisier,49045 Angers cedex, France* Biopolymers in general, and the deoxyribonucleic acid (DNA) in particular, appear to be the choice materials for the next generation photonic and electronic devices. There are several arguments for the practical use of these materials, such as their origin from renewable resources, abundance, biodegradability, versatility and ease of processing. The DNA biopolymer can be extracted from the waste of food processing industry, thus can be cheap and is ecofriendly. Although the pure DNA represents a limited interest for practical applications (water solubility only, weak π electron conjugation, low ionic conductivity) it can be functionalized with surfactants and with active molecules, providing desired optical and electrical properties. Some of these properties, like fluorescence, are enhanced due to the specific environment it offers. The DNA-surfactant complexes are insoluble in water and soluble in a number of organic solvents, offering large possibilities for functionalization. They form high optical quality thin films, which can be obtained by spin coating. In this talk the different doping mechanisms will be described and discussed. The observed nonlinear optical (NLO) molecules properties of thin films doped with some active molecules will be reviewed and discussed, similarly as the electrical properties of solid membranes which are obtained by DNA functionalization. Some practical applications of these membranes will be also presented and discussed.	
10.00 – 11.00	**Plenary Session 8 (*Aula Magna*)**	
	Chair: Maria Dinescu	
	Pl.8. Nonlinearity of chiral materials Concita Sibilia *Sapienza Università di Roma,Via Antonio Scarpa, 16, I-00161 Roma, ITALY*	
11.00 – 11.15	***Coffee Break***	

	NQO	*LMS*
	Chair: Angela Guzman	**Chair: Eugenio Fazio**
11.15 – 11.45	**III.I.4. Circular motion of particles by the help of the spin part of the internal energy flow** O. V. Angelsky*[1], A. Ya. Bekshaev[2], P. P. Maksimyak[1], A. P. Maksimyak[1], C. Yu. Zenkova[1], N.V. Gorodynska[1] *[1]Chernivtsi National University, 2, Kotsyubinsky Str., Chernivtsi 58012, Ukraine* *[2]Physical Department, Odessa I.I. Mechnikov National University, Dvorianska 2, Odessa 65082, Ukraine* *E-mail: angelsky@itf.cv.ua* Non-spherical dielectric microparticles were suspended in the water-filled cell and exposed to the coherent Gaussian light beam with switchable state of polarization. When the beam polarization is linear, the particles were trapped at certain off-axial position within the beam cross section. After switching to the right (left) circular polarization, the particles performed spinning motion in agreement with the angular momentum imparted by the field, but also they were involved in the orbital rotation around the beam axis, was treated as an evidence for the spin-to orbital angular momentum conversion. Since in our situation the moderate focusing of the beam excluded possibility of such a conversion, we treat the observed particle behaviour as a demonstration of the macroscopic "spin energy flow" predicted by the theory of inhomogeneously polarized paraxial beams. *Keywords*: spin flow, orbital flow, polarization, nanoparticles.	**II.I.4. Laser processing of soft materials: application to controlled drug delivery, tissue engineering, sensing** Irina Alexandra Paun, Andreea Matei, Valentina Carmen Dinca, Alexandra Palla Papavlu, Catlin Luculescu, Valentin Ion, Antoniu Moldovan, Thomas Lippert*, Maria Dinescu *National Institute for Lasers, Plasma, and Radiation Physics - NILPRP, Lasers Department, PO Box MG-16, Magurele, ZIP 077125, Romania* ** Paul Scherrer Institute, General Energy Research Department, 5232 Villigen PSI, Switzerland* Results obtained on soft materials processing via three laser based techniques, namely Matrix Assisted Pulsed Laser Evaporation (MAPLE), Laser Induced Forward Transfer (LIFT) and Two Photon Polymerization Direct Writing (2PP-DW) will be presented. 2PP-DW and LIFT where used for 2D and 3D scaffolds preparation for tissue engineering applications. Cells viability (keratinocytes, melanocites, fibroblasts) and their interactions were studied in relation to scaffolds characteristics. MAPLE was used for deposition of polymers, polymers blends and polymers blends with silver nanoparticles for controlled drug delivery; subsequent tests demonstrated the accurate control of the delivery rate and the antibiofuling effects. The capabilities of Laser Induced Forward Transfer technique for multi ribbon polymers printing on surface acoustic wave sensors platform used for volatile organic compounds detection was demonstrated.
11.45 – 12.00	**III.I.5. Quantum correlations of two-mode Gaussian systems in a thermal environment** Aurelian Isar *Horia Hulubei National Institute for Physics and Nuclear Engineering - IFIN-HH, Bucharest-Magurele, Romania* *E-mail: isar@nipne.ro* In the framework of the theory of open systems based on completely	**II.O.2. Laser-assisted processing for metamaterials** Nicoleta Tosa, Bogdan Cozar, Diana Bogdan, Calin Hojbota *National Institute for Research and Development of Isotopic and Molecular Technologies, 65-103 Donath, 400293 Cluj-Napoca, Romania* *E-mail: nicoleta.tosa@itim-cj.ro* We present here our results related to synthesis of metallic micro- and nanostructures, particularly gold, accomplished by photochemical

	positive quantum dynamical semigroups, we give a description of the continuous-variable quantum entanglement and quantum discord for a system consisting of two noninteracting modes embedded in a thermal environment. We describe the evolution of entanglement in terms of the covariance matrix for Gaussian input states. For all values of the temperature of the thermal reservoir, an initial separable squeezed thermal state remains separable for all times. We study the time evolution of logarithmic negativity, which characterizes the degree of entanglement, and show that	reduction of chemical systems based on metallic doped polymers using direct laser irradiation. The main advantage of this process is that it is developed under ambient conditions and follows the principles of green chemistry. The results for the optimization of these metamaterials type systems evidenced a uniform distribution as size as well as positioning of the nanostructures generated inside of the polymer matrix. Optical microscopy, TEM and AFM as well as UV-VIS spectroscopy techniques were used for investigations.
12.00 – 12.15	in the case of an entangled initial squeezed thermal state, entanglement suppression (entanglement sudden death) takes place, for non-zero temperatures of the environment. Only for a zero temperature of the thermal bath the initial entangled squeezed thermal state remains entangled for finite times. Independent of its type – separable or entangled, the initial state evolves asymptotically to an equilibrium state which is always separable. We analyze the time evolution of the Gaussian quantum discord, which is a measure of all quantum correlations in the bipartite state, including entanglement, and show that quantum discord decays asymptotically in time under the effect of the thermal bath. Before the suppression of the entanglement, the qualitative evolution of quantum discord is very similar to that of the entanglement. 1. A. Isar, *Open Sys. Information Dynamics* **18**, 175 (2011) 2. A. Isar, Phys. *Scripta T* **147**, 014015 (2012)	**II.O.3. Quantum Optical Nanolithography** Eugen Pavel[a], Sorin Jinga[b], Ecaterina Andronescu[b], Bogdan Stefan Vasile[b] , Gerald Kada[c], Akira Sasahara[d], Nicoleta Tosa[e] , Andreea Matei[f], Florin Jipa[f], Maria Dinescu[f], Adrian Dinescu[g] and Otilia Vasile[b] [a] *Storex Technologies, 274, Calea Mosilor, 020892 Bucharest, Romania* [b] *Faculty of Applied Chemistry and Materials Science, "Politehnica" University of Bucharest,* 011061, *Romania* [c] *Agilent Technologies, Tempe, AZ 85282, USA* [d] *School of Materials Science, Japan Advanced Institute of Science and Technology,1-1 Asahidai, Nomi, Ishikawa 923-1292 Japan* [e] *National Institute for R&D of Isotopic and Molecular Technologies,65-103,Donath, 400293 Cluj-Napoca, Romania* [f] *National Institute for Lasers,Plasma and Radiation Physics, 409, Atomistilor, 077125 Magurele, Bucharest,Romania* [g] *National Institute for R&D in Microtechnologies,126A, Erou Iancu Nicolae, 077190, Bucharest, Romania* Here, we present a new quantum optical method to do subwavelength lithography. Using AFM, TEM, STEM and SEM measurements we show that 2 nm width lines could be written in novel materials such as fluorescent photosensitive glass-ceramics by a quantum multiphoton confinement effect. Exposure to the focus laser diode beam (λ = 650 nm) writes high-density lines with 2 nm half- pitch on the sample surface at room temperature, far beyond the diffraction limit, a fundamental barrier to the exploitation of optical lithography. Quantum Optical Nanolithography is an important step to enable full-wafer-level fabrication at 2 nm resolution.

