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*19th International Conference and School on
Quantum Electronics*

Laser Physics and Applications

**Tanja Dreischuh
Sanka Gateva
Albena Daskalova
Alexandros Serafetinides**
Editors

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Contents

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

SESSION 1 LASER-MATTER INTERACTION

10226 02	Laser annealing of metal nanoparticles synthesized in glasses by ion implantation (Invited Paper) [10226-33]
10226 03	Slow terahertz light via resonant tunneling induced transparency in quantum well heterostructures [10226-47]
10226 04	Investigation of laser cleaning procedures for the restoration of burnt paintings [10226-51]
10226 05	Laser paper cleaning: the method of cleaning historical books [10226-48]
10226 06	Time dependent spectral birefringence excited with laser light in azopolymers and azopolymers doped with ZnO [10226-55]
10226 07	Morphological characterization of chitosan biopolymer thin films modified via fs irradiation and its potential application as functional surfaces in regenerative medicine [10226-57]
10226 08	Laser induced optically and thermally reversible birefringence in azopolymers [10226-46]
10226 09	Laser nanostructuring for plasmon enhancement of Ag/ZnO optical characteristics [10226-39]
10226 0A	Laser cleaning of graffiti on stone [10226-56]
10226 0B	Gold nanostructures for detection of pesticides, nitrates and drugs using Surface Enhanced Raman spectroscopy [10226-19]
10226 0C	Influence of the liquid level and ablation process duration on the characteristics of nanostructures created by nanosecond laser ablation of Ag in water [10226-50]
10226 0D	Neutron diffraction studies of laser welding residual stresses [10226-27]
10226 0E	Characterization of colloidal silver nanostructures produced by pulsed laser ablation in different liquids [10226-30]
10226 0F	Fabrication of Au nanostructures by pulsed laser deposition in air [10226-41]

- 10226 OG **Nanoparticle Over Mirror plasmonic structures prepared with use of Au colloid produced by laser ablation in water** [10226-34]
- 10226 OH **Qualitative and quantitative laser-induced breakdown spectroscopy analysis of archaeological metal artefacts** [10226-49]
- 10226 OI **Comparative study of electron and laser beam surface alloying** [10226-45]
- 10226 OJ **Synthesis and characterization of rare earth doped ternary chalcogenide semiconductors: effective electro-luminescence and laser materials** [10226-10]

SESSION 2 LASER SPECTROSCOPY AND METROLOGY

- 10226 OK **Forty years after the first dark resonance experiment: an overview of the COSMA project results (Invited Paper)** [10226-69]
- 10226 OL **Dark-state resonances observed on the D₂ line of potassium** [10226-65]
- 10226 OM **Nonlinear resonances sign reversal and longitudinal alignment on the resonant levels of ¹³³Cs thin-layer vapour** [10226-64]
- 10226 ON **Temporal dynamics of THz quantum cascade laser frequency combs with strong injector anticrossing (Best Young Scientist Award)** [10226-44]
- 10226 OO **Contribution of the polarization moments of different rank to the integral CPT signal** [10226-18]
- 10226 OP **Coherent population trapping in five-level system** [10226-4]
- 10226 OQ **Slow and fast light in five-level system** [10226-5]
- 10226 OR **Dynamic laser speckle metrology with binarization of speckle patterns** [10226-42]
- 10226 OS **Conical intersections S₀/S₁ of thymine mediating the non-radiative photodestruction of cyclobutane dimers: a CASSCF level study (Second Place, Best Student Paper Award)** [10226-62]

SESSION 3 LASER REMOTE SENSING AND ECOLOGY

- 10226 OT **Combined ground-based and satellite remote sensing of atmospheric aerosol and Earth surface in the Antarctic (Invited Paper)** [10226-24]
- 10226 OU **Compact micropulse backscatter lidar: airborne and ground-based applications (Invited Paper)** [10226-37]
- 10226 OV **Perspectives of methods of laser monitoring of the atmosphere and sea surface (Invited Paper)** [10226-11]

