

16th International Workshop

**Complex Systems of Charged Particles and
Their Interactions with Electromagnetic Radiation**

Moscow, Russia, April 11-13, 2018

CONFERENCE PROGRAM

10:00-10:15 Opening Remarks

SECTION-1 April 11 BASIC ASPECTS OF PLASMA SCIENCE

10:15-10:30

**THE LIMITED APPLICABILITY OF MAXWELL'S EQUATIONS IN 4X (E, B, D, H)
VECTOR REPRESENTATIONS ([Open](#))**

V.P. Makarov, A.A. Rukhadze

A.M. Prokhorov General Physics Institute of the Russian Academy of Science

10:30-11:00

ON THE BOSONIC ATOMS – STRUCTURE AND PROCESSES (*Invited*) ([Open](#))

M.Ya. Amusia^{1,2} and L.V. Chernysheva²

¹*The Racah Institute of Physics, the Hebrew University of Jerusalem, Jerusalem 91904, Israel*

²*A. F. Ioffe Physical-Technical Institute, St. Petersburg 194021, Russian Federation*

11:00-11:30

MATHEMATICS-PHYSICS IDENTITY (*Invited*) ([Open](#))

Charles K. Rhodes,

Ultrabeam Technologies, LLC 237 East Delaware Place Chicago, IL 60611

11:30-12:00

**TO THE PROBLEM OF ELECTROMAGNETIC FIELD ENERGY IN THE
MEDIUM OUTSIDE THE TRANSPARENCY DOMAIN (*Invited*) ([Open](#))**

S.A. Trigger¹, A.G.Zagorodny²

¹ *Joint Institute for High Temperatures, Russian Academy of Sciences, Moscow*

² *Bogolyubov Institute for Theoretical Physics of the National Academy of Sciences of Ukraine, Kiev*

12:00-12:30 Coffee Break

12:30-13:00

ON THE POWER TAIL OF THE SPECTRAL DENSITY DISTRIBUTION OF THE EQUILIBRIUM RADIATION IN A PLASMA (Invited) ([Open](#))

V.B. Bobrov^{1,2}, S.A. Trigger¹

¹ *Joint Institute for High Temperatures, Russian Academy of Sciences, Moscow*

² *National Research University "MPEI", Moscow*

13:00-13:30

ON PULSATING DD NEUTRON YIELD UNDER INERTIAL ELECTROSTATIC CONFINEMENT AT MINIATURE VACUUM DISCHARGE (Invited) ([Open](#))

Yu. K. Kurilenkov

Joint Institute for High Temperatures of RAS, Moscow, Russia

13:30-13:45

RADIATION THERAPY WITH THE USE OF SMALL AMOUNT OF NANOPARTICLES ([Open](#))

Mikhail L. Shmatov

Ioffe Institute, 194021 St. Petersburg, Russia

13:45-15:00 Lunch

SECTION-2 April 11 LASER PLASMAS

15:00-15:30

MICRO-STRUCTURED TARGETS FOR LASER TRIGGERED X-RAY AND NEUTRON SOURCES (Invited) ([Open](#))

A.V. Brantov^{1,2}, S.G. Bochkarev¹, D. A. Gozhev^{1,3}, and V. Yu. Bychenkov^{1,2}

¹ *P. N. Lebedev Physics Institute, Russian Academy of Science, Moscow, Russia,*

² *Center for Fundamental and Applied Research, VNIIA, ROSATOM, Moscow, Russia*

³ *Physics Department and International Laser Center of M.V. Lomonosov MSU, Moscow, Russia*

15:30-15:45

THE ACCELERATION OF ELECTRONS IN INTERSECTING GAUSSIAN PULSES ([Open](#))

A.V.Borovskiy¹, [A.L.Galkin](#)^{2,3}

¹*Baikal State University, Department of Computer Science and Cybernetics, Irkutsk, Russia*

²*A.M. Prokhorov General Physics Institute of the RAS, Moscow, Russia*

³*Pirogov Russian National Research Medical University Department of physics of MBF, Moscow, Russia*