12.15 – 12.30	**III.O.3. Fabrication of plasmonic structures on LN2 cooled substrates** Tomasz Stefaniuk*, Piotr Wróbel, Tomasz Szoplik University of Warsaw, Faculty of Physics, Pasteura 7, 02-093 Warszawa, Poland This research is motivated by our interest in fabrication of plasmonic single metal layer and metal-dielectric multilayer nanolenses with resolution exceeding the diffraction limit. Nanolayers of noble metals are evaporated in e-beam physical vapour deposition machine on smooth substrates at temperatures controlled in the range 90-600 K. For dielectric nanolayers ion assisted deposition is used in temperatures reaching the highest possible values. Thin films of Ag and Au are deposited on polished quartz and sapphire substrates. Quality of surfaces is assessed using standard deviation of average roughness measured with atomic force microscope for films deposited at different rates and different temperatures. To reduce island growth several wetting layers are used. *Keywords:* Plasmonics, metal-dielectric multilayers, plasmonic lenses.	
12.30 – 14.00	***Lunch***	
14.00 – 15.00	**Plenary Session 9 (*Aula Magna*)**	
	Chair: Valentin Craciun	
	Pl.9. Dilute-nitride based high efficiency solar cells: recent developments and future prospects Mircea Guina *Optoelectronics Research Centre, Tampere University of Technology, Korkeakoulunkatu 3, FI-33720 Tampere, Finland* *Email: Mircea.Guina@tut.fi* Dilute nitride (GaInNAs/GaAs) heterostructures are providing unexpected opportunities for the development of novel optoelectronics devices. GaInNAs/GaAs alloys can exhibit a band-gap below 1 eV while being lattice-matched to GaAs. Thus they are ideal for the development of multi-junction III-V solar cells enabling efficiencies above 41%. Such cells are instrumental for future concentrated photovoltaic (CPV) systems. In this presentation we review our recent results concerning molecular beam epitaxy of dilute nitride solar cells. We also discuss the main development avenues that have to be considered in order to make this material system a practical alternative for future CPV systems.	

	NIO	*BOER*
	Chair: Adrian Petris	**Chair: Mihail Lucian Pascu**
15.00 – 15.30	**IV.I.6. Cooperative effects between four subsystems in two-photon and Raman resonances** Nicolae Enaki and Tudor Rosca *Institute of Applied Physics, Academy of Sciences of Moldova, Chisinau, Moldova* *E-mail: enache@asm.md* A new cooperative effect between the radiators consisted of dipole active A, S and R subsystems and dipole forbidden transitions of D subsystem is established in the process of three particle spontaneous emission. It is demonstrated a new type of three particle collective spontaneous emission in which the decay rate of three atomic subsystems is proportional to the product of the numbers of atoms in each subsystem. The quantum kinetics takes into consideration both the correlations between the subsystems A, S, R and D and single and two-photons cooperative effects between the atoms of each sub-ensemble. The three particle cooperative interaction through the vacuum of electromagnetic field takes place in the process of influences of the single photon polarization of S and R atomic subsystems with the polarization of the D atomic ensemble relatively to the two-photon cooperative emission. To understand this effect it is carefully studied the new correlation function between the polarization of three different radiators from A, S, R and D subsystems. In order to avoid the confusion with the Dicke super-fluorescence or two-photon super-fluorescence, in this work it is proposed to study the cooperative effect only between one dipole forbidden atom (D atom) and two dipole active atoms S and R (the radiators S and R don't enter in resonance one with another). In this case only one possibility appear between such three particle ensemble: to enter in resonance one with another according to specific conservation laws which correspond to the two-photon resonances and scattering resonances between the three particles, respectively.	**V.I.3. Optospectral techniques for urban forest state characterization** Maria Zoran, Roxana Savastru, Dan Savastru, Marina Tautan, Sorin Miclos, Laurentiu Baschir *National Institute of R&D for Optoelectronics, Bucharest Magurele, MG 5, RO-077125* *E-mail: mzoran@inoe.inoe.ro* Spectral patterns of different forest landcover can identify certain pollution compounds, and water stress conditions based on the interaction of photons with the molecular structure of the forest target structure. Based on such methods, the objective of this research was to evaluate and characterize selected forest areas in Bucharest region, Romania, *where the climate and anthropogenic stressors endanger natural and economical values of environment. Based on time-series* Landsat TM, ETM, MODIS Terra/Aqua and IKONOS *satellite* data over 1990- 2011 period, h*ave been investigated forest landcover changes in some urban and periurban test areas of Bucharest.* Accuracy of image processing results (spectral classification) was confirmed through in-situ spectroradiometrical analysis of reflectance spectra with portable GER 2600 spectroradiometer.

15.30 – 15.45	**IV.O.4. A new method of estimating the degree of coherence of mutually orthogonal linearly polarized interacting waves** C. Yu. Zenkova, M. P. Gorsky, I. V. Soltys, P. O. Angelsky *Chernivtsi National University, 2 Kotsyubinsky Str., Chernivtsi, 58012, Ukraine* *E-mail: zenkova@itf.cv.ua* The motion of light scattering particles of nanorange in the inhomogeneously-polarized optical field, with allowance made for the Brownian movement, is analyzed in the paper. The spatial modulation of polarization in the observation plane determines the spatial modulation of the volume energy density. That is why the velocity and the resulting optical force, which causes the motion of the testing particles, change according to the degree of coherence of the interacting fields. Thus this paper presents a new method for determining the degree of coherence of superposing plane linearly polarized waves converging at the angle of 90^0 through estimating the velocity of particle motion. The influence of the forces, which arise in the viscous medium and cause the Brownian movement, upon the mechanisms of manipulating and trapping testing particles by the optical field is studied. *Keywords*: nanoparticles, degree of coherence, Poynting vector.	**V.O.3. Numerical analysis of laser paint removal from various substrates** Dan Savastru[1], Roxana Savastru[1], Ion Lăncrănjan[2], Sorin Micloş[2], Constantin Opran[3] *[1]National Institute of R&D for Optoelectronics - INOE 2000, 409 Atomistilor St., Magurele, Ilfov, RO-077125, Romania;* *[2]Advanced Study Center-INCAS, 220 Iuliu Maniu Blvd., Bucharest, RO-061126, Romania;* *[3]POLITEHNICA University of Bucharest, 313 Splaiul Independenţei Ave., Bucharest, Romania;* Numerical simulation results obtained in investigating laser paint removal from different metal substrates, mainly aluminum and aluminum alloys, are presented. The main purpose of the developed simulation model is to define the laser installation specifications required for an operation that does not affect the substrate on which the paint is deposited. This is an important laser application in aeronautical industry. The developed simulation model considers transverse laser beam intensity distribution and, consequently, the temperature distribution in the processed mechanical component.
15.45 – 16.00	**IV.O.5. Optical tweezers based on polarization interferometer** Oleg V. Angelsky, Andrew P. Maksimyak, Peter P. Maksimyak *Correlation Optics Depatment, Chernivtsi National University, 2 Kotsyubinsky Str., Chernivtsi, 58012 Ukraine* *E-mail: pmaksimyak@itf.cv.ua* We propose optical tweezers based on a biaxial crystal. To control the movement of opaque particles, we use the shift polarization interferometer. The results of experimental study of laser tweezers are shown. We demonstrates movement of a microparticle of toner using singular-optical trap, rotate a particle due to orbital momentum, conversion of two traps when changing the plane of polarizer transmission and converging of two traps.	**V.O.4. The possibilities of using scale-selective polarization cartography in diagnostics of myocardium pathologies** Yu. A. Ushenko, O.Ya.Wanchuliak *Correlation Optics Department, Chernivtsi National University, 2 Kotsyubinsky Str., Chernivtsi, 58012, Ukraine* *Bucovinian State Medical University, Chernivtsi, 58002, Ukraine* *E-mail: yuriyu@gmail.com* The optical model of polycrystalline networks of myocardium protein fibrils is presented. The technique of determining the coordinate distribution of polarization azimuth of the points of laser images of myocardium histological sections is suggested. The results of investigating the interrelation between the values of statistical (statistical moments of the 1st-4th order) parameters are presented which