- 10226 0W **Light induced fluorescence lidar developed and employed at the National Aviation Academy of Azerbaijan** [10226-8]
- 10226 0X **Lidar observations of aerosol loadings extended throughout the troposphere** [10226-66]
- 10226 0Y **Lidar measurements of wildfire smoke aerosols in the atmosphere above Sofia, Bulgaria** [10226-59]
- 10226 0Z **Optimal contrast elastic lidar sensing of clear and aerosol-loaded atmosphere** [10226-13]
- 10226 10 **Case study of the ABL height and optical parameters of the atmospheric aerosols over Sofia** [10226-54]
- 10226 11 **A compact DIAL hygrometer employing paired powerful laser diodes of 0.85–0.9 μ m wavelengths** [10226-53]

SESSION 4 LASERS IN BIOLOGY AND MEDICINE

- 10226 12 **The ultrafast high-peak power lasers in future biomedical and medical x-ray imaging (Invited Paper)** [10226-25]
- 10226 13 **Biophotonics for imaging and cell manipulation: quo vadis? (Invited Paper)** [10226-58]
- 10226 14 **Detection of plum pox virus infection in selection plum trees using spectral imaging** [10226-28]
- 10226 15 **Investigating different skin and gastrointestinal tract (GIT) pathologies ex vivo by autofluorescence spectroscopy and optical imaging** [10226-31]
- 10226 16 **Laser-induced breakdown spectroscopy of dental lesions: diagnostic and therapeutic monitoring tool** [10226-15]
- 10226 17 **Nonlinear optical microscopy for investigation of gastrointestinal lesions** [10226-7]
- 10226 18 **Autofluorescence polarization spectroscopy of cancerous and normal colorectal tissues (Second Place, Best Student Paper Award)** [10226-67]
- 10226 19 **Estimation of the quantum efficiency of the photodissociation of HbO₂ and HbCO** [10226-32]
- 10226 1A **Combined opto-ultrasound method of tissue oxygenation and its application in medicine** [10226-36]
- 10226 1B **Spatial intensity distribution of the radiative return from scattering media irradiated by a cw laser beam** [10226-12]
- 10226 1C **Pulse oximetry as a diagnostic tool in dental medicine (First Place, Best Student Paper Award)** [10226-40]

SESSION 5 LASER SYSTEMS IN NONLINEAR OPTICS

- 10226 1D **Dispersion control in a folded 4-f system for shaping femtosecond laser pulses** [10226-68]
- 10226 1E **Soliton propagation in isotropic media under the influence of third order of linear dispersion and dispersion of nonlinearity** [10226-60]
- 10226 1F **Higher order solitons in non-paraxial optics** [10226-61]
- 10226 1G **Avalanche parametric conversion in the initial moment of filamentation** [10226-63]
- 10226 1H **Determination of gas-discharge plasma parameters in powerful metal halide vapor lasers** [10226-16]
- 10226 1I **Three-dimensional imaging of cultural heritage artifacts with holographic printers** [10226-38]
- 10226 1J **Optical polymers for laser medical applications** [10226-2]

Authors

Numbers in the index correspond to the last two digits of the seven-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first five digits reflect the volume number. Base 36 numbering is employed for the last two digits and indicates the order of articles within the volume. Numbers start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B...0Z, followed by 10-1Z, 20-2Z, etc.