15:45-16:15

TO DIAGNOSTICS OF NONEQUILIBRIUM PLASMA BY THOMSON SCATTERING (*Invited*) ([Open](#))

V.V. Belyi

IZMIRAN, Troitsk, Moscow

16:15-16:45 Coffee Break

16:45-17:15

ULTRA-INTENSE K-SHELL EMISSION FROM STAINLESS STEEL FOILS IRRADIATED BY FEMTOSECOND LASER PULSES WITH ULTRA-HIGH INTENSITY ($I \geq 10^{21}$ W/CM²) (*Invited*) ([Open](#))

[M.A. Alkhimova](#)^{1,2,3}, A.Ya. Faenov^{1,2}, T.A. Pikuz^{2,4}, I.Yu. Skobelev^{2,3}, S. A. Pikuz^{2,3}, M. Nishiuchi⁵, H. Sakaki⁵, A. S. Pirozhkov⁵, A. Sagisaka⁵, N.P. Dover⁵, Ko. Kondo⁵, K. Ogura⁵, Y. Fukuda⁵, H. Kiriyaama⁵, T. Esirkepov⁵, S.V. Bulanov⁵, M. Kando⁵, K. Nishitani⁷, T. Miyahara⁷, Y. Watanabe⁷, R. Kodama^{1,4,6}, K. Kondo⁵.

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⁷*Interdisciplinary Graduate School of Engineering Sciences, Kyushu University, Japan*

17:15-17:30

INTERPRETATION OF ION ENERGY SPECTRA DIRECTLY MEASURED IN THE INTERACTION VOLUME OF INTENSE LASER PULSES WITH CLUSTERED PLASMA ([Open](#))

S. G. Bochkarev^{1,5}, A. Faenov^{2,3}, T. Pikuz^{3,4}, A. V. Brantov^{1,5}, V. F. Kovalev^{1,5,6}, I. Skobelev^{3,7}, S. Pikuz^{3,7}, R. Kodama^{2,4,8}, K. I. Popov⁹, and V. Yu. Bychenkov^{1,5}

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⁵*Center for Fundamental and Applied Research, VNIIA, ROSATOM, Moscow, 127055, Russia*

⁶*Keldysh Institute of Applied Mathematics, RAS, Moscow, 125047, Russia*

⁷*National Research Nuclear University MEPhI, Moscow, 115409, Russia*

⁸*Photon Pioneers Center, Osaka University, Suita, Osaka 565-0871, Japan*

⁹*University of Ottawa, Ottawa, ON K1N 6N5, Canada*

17:30-17:45

STIMULATED RAMAN SCATTERING AND TWO PLASMON DECAY INSTABILITIES IN INHOMOGENEOUS FEMTOSECOND LASER PLASMA ([Open](#))

Tsymbalov I.N.,¹ Gorlova D.A.,¹ Sen'kevich A. M.,¹ Shulyapov S.A.,¹ Ivanov K.A.,¹ Ksenofontov P.A.,² Brantov A.V.,² Savel'ev A.B.,¹ Bychenkov V. Yu.²

¹*Faculty of Physics and International Laser Center of Lomonosov Moscow State University, Moscow, Russia*

²*P.N. Lebedev Physical Institute, Russian Academy of Sciences, Moscow, Russia*

17:45-18:00

NEW REPRESENTATION OF CHARGED PARTICLES ENERGY DISTRIBUTIONS IN EXPERIMENTS OF LASER IRRADIATION OF TARGETS ([Open](#))

O.S.Garanina¹, M.Yu.Romanovsky^{2,3}

¹*A.M.Prokhorov General Physics Institute of RAS, Vavilov str., 38, 119991, Moscow, Russia*

²*Federal Agency for Scientific Organization, Leninsky prosp. 32A, 119991, Moscow, Russia*

³*Moscow Technological University (MIREA), prosp.Vernadskogo 78,119454, Moscow, Russia*

18:00-18:15

NUMERICAL CALCULATIONS OF TRANSVERSE ELECTRON ACCELERATION AT THE FIELD OF TERAHERTZ RADIATION ([Open](#))