		characterize distributions of wavelet-coefficients polarization maps of myocardium layers and death reasons. *Keywords:* polarization, biological tissue, birefringence, wavelet
16.00 – 16.15	**IV.O.6. Optical cloning of arbitrary images beyond the diffraction limits** Onkar N. Verma[1], Jörg Evers[2], and Tarak N. Dey[1, 2] *[1]Department of Physics, Indian Institute of Technology Guwahati, Guwahati- 781 039, Assam, India* *[2]Max-Planck-Institut f˙ur Kernphysik, Saupfercheckweg 1, 69117 Heidelberg, Germany* *E-mails: onkar@iitg.ernet.in; joerg.evers@mpi-hd.mpg.de; tarak.dey@gmail.com* We investigate the possibility of cloning and improving the resolution of an arbitrary structure beyond the diffraction limit. We use coherent population trapping phenomena to transfer the spatial structure of the control beam to the transmitted probe beam through a homogeneously broadened three-level atomic system in Λ configuration. We found the finesse of the transmitted probe beam to be 2 times greater than that of the control beam which explain the experiments of Li et al. [Phys. Rev. A 78, 013803(2008)]. We also found that the ground state atomic coherence plays a key role for creating a structure of sub-wavelength size.	
16.00 – 17.00	**CLOSING SESSION**	

POSTER SECTION I: LASERS AND RADIATION SOURCES

I.P.1. Spatial chirp correction in a CPA system using a 2D spatial light modulator

Laura Ionel

National Institute for Laser, Plasma and Radiation Physics, Laser Department, Atomistilor Str. 409, P.O. Box MG-36, 077125 Magurele-Bucharest, Romania;
E-mail: laura.ionel@inflpr.ro

Pulse-front tilt in an ultrashort laser pulse had been proved to be a direct effect of angular dispersion produced by temporal and spatial chirp of the pulse. In this paper, we present an alternative method to correct the spatial chirp for a Gaussian beam propagated through a chirped pulse amplification system using a spatial light modulator (SLM). An iterative code based on Gerchberg-Saxton algorithm was elaborated to design computer generated holograms to be addressed on the SLM in order to compensate optical aberrations as the pulse-front tilt and angular dispersion. The results are relevant for different applications where the wavefront correction is needed.

I.P.2. Lasing effects in micro droplets

M. Boni[1,2], V. Nastasa[1,2], I. R Andrei[1], Angela Staicu[1], M. L. Pascu[1,2]

[1] National Institute for Laser, Plasma & Radiation Physics (INFLPR)
[2]Faculty of Physics, University of Bucharest
E-mail: mihai.boni@inflpr.ro

In this paper we report the lasing effects that are obtained by laser pumping of micro-droplets which contain solutions of Rhodamine 6G (R6G) in ultrapure water. This optical resonant effect appears due to the amplification obtained within the spherical resonant cavity constituted by the droplets themselves that amplify preferentially different R6G emission signals. In order to observe and characterize the lasing emission, the laser induced fluorescence emitted by the pendant droplets when excited at 532 nm was measured.

I.P.3. Analysis of synchronization regimes and optical spectrum of a coupled chaotic laser system

I.R. Andrei[a*], G.V. Popescu[a], C.M. Ticos[a], M. Bulinski[b] and M.L. Pascu[a]

[a] National Institute for Lasers, Plasma, and Radiation Physics, P.O. Box MG-36, str. Atomistilor 409, 077125 Magurele,
[b] University of Bucharest, Faculty of Physics, str. Atomistilor 405, 077125 Magurele
** E-mail: ionut.andrei@inflpr.ro*

In the present work, two semiconductor lasers (SL) were optically coupled into a master - slave synchronization scheme. The master systems was a SL operated under external optical feedback conditions in the low-frequency fluctuation chaotic regime, while the slave system was a solitary laser with free emission. The chaotic synchronization regimes and optical spectrum behaviour of the coupled system have been experimentally analyzed in relation to the initial emission spectra of the two solitary semiconductor lasers. The results allow to better understand the mechanisms that contribute to the synchronization regimes stability and optical spectrum formation of the coupled system.

I.P.4. Energy levels of Er^{3+} and their kinetics in the partially disordered calcium lithium niobium gallium garnet

Octavian Toma, Serban Georgescu, Lucian Gheorghe

Solid-State Quantum Electronics Laboratory, National Institute for Laser, Plasma and Radiation Physics, 409 Atomistilor Street, Magurele, Jud. Ilfov, 077125, Romania.

The energy levels of Er^{3+} in the partially disordered calcium lithium niobium gallium garnet are found using absorption spectra at low temperature. The multi-center structure of these spectra is discussed. The lifetimes of the metastable infrared-emiting erbium levels $^4I_{11/2}$ and $^4I_{13/2}$ are found and their kinetics is discussed.

I.P.5. Generation of high-peak power 532-nm green pulses from passively Q-switched, all-poly-crystalline Nd:YAG/Cr^{4+}:YAG ceramics laser

G. Salamu, A. Ionescu, C. Brandus, O. Sandu, N. Pavel, T. Dascalu

National Institute for Laser, Plasma and Radiation Physics, Laboratory of Solid-State Quantum Electronics, Bucharest R-077125, Romania
E-mail: gabriela.salamu@inflpr.ro

Green laser pulses at 532 nm with 0.36-mJ energy and 0.3-MW peak power are obtained by single-pass frequency doubling with LiB_3O_5 nonlinear crystal at room temperature of pulses delivered by a quasi-cw, diode-pumped, composite, all-poly-crystalline Nd:YAG/Cr^{4+}:YAG ceramics laser. The infrared to visible light conversion efficiency is 0.27.