Alexandrov, M. T., 0C	Dimitrov, N., 1D
Alexandrov, S., 0H	Donev, Evgeni, 10
Alipieva, E., 0K, 0O	Doulgerides, M., 04
Allahverdiyev, Kerim R., 0J, 0V, 0W	Doynov, Nikolay, 0D
Alzetta, G., 0L	Drampyan, R., 0K
Amoruso, S., 09	Dreischuh, A., 1D
Andreeva, C., 0K, 0L	Dreischuh, Tanja N., 0X, 0Y, 1B
Angelova, Liliya, 14	Entin, V., 0K
Antonopoulou-Athera, N., 04	Esman, S. S., 19
Asimov, M. M., 19, 1A	Evgenieva, Tsvetina T., 0Z, 10
Atanasov, Petar A., 0B, 0C, 0E, 0F, 0G	Fedarenka, A., 0T
Atanassova, Victoria, 0A	Fedchenko, Yulian I., 1H
Avramov, Lachezar A., 14, 15, 16, 17, 18, 1B	Fourmaux, S., 12
Azizbekyan, H., 0K	Fukata, N., 09
Berberova, Nataliya, 06, 08, 0R, 1I	Gateva, S., 0K, 0L
Bevilacqua, G., 0K	Gawlik, W., 0K
Biancalana, V., 0K	Gazazyan, E. A., 0P, 0Q
Blagoev, K., 0H	Genchev, Gancho, 0D
Blagoeva, B., 06, 08	Genova, Tsanislava, 15, 16, 17, 18
Blarel, L., 0T	Georgieva, D., 1G
Bliznakova, I., 07	Ghosh, P. N., 0K
Boevski, I. I., 0C	Gisbrecht, A. I., 19, 1A
Bokuchava, Gizo D., 0D	Goloub, P., 0T
Borisova, Ekaterina, 14, 15, 16, 17, 18	Gotchev, Atanas, 0R
Bozhikoliev, I., 1F	Gozzini, S., 0K, 0L
Buchvarov, I., 07	Grigoryan, G. G., 0Q
Budker, D., 0K	Grochowska, K., 0B
Burghoff, David, 0N	Grozeva, Margarita, 0A, 0H
Cartaleva, S., 0K, 0L, 0M	Gurdev, Ljuan L., 0Z, 1B
Cecchi, R., 0K	Hong, Sunghee, 1I
Chaikovskaya, L., 0T	Hristova, T., 0H
Chaikovsky, Anatoli, 0T	Hu, Qing, 0N
Chapovsky, P., 0K	Huseynov, Ilkin T., 0J
Chatzitheodoridis, Elias, 04, 05	Husinsky, W., 07
Dakova, A., 1E, 1F	Hussain, S., 0K
Dakova, D., 1E, 1F	Ivanov, Branimir, 0R, 1I
Dancheva, Y., 0K	Ivanov, D., 06, 08
Danchovski, Ventsislav, 10	Ivanov, Danko, 10
Daskalova, A., 07	Ivanov, G., 0H
Daskalova, D., 06	Jevasuwan, W., 09
Deans, C., 0K	Jirauschek, Christian, 03, 0N
Delchev, V. B., 0S	Kaleyna, Petya, 10
Deleva, Atanaska D., 0X, 0Y	Kancheva, P. B., 0S
Denishchik-Nelubina, N., 0T	Kang, Hoonjong, 1I
Denisov, S., 0T	Karashanova, D. B., 0C, 0E
Dey, S., 0K	Karczewski, Jakub, 0G
Dick, V., 0T	Kasarova, Stefka N., 1J
Dikovska, Anna Og., 0F	Katsev, I., 0T
Dimitrov, I. Z., 0C	Khanbekyan, Alek., 0K