M.Yu.Romanovsky¹, O.B.Shiryaev^{2,3}

¹*Federal Agency for Scientific Organizations, Leninsky prosp. 32A, 119991 Moscow, Russia; Moscow Technological University (MIREA), prosp. Vernadskogo 78, 119454 Moscow, Russia;*

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³*N.I. Pirogov Russian National Research Medical University, Ostovityanova 1, 117997 Moscow, Russia*

18:15-18:30

REGIMES OF MAGNETIC RECONNECTION IN COLLIDING LASER-PRODUCED MAGNETIZED PLASMA BUBBLES ([Open](#))

K.V. Lezhnin^{1,2}, W. Fox^{1,3}, A. Bhattacharjee^{1,3}

¹*Department of Astrophysical Sciences, Princeton University, Princeton, New Jersey 08544, USA*

²*National Research Nuclear University MEPhI, 115409, Moscow, Russia*

³*Princeton Plasma Physics Laboratory, Princeton, New Jersey 08543, USA*

SECTION-2 April 12 LASER PLASMAS

09:30-10:00

LASER-ION ACCELERATION AT ELI-NP (*Invited*) ([Open](#))

O. Budrigă¹, E. d'Humières², L. E. Ionel¹, M. Budrigă¹, M. Carabaș³

¹*National Institute for Laser, Plasma and Radiation Physics, Măgurele, Romania*

²*Université de Bordeaux - CNRS - CEA, CELIA, Talence, France*

³*Faculty of Automatic Control and Computers, University POLITEHNICA of Bucharest, Bucharest, Romania*

10:00-10:30

HIGH HARMONIC GENERATION AT THE TUNNELING IONIZATION OF ATOMS BY INTENSE LASER RADIATION NEAR THE CLASSICAL CUT-OFF (*Invited*) ([Open](#))

A.V. Gets and V.P. Krainov,

Moscow Institute of Physics and Technology, 141700 Dolgoprudny, Moscow Region, Russian Federation

10:30-10:45

RESONANT METHOD OF XUV ATTOSECOND PULSE MEASUREMENT ([Open](#))

V. V. Strelkov, A. I. Magunov

A.M. Prokhorov General Physics Institute of RAS, Moscow, Russia,

10:45-11:00

INVESTIGATION OF THE GENERATION AND ATTENUATION OF SHOCK WAVES GENERATED BY PICOSECOND LASER PULSE IN METALS ([Open](#))

S.Yu. Gus'kov², I.K. Krasnyuk^{1,2}, P.P. Pashinin¹, A.Yu Semenov¹, I.A. Stuchebrukhov^{1,2}, K.V. Khishchenko³, D. Batani⁴

¹*A.M. Prokhorov General Physics Institute of RAS, Moscow, Russia*

²*P.N. Lebedev Physical Institute of RAS, Moscow, Russia*

³*Joint Institute for High Temperatures of RAS, Moscow, Russia*

⁴*Centre Lasers Intenses et Applications Université Bordeaux 1, France*

11:00-11:15

DETERMINATION OF THE ABSOLUTE INTENSITIES OF X-RAYS EMITTED DURING IRRADIATION OF THIN SI FOILS BY PETAWATT LASER PULSES ([Open](#))

Arich D.D.^{1,2,3}, Ryazantsev S.N.¹, Skobelev I.Yu.^{1,2}, Faenov A.Ya.^{1,3}, Alkhimova M.A.^{1,2}, Filippov E.D.^{1,2}, Pikuz S.A.^{1,2}

¹*Joint Institute for High Temperatures of the Russian Academy of Sciences, Izhorskaya 13 Bldg 2, Moscow, 125412, Russia*

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³*Open and Transdisciplinary Research Initiative, Osaka University, 1-1 Yamadaoka, Suita, Osaka 565-0871, Japan*

11:15-11:30

INVESTIGATION OF ENERGY TRANSFER IN FOILS HEATED BY PETAWATT LASER PULSES BY METHODS OF X-RAY ABSORPTION SPECTROSCOPY ([Open](#))