I.P.6. Simple method to measure the clip-level (threshold) area of a laser spot

Alexandru Zorilă[1,2*], Laurenţiu Rusen[2], Aurel Stratan[2], George Nemeş[3]

[1]"Politehnica" University of Bucharest, 313 Splaiul Independentei, Bucharest 060042, Romania
[2]Department of Lasers, National Institute for Laser, Plasma, and Radiation Physics, 409 Atomistilor Str., Măgurele 077125, Romania
[3]ASTiGMAT™, Sacramento, CA 95827, USA
**E-mail: alexandru.zorila@inflpr.ro*

The clip-level area of a laser spot is defined, compared to other definitions, and a simple method to measure it is presented. A self-calibrating technique to determine the single-pulse damage threshold of a thin layer on a substrate, and a controlled attenuation of the laser beam are used. Adjusting the beam attenuation, the single-pulse damage threshold is obtained as the smallest detectable damage. Then, another pulse with the same energy is applied, this time with a fixed calibrated attenuator (10x) removed from the beam path. The boundary of the newly affected zone on the sample corresponds to the damage threshold fluence on the substrate's material. The area inside this boundary, measured with a microscope and software, is the clip-level area of the laser spot. The method was tested on several substrates, and by directly measuring the clip-level area of the laser spot with a beam profiler. A 5% average relative error between the new method and the beam profiler-based one is obtained.

POSTER SECTION II: LASERS IN MATERIALS SCIENCE

II.P.1. Direct femtosecond laser written waveguides in Nd:YAG

G. Salamu[1], F. Voicu[1], F. Jipa[2], M. Zamfirescu[2], N. Pavel[1]

National Institute for Laser, Plasma and Radiation Physics, Bucharest R-077125, Romania
[1]Laboratory of Solid-State Quantum Electronics
[2]Laser Department, Solid-State Laser Laboratory
Email: gabriela.salamu@inflpr.ro

Tracks were written in Nd:YAG by modifying the laser crystal refraction index with a femtosecond laser. Stress-induced birefringence was observed in vicinity of the tracks, which were fabricated near to, as well as up to 300-μm depth under the Nd:YAG surface. While the threshold of ablation was ~3.4 J/cm^2, the tracks were realized with peak laser fluence higher than 14.3 J/cm^2. These are our first results toward realization of waveguide lasers by direct femtosecond laser writing technique.

II.P.2. The influence of the femtosecond laser ablation accuracy on fabrication of TiO_2 photonic bangap structures

Iulia Anghel[1], Florin Jipa[1], Marian Zamfirescu[1], Andreea Andrei[1], Sandel Simion[1], Razvan Dabu[1] and Adrian Rizea[2]

[1]National Institute for Laser, Plasma and Radiation Physics, Atomistilor 409, 077125 Magurele, Romania
[2]S.C. PROOPTICA S.A, Gh. Petrascu 67, 745081, Bucharest, Romania

Photonic structures were experimentally and theoretically studied on TiO_2 films. Periodical structures with triangular symmetry were produced by laser ablation. The samples were precisely processed by tightly focusing a femtosecond laser beam with 200 fs pulse duration, 775 nm wavelength, energy of hundreds of nJ per pulse, and repetition rate 2 kHz. Finite-difference time-domain and the plane wave expansion numerical simulation of the photonic structure revealed photonic band gaps around telecommunication wavelength at 1.55 μm. We studied the modification of the photonic band gaps with variation of the radius of the holes, caused by limited laser processing accuracy.
Keywords: photonic crystal, femtosecond laser ablation, TiO_2

II.P.3. 3D laser target micro-fabrication using Two Photon Photo-polymerization method

Florin Jipa, Marian Zamfirescu, and Razvan Dabu

National Institute for Laser, Plasma and Radiation Physics, Str. Atomistilor 409, 077125 Magurele, Romania
E-mail: florin.jipa@inflpr.ro

When a ultra short high intense laser pulse interact with a solid target, high energy particles like ions, protons, or X-ray are generated. In order to increase the energy particles as well as energy transformation efficiency, micro- structured targets (hohlraum) with reduced dimensions are used.
In this paper, we present a 3D micro-target structure for high intense laser interactions, created in inorganic-organic hybrid OrmoCore photoresist material using Two Photon Photo-polymerization (TPP) technique. This technique use two-photon absorption effect generated by focused femtosecond laser pulses to induce photo-polymerization of the material.
Keywords: two-photon polymerization, photosensitive materials, femtosecond laser, laser target.

II.P.4. Hydroxyapatite Thin Films Synthesized by Pulsed Laser Deposition and Radio Frequency-Magnetron Sputtering onto Titanium Mesh Implants

L. Duta[1]*, G.E. Stan[2], G. Socol[1], A.C. Popescu[1], F.M. Miroiu[1], I.N. Mihailescu[1], A. Ianculescu[3], A. Chiriac[4], I. Poeata[4]

[1]*National Institute for Lasers, Plasma and Radiation Physics, Atomistilor Street 409, Magurele, Romania*
[2]*National Institute of Materials Physics, 105 bis Atomistilor Street, Magurele, Romania*
[3]*Polytechnics University of Bucharest, Romania*
[4]*"Gr.T. Popa" University of Medicine and Pharmacy, 16 University Street, Iasi, Romania*
E-mail: liviu.duta@inflpr.ro

We report on the synthesis of advanced nanostructured Hydroxyapatite thin films onto 3D Ti mesh substrates by two deposition methods. Morpho-structural and pull-out tests assessed the purity and crystallinity of Hydroxyapatite films along with their good adhesion. The tomodensitomery analysis of the control cranial scans evidenced the process of osteogenesis. In 4 patients with Hydroxyapatite/Ti mesh, the modification of the value obtained on Hounsfield scale was observed at the level of implant, supporting the osteointegration phenomenon. We conclude that the structures exhibited excellent bonding strength and functionality, and are suitable for neurosurgical applications.
Keywords: cranial bone defects; osteointegration; Ti mesh, Pulsed Laser Deposition, Radio Frequency-Magnetron Sputtering

II.P.5. Laser-induced breakdown spectroscopy applied to metallic thin films compositional libraries analyses

E. Axente[1*], G. Socol[1], S. Beldjilali[2,3], C. Ristoscu[1], I. N. Mihailescu[1], and J. Hermann[2]

[1]*Lasers Department, INFLPR, P.O. Box MG 36, RO-77125, Magurele, Ilfov, Romania* [2]*Laboratoire LP3, CNRS – Université Aix-Marseille II, Luminy, 13288 Marseille, France* [3]*LPPMCA, Universite´ des Sciences et de la Technologie d'Oran, BP 1505 El Mnaouer, Oran, Algeria*
E-mail: emanuel.axente@inflpr.ro

Combinatorial Pulsed Laser Deposition approach proved to be an ideal tool for the synthesis of thin films compositional libraries with lateral and longitudinal concentration gradients. We report on the fabrication of metallic libraries films (Au, Ag, and Cu) using a KrF* laser, on typical microscope slides.
LIBS technique was used to investigate samples composition along their longitudinal direction using a Nd:YAG laser in argon. The relative concentrations of metals were evaluated by comparing the measured spectra to the spectral radiance computed for a plasma in local thermal equilibrium. Plasma temperature and electron density were deduced from the relative intensities and Stark broadening of spectral lines of atomic species. Analyses at different locations on the deposited samples revealed that metals concentration ratio varies significantly along surface.

II.P.6. Azo derivatives thin films deposited by laser techniques

A. Emandi[1], I.C. Vasiliu[1], I. Ionita[2], A. Matei[3], V. Ion[3], M. Dinescu[3]

[1]*INOE 2000 - National Institute for Optoelectronics, 1 Atomistilor Str., PO Box MG 5, RO-077125 Magurele, Bucharest, Romania*
[2] *University of Bucharest, Faculty of Physiscs, 405 Atomistilor Str., Magurele, Jud. Ilfov, Romania*
[3]*National Institute for Laser, Plasma and Radiation Physics, 409 Atomistilor Str., RO-077125 Magurele-Bucharest, Romania*

Azo dyes have been extensively studied throughout the past decades due to their interesting chemical and physical properties. These molecules have been considered for nano-tweezers, photoresponsive biomaterials, polymer-based nanostructures, photonic crystals etc. Azo dyes compounds are very attractive because of their nonlinear optical properties, mainly two-photon absorption, optical limiting performance and all-optical poling.