Khanbekyan, Alen, 0K
 Kieffer, J. C., 12
 Kim, Youngmin, 1I
 Kolev, Nikolay, 10
 Koleva, M. E., 09
 Korol, Michail, 0T
 Kostadinov, Ivan, 0A
 Kostadinova, D., 06, 08
 Kosturkov, D., 1C
 Kotsifaki, Domna G., 13
 Kovachev, L., 1E, 1F, 1G
 Krasteva, A., 0K, 0L, 0M
 Krol, A., 12
 Kuzmina, I., 15
 Lapyonok, A., 0T
 Lazarova, P., 1D
 Lazarova, Rumiana L., 0I
 Lomova, M., 17
 Makarov, Vladislav, 0U
 Makropoulou, Mirsini, 13
 Malcheva, G., 0H
 Malinka, A., 0T
 Malinowski, Nikola, 1I
 Mamilov, S. A., 19
 Margalit, L., 0K
 Marinelli, C., 0K
 Marinkov, N. E., 0C
 Mariotti, E., 0K
 Marmugi, L., 0K
 Mateev, Georgy, 06, 08, 0R
 Matthey, Renaud, 0U
 Michailov, Vesselin G., 0D
 Mihailescu, I. N., 0C
 Miloushev, Ilko, 0A
 Mirzoyan, R., 0K
 Mitev, Valentin, 0U
 Mitra, S., 0K
 Moi, L., 0K, 0L
 Naboko, S., 1I
 Nakajima, Y., 0B
 Nasyrov, K. A., 0K, 0L
 Nathala, C. R., 07
 Nazarova, Dimana, 06, 08, 0R, 1I
 Nedelchev, L., 06, 08
 Nedyalkov, Nikolay N., 09, 0B, 0C, 0E, 0F, 0G, 1G
 Nekhrizov, G., 0H
 Nikolov, A. S., 0B, 0C
 Nikolov, Ivan D., 1J
 Nikolov, N., 0K
 Nikov, R. G., 0B, 0C, 0E
 Nikov, Rumen G., 0B, 0F, 0G
 Ormanova, Maria A., 0D
 Ozun, O., 0K
 Papoyan, A., 0K
 Papushkin, Igor V., 0D
 Park, Jiyong, 1I
 Park, Joo Sup, 1I
 Pashayev, Arif M., 0J, 0V, 0W
 Patton, B., 0K
 Paturyan, V. S., 0Q
 Penchev, S., 1I
 Pencheva, V., 1I
 Penev, Dimitar, 16
 Penkov, N., 15, 17, 18
 Peshev, Zahary Y., 0X, 0Y
 Petkov, Doyno, 10
 Petrov, N., 0K
 Petrov, Peter Iv., 0D, 0I
 Podvin, T., 0T
 Polischuk, V., 0M
 Prikhach, A., 0T
 Profitis, E., 04
 Pustelny, S., 0K
 Rassi, D., 0K
 Ray, B., 0K
 Renzoni, F., 0K
 Sadikhov, Ilham A., 0V, 0W
 Sargsyan, A., 0K, 0M
 Sarkisyan, D., 0K, 0L
 Savov, Plamen, 10
 Sawczak, Mirosław, 0B, 0G
 Semyachkina-Glushkovskaya, O., 17
 Serafetinides, Alexandros A., 04, 05, 13
 Shmavonyan, S., 0K
 Slavchev, V., 1E, 1F
 Slaveeva, Stefka I., 1H
 Slavov, D., 0K
 Śliwiński, Gerard, 0B, 0G
 Spigulis, J., 15
 Stabrawa, A., 0K
 Stanciu, G., 17
 Stankova, Nadya A., 0G
 Staykov, P., 1E
 Stefanov, I., 1D
 Stefleкова, V., 0H
 Stepanov, Andrey L., 02
 Stiacchini, L., 0K
 Stoev, Antoni, 14
 Stoyanov, Dimitar V., 0X, 0Y, 1B
 Stoyanov, L., 1D
 Stoykova, Elena, 08, 0R, 1I
 Sudyka, J., 0K
 Sultanova, Nina G., 1J
 Svidinsky, V., 0T
 Tagiev, Oktay B., 0J
 Tagiyev, Bahadir G., 0J, 0W
 Tankova, V., 0H
 Taskova, E. T., 0K, 0O
 Taslakov, M., 0K
 Temelkov, Krassimir A., 1H
 Terakawa, M., 0B
 Terlix, A., 04
 Terziev, I., 17, 18
 Todorov, G., 0M, 0O
 Todorov, P., 0K
 Toncheva, Eleonora N., 1B
 Tonoyan, A., 0K
 Tranca, D., 17
 Trifonov, A., 07
 Tsigaridas, Giorgos, 13