Ryazantsev S.N.¹, Skobelev I.Yu.^{1,2}, Arich D.D.^{2,1}, Bratchenko P.S.^{2,1}, Faenov A.Ya.^{1,3}, Pikuz T.A.^{1,4}, Durey P.⁵, Doehl L.⁵, Farley D.⁵, Baird C.⁵, Lancaster K.⁵, Murphy C.⁵, Booth N.⁶, Spindloe C.⁶, McKenna P.⁷, Hansen S.B.⁸, Colgan J.⁹, Kodama R.^{3,4}, Woolse N.⁵, Pikuz S.A.^{1,2}

¹*Joint Institute for High Temperatures of the Russian Academy of Sciences, Izhorskaya 13 Bldg 2, Moscow 125412, Russia*

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⁵*York Plasma Institute, Department of Physics, University of York, Church Lane, Heslington, York YO10 5DQ, United Kingdom (Great Britain)*

⁶*Central Laser Facility, Rutherford Appleton Laboratory, Harwell Campus, Didcot, Oxfordshire OX11 0QX, United Kingdom (Great Britain)*

⁷*Department of Physics, University of Strathclyde, 107 Rottenrow East, Glasgow G4 0NG, United Kingdom (Great Britain)*

⁸*Sandia National Laboratories, Albuquerque, New Mexico 87123, United States*

⁹*Theoretical Division, Los Alamos National Laboratory, Los Alamos, New Mexico 87545, United States*

11:30-12:00

INTERACTION OF RELATIVISTICALLY INTENSE LASER PULSES WITH SOLID AND LOW-DENSITY TARGETS (*Invited*) ([Open](#))

N.E. Andreev^{1,2}

¹*Joint Institute for High Temperatures of the Russian Academy of Sciences, Moscow 125412, Russia*

²*Moscow Institute of Physics and Technology, Dolgoprudny, Moscow Region 141700, Russia*

12:00-12:30 Coffee Break

12:30-12:45

PLASMA WAVES GENERATION BY AN ULTRASHORT FOCUSED PULSE OF LASER RADIATION ([Open](#))

V.E. Grishkov, S.A. Uryupin

P. N. Lebedev Physics Institute, Russian Academy of Science, Moscow, Russia

12:45-13:00

THE DIPOLE STRUCTURE OF TERAHERTZ RADIATION UNDER LASER ACTION ON CLUSTERS ([Open](#))

A.A. Frolov

Joint Institute for High Temperatures RAS, Moscow, Russia, e-mail: frolov@ihed.ras.ru

13:00-13:15

ON THE LINEAR DISPERSION LAW OF HIGH-FREQUENCY PLASMA WAVES IN PHOTOIONIZED PLASMA ([Open](#))

K.Yu. Vagin¹, T.V. Mamontova^{1,2}, S.A. Uryupin^{1,2}

¹*P.N.Lebedev Physical Institute of RAS,*

²*National Research Nuclear University MEPhI*

13:15-13:30

WAVE-PACKET BASED ATOMISTIC MODELLING OF LASER EXCITED ALUMINUM NANOPARTICLES ([Open](#))

Chernyshov A. I.^{1,2}, Orekhov N. D.^{1,2} and Stegailov V. V.^{1,2}

¹*Joint Institute for High Temperatures of the Russian Academy of Sciences, Izhor'skaya 13 Bldg 2, Moscow 125412, Russia*

²*Moscow Institute of Physics and Technology, Institut'skiy Pereulok 9, Dolgoprudny, Moscow Region 141700, Russia*

SECTION-3 April 12 *COMPLEX PLASMAS*

13:30-13:45

LENGTH SEGREGATION IN MIXTURES OF SPHEROCYLINDERS INDUCED BY IMPOSED TOPOLOGICAL DEFECTS ([Open](#))