An important aspect is the use of these compounds is their processing as thin films. This study deals with optimization of the ordering of these compounds molecules in thin films grown by laser techniques (Matrix assisted pulsed laser evaporation - MAPLE). Morphological, structural and optical investigations performed.

II.P.7. The effect of post-deposition annealing treatments on the structural and optical characteristics of some TCO thin films

P. Prepelita (m. Garoi), V. Craciun, N. Stefan, M. Filipescu and C. Luculescu

National Institute for Lasers, Plasma and Radiation Physics, 409Atomistilor Street, Magurele 077125, Ilfov, Romania
E-mail: petronela.garoi@inflpr.ro

Some transparent contact electrodes (TCO) like ZnO:Al, ITO and SnO_2 thin films have been prepared by modern methods in various deposition conditions. It was established that post-deposition annealing treatments determined a stable structure of the films and a good oxidation of samples. Information about the crystalline structure and surface topography of the samples was obtained using SEM. AFM images showed that our samples have a grain like surface morphology. The XRD patterns indicated the films are polycrystalline oxide thin films. Optical energy gap determined from the absorption spectra was in the range from 3.2 eV to 3.7 eV.

II.P.8. Spectroscopical studies of zinc phthalocyanine in binary solvent mixtures.

A. Staicu[a*], A. Pascu[a], M. Boni[a], T. Alexandru[a], M. Enescu[b], M.L. Pascu[a]

[a] National Institute for Lasers, Plasma and Radiation Physics, Laser Department, Atomistilor 409, 077125 Magurele, Bucharest, Romania
[b]UFR-ST Laboratoire Chrono-Environnement UMR CNRS 6249, 16 Route de Gray, 25030 Besancon Cedex, Université de Franche-Comté, France
**E-mail: angela.staicu@inflpr.ro*

Photophysical studies of zinc phthalocyanine (ZnPc), compound having good photosensitizing properties, in binary solvent mixtures are reported. The spectroscopical techniques implied in this study are: steady state absorption, laser induced fluorescence time-resolved phosphorescence, and photoacoustic calorimetry. Photophysical parameters as absorbance, quantum yield of fluorescence are determined function of mole fractions in the solvent mixtures. The lifetime and quantum yield of photogenerated singlet oxygen versus solvents rate were determined by measurement of the time resolved phosphorescence of O_2 molecule at 1270 nm. This was generated *via* energy transfer from excited ZnPc molecule by the third harmonic of a pulsed Nd:YAG laser.

II.P.9. Al &Fe nanoparticles obtained by laser ablation in liquid

M. Bojan[1], I. Iordache[1], I. Apostol[1], C. Udrea[1], V. Damian[1], S. Manoiu[2]

[1]National Institute for Laser, Plasma and Radiation Physics, Dept. of Lasers, 409 Atomistilor Str., PO Box MG-36, R-077125 Bucharest-Magurele, Romania
[2]National Institute of Research and Development for Biological Sciences (INCDSB), Splaiul Independenței nr. 296, sector 6, R-060031, P.O. Box 17-16, Bucharest - Romania

Nanoparticles production by laser induced ablation in liquids from iron and aluminum targets is reported. As a laser source we have used a Nd:YAG laser (355 nm wavelength, 5 ns pulse length) and water as ambience liquid. After a proper selection of the parameters of the incident laser radiation for each target, we have analyzed the nanoparticles obtained and stocked in the liquid medium by transmission electron microscopy. In case of the iron target ablation we have obtained nanoparticles with dimensions situated in the 3-5 nm and 10-15 nm domains and for aluminum targets the diameters are between 5-20 nm, but also “big” particles of 50- 90 nm are present.

POSTER SECTION III: NANOPHOTONICS AND QUANTUM OPTICS

III.P.1. Numerical Analysis of a Nanowire Grating Plasmon

Ion Lăncrănjan[a], Sorin Micloş[b], Aurelian Popescu[b], Dan Savastru[b], Ion N.Mihăilescu[c]

[a] *Advanced Study Center-INCAS, 220 Iuliu Maniu Blvd., Bucharest, RO-061126, Romania;*
[b] *National Institute of R&D for Optoelectronics - INOE 2000, 409 Atomistilor St., Magurele, Ilfov, RO-077125, Romania;*
[c] *National Institute for Laser, Plasma and Radiation Physics, 409 Atomistilor St., Magurele, Ilfov, RO-077125, Romania*

Preliminary results obtained in investigating a plane electromagnetic wave incident on a metal nanowire grating formed on a dielectric substrate, using FEM, are presented. The numerically simulated model is developed considering Cu, Au, Ag or other metal nanowire having a diameter of 40 nm - 800 nm, formed on dielectric substrates with a refractive index between 1.4 and 2.4. The transmission and reflection coefficients for refraction, specular reflection and first order diffraction are computed. The cases of dielectric substrate with metallic layers of different thicknesses deposited on the opposite side are also investigated.

III.P.2. Nonlinear refractive properties of 1D periodically nanostructured silicon-on-insulator investigated by reflection I-Scan

Tatiana Bazaru Rujoiu, Adrian Petris, Valentin I. Vlad

National Institute for Laser, Plasma and Radiation Physics, Dept. of Lasers, 409 Atomistilor Str., PO Box MG-36, 077125 Bucharest-Magurele, Romania

Periodically nanostructured silicon-on-insulator could be considered as a composite material and described by effective medium theory of surface periodic structures. In this work, we present our theoretical and experimental studies of effective optical linear refractive index and thermal and electronic third-order optical nonlinearities of silicon-on-insulator periodic nanostructures. By using reflection intensity scan in continuous laser beam, at wavelength of 808 nm, and pulsed femtosecond laser beam, at 775 nm and 140 fs pulse duration, we shown that the thermal and electronic third-order optical nonlinearities are larger than results obtained on bulk silicon. Also, our experimental results were compared with theoretical predictions and are in good agreement. Our studies are important for applications in linear and nonlinear photonics.

III.P.3. In-situ diagnosis of nanoparticles obtained by laser ablation in liquid

I. Iordache, I. Apostol, M. Bojan, C. Udrea, V. Damian

National Institute for Laser, Plasma and Radiation Physics, Dept. of Lasers, 409 Atomistilor Str., PO Box MG-36, 077125 Bucharest-Magurele, Romania

In the process of laser ablation in liquids (LAL) nanoparticles are produced and collected in the liquid environment. We have analyzed the obtained nanoparticles as they are collected in suspension by optical absorption spectroscopy and dynamic light scattering. The obtained results are compared with the measurements of the produced nanoprticles by electron microscopy in order to correlate the nanoparticles dimensions with the results obtained with the diagnostic methods using the as obtained suspension, considered as “in-situ” methods. The limitations of the methods and the possibility to use them to control in real time the LAL process are discussed.