Tsilikas, Ioannis, 05
Tsvetkov, S., 0K
Tunaboylu, Bahadir, 0V
Tzenov, Petar, 03, 0N
Usta, Metin, 0V
Uzunov, Tzonko, 16, 1C
Uzunova, P., 1C
Valkov, Stefan Ts., 0I
Vankov, Orlin I., 1B
Vartanyan, T., 0M
Visan, A., 0C
Vladimirov, B., 17, 18
Vladimirov, D. B., 1A
Wickenbrock, A., 0K
Wilson Gordon, A., 0K
Wojciechowski, A., 0K
Zahariev, Peter, 0A
Zege, E., 0T
Zekou, Evangelini, 05
Zhelyazkova, A. Zh., 15, 18
Zhivun, L., 0K
Zyskowski, Marcin, 0G

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- 5 Laser Systems and Nonlinear Optics
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Introduction

The International School on Quantum Electronics "Laser Physics and Applications" is a traditional event, organized biennially by the Institute of Electronics, Bulgarian Academy of Sciences, since 1980 with the aim to act as a forum for interchange and dissemination of knowledge and ideas on the latest developments and results in the research areas of quantum electronics and optics, as well as the technological practical applications of new ideas, devices, instruments and laser systems. Leading scientists and companies are invited to deliver lectures and demonstration on the fundamentals of laser physics and applications of lasers as well as the newest results in these areas. The informal atmosphere stimulated further collaborations and joint works. The School Proceedings have been published since 1996 on the SPIE Digital Library. In 2016, the scientific program was such that this year's edition of the School somehow naturally grew to being also a Conference.

Thus, the 19th International Conference and School on Quantum Electronics (ICSQE2016) was held from 26 to 30 September 2016 in the Black Sea resort town of Sozopol, Bulgaria. It was sponsored by the Optical Society of America (OSA), SPIE, the European Physical Society and the Bulgarian National Scientific Fund, to whom the Organizing Committee expresses its deep gratitude. The leading companies such Coherent and Toptica Photonics presented their products through oral presentations and exhibitions.

For over 35 years, ICSQE has provided an excellent opportunity for young researchers to meet internationally renowned scientists to exchange ideas, review latest technologies and achievements, discuss the future directions, and initiate new collaborations and joint research projects. To recognize research excellence and scientific presentation abilities, SPIE, OSA and EPS sponsored the Best Student Paper Awards Competition.

More than 80 scientists from Armenia, Azerbaijan, Belarus, Canada, Germany, Greece, Italy, Latvia, Poland, Russia, Switzerland, Turkey, United Kingdom and Bulgaria participated in ICSQE2016 and presented around 100 contributions – invited lectures, oral and poster presentations. One of the highlights of the ICSQE2016 was related to the processes occurring in three-level systems - coherent population trapping, bright resonances, electromagnetic-induced transparency, marking the three anniversaries: 40 years since the first dark-state observation in Pisa, 20 years of its theoretical interpretation, and 25 years of the first experimental evidence of electromagnetically-induced transparency.

This Proceedings volume contains fifty-four invited and contributed papers covering the Conference topics of laser-matter interactions, laser spectroscopy and metrology, laser remote sensing and ecology, lasers in biology and medicine, and laser systems and nonlinear optics. All the submitted manuscripts were peer-

reviewed by experts in the respective fields using the SPIE review system.

ICSQE2016 owes its success to many people. The International Program Committee planned and organized the scientific program, ensuring high-quality plenary presentations. The Local Committee bore the brunt of the organization and ensured the smooth running of the conference. The choice of Sozopol, one of the oldest towns on the Bulgarian Black Sea coast, strongly enhanced the friendly and stimulating atmosphere of the Conference.

The Editors of the volume would like to thank all the invited speakers and participants for their contribution to these proceedings, the members of the International Advisory and Program Committees for their great support, as well as the reviewers for their time and effort evaluating the papers. Thanks also go to the SPIE staff for their invaluable assistance. We hope that the readers will find this collection of papers interesting and useful and we would like to invite them to take part in the next 20th ICSQE, which will be held in September 2018.

Tanja Dreischuh
Sanka Gateva
Albena Daskalova
Alexandros Serafetinides