Elshad Allahyarov^{1,2,3}

¹*Theoretical Department, OIVT RAN Moscow,*

²*Physics Department, CWRU, Cleveland, OH, USA*

³*Theoretical Chemistry, Essen-Duisburg University, Essen, Germany*

13:45-15:00 Lunch

15:00-15:30

THE EVOLUTION OF DISSIPATIVE DUST STRUCTURES IN PLASMA UNDER ACTION OF LOW ENTROPY RADIATION (*Invited*) ([Open](#))

Oleg F. Petrov^{1,2,3}

¹*Joint Institute for High Temperatures, Russian Academy of Sciences, Moscow, Russia*

^{2,3}*Moscow Institute of Physics and Technology, Dolgoprudny, Russia*

15:30-16:00

MAGNETIZATION OF PARTICLES IN DUSTY PLASMA (*Invited*) ([Open](#))

V. Yu. Karasev, E.S. Dzlieva, S.I. Pavlov, L.A. Novikov

Saint Petersburg State University, 199034, Universitetskaya nab., 7/9, St. Petersburg, Russia,

16:00-16:30

NONRECIPROCAL INTERACTION AND OSCILLATIONS OF PLASMA CRYSTAL ([Invited](#)) ([Open](#))

A.M. Ignatov

A.M. Prokhorov General Physics Institute of the Russian Academy of Sciences, 119991, Vavilov 38, Moscow, Russia

16:30-17:00 Coffee Break

17:00-17:30

DUSTY PLASMAS IN THE SYSTEM OF MARTIAN SATELLITES (*Invited*) ([Open](#))

S.I. Popel, A.P. Golub', L.M. Zelenyi

Space Research Institute RAS, Moscow, Russia

17:30-17:45

DUST COUPLING PARAMETER AND THE ANOMALOUS KINETIC HEATING IN RADIO-FREQUENCY-DISCHARGE COMPLEX PLASMA UNDER MICROGRAVITY CONDITIONS ([Open](#))

D.I. Zhukhovitskii, V.N. Naumkin, A.I. Khusnulgatin, V.I. Molotkov, and A.M. Lipaev

Joint Institute for High Temperatures of the Russian Academy of Sciences

17:45-18:00

STRUCTURES OF CHARGED MACROPARTICLES IN GAS DISCHARGE PLASMA AND IN INHOMOGENEOUS MAGNETIC FIELDS ([Open](#))

M.M. [Vasiliev](#)^{1,2}, O.F. Petrov^{1,2}

¹*Joint Institute for High Temperatures RAS, Moscow 125412, Russia*

²*Moscow Institute of Physics and Technology, Dolgoprudny 141700, Russia*

18:00-18:15

CONFIGURATIONAL ENTROPY OF THE MODEL OF PLASMA-DUST SYSTEM ([Open](#))

A.V. Timofeev

JIHT RAS, Moscow, Russia

18:15-18:30

DUSTY PLASMAS IN MARTIAN ATMOSPHERE AND VORTEX PHENOMENA AT THE SURFACE OF MARS ([Open](#))

[Yu.N. Izvekova](#), S.I. Popel

Space Research Institute RAS, Moscow, Russia

18:30-18:45

MODEL OF DUSTY PLASMA IN DC DISCHARGE EXPERIMENTS IN THE RANGE OF TEMPERATURES 100—300 K ([Open](#))

[V.S. Nikolaev](#)^{1,2}, A.V. Timofeev^{1,2}

¹*JIHT RAS, Moscow, Russia*

²*MIPT, Moscow, Russia*

SECTION-3 April 13 *COMPLEX PLASMAS*

10:00-10:15

EFFECT OF CATHODE DISPERSION ON GAS DISCHARGE CHARACTERISTICS ([Open](#))

M.M. Vasiliev, ^{1,2}S.A. Maiorov, ¹O.F. Petrov

¹ *JIHT of Russian Academy of Sciences, Moscow, Russia*

² *A.M. Prokhorov General Physics Institute of Russian Academy of Sciences, Moscow, Russia, e-mail:*

SECTION-4 April 13 GENERAL PLASMAS

10:15-10:45

PLASMA PHASE TRANSITION. 50 YEARS (*Invited*) ([Open](#))

Norman G. E., Saitov I. M., Sartan R.A.