POSTER SECTION IV: NON-LINEAR AND INFORMATION OPTICS

IV.P.1. Luminescence Induced Spatial Soliton Waveguides

Eugenio Fazio, Massimo Alonzo, Rémy Passier

Ultrafast Photonics Lab, Department of Fundamental and Applied Sciences for Engineering, Sapienza Università di Roma, Via Antonio Scarpa, 16 I-00161 Roma Italy
E-mail: eugenio.fazio@uniroma1.it

Luminescence Induced Spatial Solitons (LISS) will be reviewed in close connection with the photorefractive properties of erbium doped lithium niobate crystals. Trapped beams are obtained in crystals doped with erbium that generates higher-energy luminescence by 2-step absorption. Luminescence can be absorbed by the bulk lithium niobate medium originating the photorefractive effect. Thus, luminescence generates at the same time the solitonic channel and the background illumination for the photorefractive soliton stabilisation (bending elimination). Numerical investigations of LISS formation and waveguiding highlight the great feasibility of such structures, showing that LISS waveguides can be optimized for propagation exactly at the erbium lasing wavelengths i.e. in the third telecom window, with propagation losses down to 0.05 dB/cm at 1540 nm.
Indeed, LISS channels have very high potentialities for active and passive electro-optic devices.

1. E. Fazio, F. Renzi, R. Rinaldi, M. Bertolotti, M. Chauvet, W. Ramadan, A. Petris, V.I. Vlad, *Screening-photovoltaic bright solitons in lithium niobate and associated single-mode waveguides,* Appl. Phys. Lett. 85, 2193-2195 (2004).
2. V. I. Vlad, E. Fazio, M. Bertolotti, A. Bosco, A. Petris, *Laser generated soliton waveguides in photorefractive crystals*, Appl. Surf. Sci. 248, 484-491 (2005).
3. M. Alonzo, F. Pettazzi, M. Bazzan, N. Argiolas, M.V. Ciampolillo, S. Heidari Batheni, C. Sada, D. Wolfersberger, A. Petris, V.I. Vlad and E. Fazio, *Self-confined beams in erbium–doped lithium niobate*, J. Opt. **12**, 015206-1/015206-6 (2010)
4. A. Petris, S. Heidari Bateni, V.I. Vlad, M. Alonzo, F. Pettazzi, N. Argiolas, M. Bazzan, C. Sada, D. Wolfersberger and E. Fazio, *The r_{33} electro-optic coefficient of Er:$LiNbO_3$*, J. Opt. **12**, 015205-1/015205-5 (2010)
5. E. Fazio, M. Alonzo, F. Devaux, A. Toncelli, M. Bazzan, C. Sada and M. Chauvet, *Luminescence-Induced Photorefractive Spatial Solitons*, Applied Physics Letters **96**, 091107-1/3 (2010)

IV.P.2. Particle-in Cell simulation of high harmonics generation mechanism occurring at the interaction of ultrashort and intense laser pulses with plasma

A. Mihailescu, V. Stancalie, V.F. Pais

National Institute for Laser, Plasma and Radiation Physics, P.O.Box MG-36, Magurele, 077125 ROMANIA, Association EURATOM MEdC
E-mail: andreea.mihailescu@inflpr.ro

In this work the interaction of a short and intense laser beam ($I\lambda^2 = 10^{17} - 10^{19} Wcm^{-2}\mu m^2$) with an overdense plasma layer is simulated with the purpose of studying the high harmonics generation mechanism and its efficiency. Therefore, we make use of a 1D3V relativistic particle in cell (PIC) code. Pulses have been adjusted in shape and duration– at normal and oblique incidence- while the intensity and the polarization of the laser beam were varied. Influences of the plasma density and of the initial electron temperature have also been taken under consideration. Numerical errors have been optimized by properly tailoring the size of the simulation box, the time steps per laser cycle and the number of macroparticles per cell.

IV.P.3. Escape factors approximation in radiation-transfer codes

A. Stancalie[1], S. Ciobanu[2], V.F. Pais[1], A. Mihailescu[1], V. Stancalie[1]

[1]National Institute for Laser, Plasma & Radiation Physics, Department of Lasers, Atomistilor 409, P.O.Box MG-36, Magurele, Ilfov, 077125 ROMANIA, Association EURATOM/ MEdC
[2]University Politehnica of Bucharest, Department of Physics, 313 Splaiul Independentei, 060042 Bucharest, Romania

In this work the escape factor method is used to simulate radiation transfer in a laser produced copper plasmas in vacuum, obtained by the ablation of a solid target under high power laser exposure [1]. Two package programs, ADAS [2] and FLYCHK [3], are used in the present spectra simulation. We examine the prediction for the intensity of optically thick spectral lines in a coronal equilibrium plasma produced by a high-power laser. We will compare and contrast the mean opacity calculation results from these two codes.

[1] S. Ciobanu, et. al. *35th EPS Conference on Plasma Phys. ECA Vol.32D, P-5.144(2008).*
[2] http://www.adas.ac.uk
[3] H. K. Chung, et. al. *High Energy Density Physics* 1, 3(2005).

IV.P.4. Accessing physics data using web services

V. F. Pais, A. Stancalie, A. Mihailescu, V. Stancalie

National Institute for Laser, Plasma and Radiation Physics, P.O. Box MG-36, Magurele, 077125, ROMANIA, Association EURATOM/MEdC
E-mail: vasile.pais@inflpr.ro

Physics research involves both experiments and simulations, usually producing and accessing large amounts of data. This information is then used for further studies and simulations, either by the party that produced it or by other research organizations [1]. In this context, data access is a key problem, especially when information is supposed to become part of international databases.
This paper presents a mechanism for accessing physics related information using web services. The inherent problems arising from having huge data sets [2] are tackled and solutions for high speed access are given. Furthermore, security issues [3] are taken into account, presenting ways of integrating authentication and authorization mechanisms.

[1] V.F. Pais, S. Balme, H.S. Akpangny, F. Iannone, P. Strand, "Enabling remote access to projects in a large collaborative environment", Fusion Engineering and Design 85 (2010), pp. 633-636
[2] V.F. Pais, V. Stancalie, F.A. Mihailescu, M.C. Totolici, "Performance Issues Related to Web Service Usage for Remote Data Access", AIP Conf. Proc. 996, 276-280 (2008)
[3] V.F.Pais, V. Stancalie, "Providing Secure Access to Unsecure Web Services", IEEE Xplore Digital Library, IEEE CNF, ISBN: 978-0-7695-3329-2, pages 161-164, doi:10.1109/SECURWARE.2008.69

IV.P.5. Experimental results that confirm the existence of a real optical path from the object to the image plane when SPDC generated light and ghost image technique are used

L. Rusu, Al. Rusu

"Horia Hulubei" National Institute for Physics and Nuclear Engineering, Reactorului Street, No. 34, City Măgurele, jud. Ilfov, POB 077125

It is generally accepted that the wave vector correlation of the signal (s) and idler (i) beams allows the explanation of the ghost image technique. Pittman & al. [1] designed their setup so that the time coincidence window is shorter than the photon propagation time along *s* beam, from the object to the barium beta-borate crystal and then, following the *i* beam, to the image plane. Consequently, the object reflected photons cannot contribute to the coincidence image. Nevertheless, D. B. Ion considers the already mentioned optical path as a

real one [2]; the photons follow it according to a “quantum mirroring process” based on the crossing symmetry of the electromagnetic phenomena.
Our experiment reveals the existence of a quantum mirroring process. The poster contains the measuring setup, the experimental results, an idea to explain them and suggestions for the setup improvements.

1. T. B. Pittman, Y. H. Shih, D. V. Strekalov, A. V. Sergienko, Optical imaging by means of two-photon quantum entanglement, Phys. Rev A 52, 3429 (1995)
2. D.B. Ion, M.L. Ion, L. Rusu, Quantum crossing symmetry as heart of ghost imaging, Optics Communications 283 (2010) 1026–1031.

IV.P.6. Simulation and measurement of vibration modes of a rough object

F. Garoi, V. Damian and D. Apostol

National Institute for Laser, Plasma and Radiation Physics, 409 Atomistilor Street, Magurele 077125, Ilfov, Romania
E-mail: florin.garoi@inflpr.ro

Vibration modes of an aluminium plate are measured by speckle interferometry and simulated with finite element method (FEM). We also described the experimental setup and the image processing algorithm of the interferograms. The two methods are compared and complementary description of the studied vibration modes is given. Even though a fair description of the vibrations can be achieved by FEM, a comprehensive knowledge of the object physical properties and its kinematics is necessary beforehand. With the interferometric method however, only the experimental details need attention and no information about the object is required.

POSTER SECTION V: BIOPHOTONICS AND OPTICS IN ENVIRONMENT RESEARCH

V.P.1. Linear dichroism of biological tissues in cancer diagnostics

I. Gruia [a], M. G. Gruia [b], S. B. Yermolenko[c], P. V. Ivashko[c]

[a]*University of Bucharest, Optics-Spectroscopy-Plasma-Lasers Dept., Bucharest, Romania,*
[b]*Oncologic Institute "Al. Trestioreanu", Bucharest, Romania,*
[c]*Chernivtsi National University, 2 Kotsyubinsky Str., Chernivtsi, 58012, Ukraine*
E-mail: yeserg@rambler.ru

The results of studies of linear dichroism values of different types of biological tissues (human prostate, epithelial human, muscle) both healthy and infected tumor at different stages of development are shown here. The significant differences in magnitude of linear dichroism and its spectral dependence in the spectral range λ = 330 - 750 nm both among the objects of study, and between biotissues: healthy (or affected by benign tumors) and cancer patients are established. As for healthy tissues linear dichroism is absent, the results may have diagnostic value for detecting and assessing the degree of development of cancer.

V.P.2. Scattering modeling of the polarized light in epithelium cancer tissue

S. B. Yermolenko, P. V. Ivashko

Chernivtsi National University, 2 Kotsyubinsky Str., Chernivtsi, 58012, Ukraine
E-mail: yeserg@rambler.ru

The algorithm for calculating matrix elements in the process of Muller backscattering of polarized laser radiation in biological tissues (on the skin sample) was developed. The modeling in case of different particle sizes, scattering and absorption environment coefficients are made. It is shown that this method is suitable for spherical particles with the size of the wavelength; absorption and scattering optical layer coefficients do not influence the effectiveness of the method. The feature of the method is that the size of objects should greatly exceed the wavelength, and require considerable time for ray tracing.

V.P.3. Laser induced modifications on drugs and their use as transport vectors to biological targets

V. Nastasa[1,2], M. Boni [1,2], I. R. Andrei[1], M. L. Pascu[1]

[1]*National Institute for Laser Plasma and Radiation Physics, Bucharest, Romania*
[2]*Faculty of Physics, University of Bucharest, Romania*
E-mail: viorel.nastasa@inflpr.ro

There is currently significant interest in the multiple resistance to treatment using drugs (MDR), developed by bacteria and malignant tumors. One of the alternatives to the existing medicines and treatment procedures in fighting MDR is strengthening the effects of medicines by improving their delivery methods. Such a method is represented by the generation, transport and use of micro/nano-droplets which contain drugs. This approach can reduce the medicines consumption by generating micro-droplets which contain drugs incorporated in solvents substances; the micro-/nano-droplets can favor a faster delivery to the targets and a higher drug concentration in them. Another studied method used to improve the effect of medicines is represented by the laser irradiation of these solutions. It was noticed that laser irradiation can induce molecular modifications in the studied drugs.

V.P.4. Spatial-frequency structure and polarization phasometry of coherent images of biological polycrystalline networks

Pavlo O. Angelsky*, L. Trifonyuk

Correlation Optics Department, Chernivtsi National University, 2 Kotsyubinsky Str., Chernivtsi, 58012, Ukraine
E-mail: yuriyu@gmail.com

Our research is aimed at designing an experimental method of Fourier laser polarization phasometry of the layers of human effusion for an express determining the potentialities of diagnostics of pathological changes in mammary gland basing on polarization analysis of laser images of polycrystalline networks of blood plasma albumins and globulins.
Keywords: polarization, Fourier plane, birefringence, spatial-frequency selection

V.P.5. Complex degree of mutual coherence of biological liquids

V.A. Ushenko

Correlation Optics Department, Chernivtsi National University, 2 Kotsyubinsky Str., Chernivtsi, 58012, Ukraine
E-mail: yuriyu@gmail.com

To characterize the degree of consistency of parameters of the optically uniaxial birefringent protein nets of blood plasma a new parameter – complex degree of mutual coherence (CDMC) is suggested. The technique of polarization measuring the coordinate distributions of the complex degree of mutual anisotropy of blood plasma is developed.
Keywords: polarization, correlation, birefringence, blood plasma

V.P.6. Assessment of the aerosols distribution in the Bucharest metropolitan area in relation with health effects

Maria Zoran[1], Mariana Rodica Dida[2]

[1]*National Institute of R&D for Optoelectronics, Bucharest, Romania*
E-mail :mzoran@inoe.inoe.ro
[2]*University of Medicine and Farmacy of Craiova, Romania*

MODIS Terra/Aqua time-series satellite images and in- situ monitoring of particle matter PM2.5 and PM10 have been used in an effort to qualitatively assess distribution of aerosols in the greater Bucharest area during 2010-2011 period. It was found that PM2.5 and PM10 aerosols exhibit their highest concentration mostly in the central part mainly due to road traffic as well as in the industrialized parts outside of city's centre. Many epidemiological studies examining the relationships between adverse health outcomes and exposure to air pollutants in urban agglomerations use ambient air pollution measurements like as PM10 and PM2.5 levels as a proxy for personal exposure levels. The measurements of environmental concentrations of particulate matter air pollutants have been correlated with some meteorological parameters (air temperature and pressure, relative humidity, wind intensity) in urban and periurban.

V.P.7. Analysis of climatic and anthropogenic changes effects on spectral vegetation indices of forested areas

Maria Zoran, Roxana Savastru, Dan Savastru, Marina Tautan, Sorin Miclos, Laurentiu Baschir

National Institute of R&D for Optoelectronics, Bucharest Magurele, MG 5, RO-077125
E-mail: mzoran@inoe.inoe.ro
Climate variability and change are risk factors for climate sensitive activities such as forestry. Managing these risks requires "climate knowledge", through understanding of causes and consequences of climate variability

and potential suitable management options. Thresholding based on biophysical variables derived from time series satellite data is a new approach to classifying forest land cover via remote sensing through use of Normalized Difference Vegetation Index (NDVI). This paper aims to assess spatio-temporal forest changes through applied *time-series* Landsat TM, ETM, MODIS Terra/Aqua and IKONOS satellite remote sensing data of Cernica forest area near Bucharest, Romania, during 1990-2011 period.