JIHT RAS, Moscow, Russia

10:45-11:00

METASTABLE STATES OF PLASMA PHASE TRANSITION ([Open](#))

Norman G. E., Saitov I. M., Sartan R.A.

JIHT RAS, Moscow, Russia

11:00-11:15

TWIN TRANSITIONS TO THE CONDUCTING STATE IN SOLID AND FLUID HYDROGEN UNDER PRESSURE ([Open](#))

Norman G. E., Saitov I. M.

National Research University Higher School of Economics, Russia, Joint Institute for High Temperatures of RAS, Russia

11:15-11:30

NONEQUILIBRIUM AND DENSITY EFFECTS IN THE ATMOSPHERIC PRESSURE ARC HELIUM PLASMA ([Open](#))

L.G. Dyachkov, D.I. Kavyrshin, O.V. Korshunov, V.F. Chinnov

Joint Institute for High Temperatures, RAS, Moscow, Russia

11:30-11:45

INFLUENCE OF SELF-GENERATED GIGAGAUSS MAGNETIC FIELDS ON SHEATH ACCELERATION OF IONS DRIVEN BY ULTRAHIGH-INTENSITY LASER ([Open](#))

Artem V. Korzhimanov

Institute of Applied Physics RAS, Nizhny Novgorod, Russia

11:45-12:30 Coffee Break

12:30-12:45

THE EVOLUTION OF VIRIAL EQUATION FOR COULOMB SYSTEM IN THE PAUL TRAP ([Open](#))

Lapitsky D.S., Filinov V.S., Syrovatka R.A., Deputatova L.V., Vasilyak L.M., Vladimirov V.I., Pecherkin V.Ya.

Joint Institute for High Temperatures of the Russian Academy of Sciences, Izhorskaya 13, Moscow, Russia

12:45-13:15

SOME POSSIBLE EFFECTS OF HIGH-ENERGY PHOTONS FROM BALL LIGHTNING (*Invited*) ([Open](#))

Mikhail L. Shmatov

Ioffe Institute, 194021 St. Petersburg, Russia

13:15-13:30

GENERATION THE SYSTEM OF VORTEX BY THE MICROWAVE RADIATION IN THE WET ATMOSPHERE ([Open](#))

O.A. Sinkevich, G.O. Zinchenko

National Research University «Moscow Power Engineering Institute», Joint Institute for High Temperature

13:30-13:45

FIELD CIRCLES AS PLASMA CHEMICAL SOIL MODIFICATION IN CONDITIONS OF ATMOSPHERIC ELECTRICITY ([Open](#))

V.L. Bychkov, A.R. Bismukhametova, N.V. Ardelian, R.V. Kosmachevskii

M.V. Lomonosov MSU, Moscow, Russia

13:45-15:00 Lunch

15:00-15:30

ELECTRON DIFF IN ARGON WITH IRON VAPOR (*Invited*) [\(Open\)](#)

V.S. Kurbanismailov¹, S.A. Maiorov^{2,3}, O.A. Omarov¹, [G.B. Ragimkhanov](#)¹, Tereshonok D.V.³

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³*Joint Institute for High Temperatures of the Russian Academy of Sciences, Izhoroskay Str.13, Moscow, 125412 Russia*

15:30-15:45

INTERPRETATION OF TOLMAN - STEWART EXPERIMENTAL RESULTS [\(Open\)](#)

[V.L.Bychkov](#), F.S. Zaitsev, V.A.Chizhov

M.V. Lomonosov MSU, Moscow, Russia

15:45-16:15

ELECTROMAGNETIC RADIATION LOCALIZATION IN THE EXTENDED SPACE MODEL - PREDICTION AND LABORATORY TEST [\(Open\)](#)

V.A. Andreev¹, D.Yu. Tsipenyuk²

¹*Lebedev Physical Institute RAS, Moscow, Russia*

²*Prokhorov General Physical Institute RAS, Moscow, Russia*

16:30 Conference Closing Remarks