V.P.8. Generation and biological evaluation of the products formed from the exposure of Chlorpromazine to a 266 nm laser beam

T. Alexandru[1], M. L. Pascu[1], B. Danko[2], V. Nastasa[1], M. Boni[1], A. Militaru[1], I. R. Andrei[1], A. Staicu[1], A. Hunyadi[2], A. Armada[3], M. Viveiros[3], L. Amaral[3]

[1]*National Institute for Laser, Plasma and Radiation Physics, Laser Department, 409 Atomistilor, 077125, Magurele, Romania*
[2] *Institute of Pharmacognosy, Faculty of Pharmacy, University of Szeged, Eötvös u. 6., H-6720, Szeged, Hungar*
[3] *Group of Mycobacteria, Unit of Microbiology, Institute of Hygiene and Tropical Medicine, Universidade Nova de Lisboa, Lisbon, Portugal.*
E-mail: tatiana.alexandru@inflpr.ro

Phenothiazine exposed to white light or UV radiation undergoes a variety of reactions that result in the degradation of the parental compound and the formation of new species. Chlorpromazine exposed to the 266 nm laser beam of given energy levels yielded species derived from it, whose number increased with duration of exposure. At distinct time intervals the irradiation products were evaluated by spectrophotometry between 200-1500 nm, thin layer chromatography, and for antimicrobial activity of Chlorpromazine against the efflux system of different test organisms such as: *Staphylococcus aureus, Escherichia Coli, Salmonella Enteritidis.*

V.P.9. A Novel Low Level Laser Therapy Device

Nicolae Dan Becherescu[a,c], Vasile Sava[a,c], Bogdan Chiricuta[b,c], Mioara Iacob[c] , Mihai Selagea[b,c], Mircea Udrea[c]

[a]*University of Bucharest, Faculty of Physics, Romania*
[b]*University "Politehnica" of Bucharest, Romania*
[c]*SC Apel Laser SRL, Bucharest, Romania*
E-mail: nicu.becherescu@apellaser.ro

Low Level Laser Therapy (LLLT) devices are considered by many scientists to be "a new branch of medicine". Laser light can be used in various medical domains such as rheumatology, dermatology, rehabilitation, and acupuncture with remarkable result. In this paper we introduce a new type of computer controlled device that takes into account the medical history of every patient and start irradiation accordingly. Using a Monte Carlo method we appreciate the heat delivery process. We use different diode laser wavelengths in the visible and infrared domain (from 630 to 830 nm) over a large power scale (from 5 to 500 mW), continuously adjustable. A multi channel data acquisition/data generating device was utilized. Different laser probes assure a broad area of applications.

V.P.10. Surface Acoustic Wave Sensors for Hydrogen Detection based on Pd and ZnO Nanoporous Layers Deposited by a ps Laser Technique

C. Viespe, C. Grigoriu

Laser Department, National Institute of Laser, Plasma and Radiation Physics, Magurele-Bucharest, Romania
E-mail: viespe@ifin.nipne.ro.

The performance of the surface acoustic wave sensors based on nanoporous films of Pd and ZnO for hydrogen detection at room temperature (RT) is studied and compared in this paper.

The sensors were "delay line" type (quartz substrate, 69.4 MHz central frequency). The nanoporous sensitive layers were directly deposited on quartz substrate, using the picosecond laser ablation method.
The sensor performances (sensitivity, limit of detection and response time) at RT, for a hydrogen concentration in synthetic air 0.015– 2 % were studied.

V.P.11. Application of laser based methods for the fabrication of polymeric transdermal drug-delivery system incorporating captopril: Morphological characterization

A. Palla Papavlu, L. Rusen, V. Dinca, M. Dinescu

National Institute for Lasers, Plasma, and Radiation Physics, Bucharest-Magurele, MG 16, ZIP 077125, Romania

During the past decade, transdermal delivery systems (TDS) have become increasingly important for treating cardiovascular heart disorders. In this work is presented the preparation of transdermal patches impregnated with captopril. Transdermal patches of captopril were aimed to be prepared in order to overcome their side effects by oral application. The strategy followed is the formation of polymer thin films (i.e. polyisobutylene - PIB, ethylcellulose - EC, and hydroxypropyl (methyl) cellulose - HPMC) as well as polymer-captopril mixtures by matrix-assisted pulsed laser evaporation (MAPLE) for the fabrication of TDS. Atomic force microscopy - AFM has been applied to investigate the surface morphology of the individual thin polymer membranes and polymer-captopril films. More insight on surface morphology, captopril distribution and content in the deposited thin films has been achieved by contact angle measurements, FTIR, and spectrophotometry measurements.
Our results conclude with an outlook on the future of applying the versatile and successful MAPLE deposition method for the development of captopril patches.

V.P.12. Matrix Assisted Pulsed Laser Evaporation of biopolymers using 266 nm for biomedical applications

V. Dinca, L. Rusen, M. Dinescu

National Institute for Lasers, Plasma, and Radiation Physics, Bucharest-Magurele, MG 16, ZIP 077125, Romania

In this work is presented the preparation of chitosan biopolymer containing collagen in different ratio. The approach followed is the deposition of polymer thin films by matrix-assisted pulsed laser evaporation (MAPLE) using alternative ablation from collagen and chitosan targets during the same experiment. Atomic force microscopy - AFM has been applied to investigate the surface morphology of the thin biopolymer films. The structural characterization of the deposited thin films has been achieved by Fourier transform spectroscopy (FTIR).
Our results conclude with successful MAPLE deposition method for biopolymer thin films for biomedical applications.

V.P.13. Effective method for polymeric materials patterning for cell behavior studies

L. Rusen[1], V. Dinca[1], C. Mustaciosu[2], M. Dinescu[1]

[1]*National Institute for Lasers, Plasma, and Radiation Physics, Bucharest-Magurele, MG 16, ZIP 077125, Romania*
[2]*Horia Hulubei National Institute of Physics and Nuclear Engineering-IFIN-HH*

In this work is presented the structuring of thin films of different polymers (i.e. chitosan, collagen, PVA) using a Ti:Saphire femtosecond laser. Atomic force microscopy – AFM and Scanning Electron Microscopy (SEM) have been applied to investigate the surface morphology of the patterned materials. The influence of the morphology and architecture patterns on fibroblast cell was evaluated. Our results conclude with successful polymer patterning by fs laser structuring method for fibroblast cell behavior studies.

POSTER SECTION VI: OPTOELECTRONICS AND OPTICAL COMPONENTS

VI.P.1. Evaluation of FBGs behavior under electron beam irradiation

D. Sporea, A. Stancalie, C. Oproiu

National Institute for Laser, Plasma & Radiation Physics, Laser Metrology and Standardization Laboratory, Atomistilor 409, Magurele,, 077125 Romania

We investigated for the first time the behavior of commercially available Fiber Bragg Gratings under electron beam irradiation. The goal of these investigations was to evaluate the change in the temperature sensitivity as well as the reproducibility of temperature measurements using Bragg sensors. Measurements were performed on-line by monitoring the maximum value of gratings' wavelength shift during the irradiation. The radiation exposure was performed in several steps, at total doses of 22 MRad. For the tested devices no major modifications of the temperature sensitivity, response stability and S/N ration was observed.

VI.P.2. The evaluation of acoustic sources by 3D Laser Vibrometry

Dan Sporea and Laura Mihai

National Institute for Laser, Plasma and Radiation Physics, 409 Atomistilor, RO-77125, Magurele, Romania
E-mail: laura.mihai@inflpr.ro

In this paper we report the evaluation of the characteristics of several low power sound emitters in order to assess the use of their acoustic filed as excitation source for vibrometry investigations. These characteristics were measured by laser vibrometry with a 3D laser scanner. The tests were run under different operating conditions of the acoustic sources (variable frequency and amplitude of the electrical signal, the periodic temporal change of the driving signal such as sine, ramp). The reproducibility and the linearity of the acoustic oscillation were estimated in order to optimize the operating conditions for specific measurements.

VI.P.3. Elementary Heterogeneously Polarized Field Modeling

I.I. Mokhun*, Yu.K. Galushko, K.S. Kharytonova and Ju.Yu. Viktorovskaya

Department of Correlation Optics, Chernivtsi University, 2, Kotsubynsky Str., Chernivtsi, 58012, Ukraine
**E-mail: mokhun@itf.cv.ua*

The new approach for modeling of elementary field cells with heterogeneous polarization and controlled number of polarization singularities is proposed. The cells may be obtained by the superposition of specially formed orthogonally linearly polarized waves.
Keywords: polarization singularities, C-point.