International Symposium

TOPICAL PROBLEMS OF NONLINEAR WAVE PHYSICS
(NWP-2021)

Nizhny Novgorod, Russia, 19–22 September, 2021

Nonlinear Dynamics of Oscillatory Systems
(NWP-1)

Extreme Photonics
(NWP-2)

Nonlinear Phenomena in the Atmosphere and Ocean
(NWP-3)

PROGRAM

Nizhny Novgorod
2021

Workshops

Russian-Chinese Workshop “Ultra Intense Laser Technology and Intense Field Physics”

Nonlinear and Quantum Optics in Confined Systems

Electromagnetic Environment of the Earth

Young Scientists School
“High-power Sources of Electromagnetic Radiation of the Terahertz, Optical and X-ray Ranges Based on Photoinjector Complexes”

Young Scientists School
“Laser-plasma Sources of X-ray Radiation”

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Conference Chairs

NWP-1: Nonlinear Dynamics of Oscillatory Systems

Vladimir Nekorkin, *Institute of Applied Physics RAS, Russia*
Stefano Boccaletti, *CNR Institute of Complex Systems, Italy*

NWP-2: Extreme Photonics

Efim Khazanov, *Institute of Applied Physics RAS, Russia*
Björn Manuel Hegelich, *University of Texas at Austin, USA*

NWP-3: Nonlinear Phenomena in the Atmosphere and Ocean

Alexander Feigin, *Institute of Applied Physics RAS, Russia*
Evgeny Mareev, *Institute of Applied Physics RAS, Russia*
Colin Price, *Tel Aviv University, Israel*
Juergen Kurths, *Potsdam Institute for Climate Impact Research, Humboldt University, Germany*

https://nwp2021.ipfran.ru

Timetable

(Moscow time, UTC+3)

Sunday, September 19	8.00–9.00	Registration
	9.00–9.20	Opening Session
	9.20–11.00	NWP-1, NWP-2, NWP-3 sessions
	11.00–11.20	*Coffee break*
	11.20–13.20	NWP-1, NWP-2, NPW-3 sessions, w/sh "Nonlinear and quantum optics in confined systems" 1
	13.30–14.30	*Lunch*
	14.30–15.20	Plenary talk. Itamar Procaccia (NWP-1)
	15.20–16.10	Plenary talk. Alexey Eliseev (NWP 3)
	16.10–17.00	Plenary talk. Philip Russel (NWP-2)
	17.00–17.20	*Coffee break*
	17.20–20.40	NWP-1, NWP-2 sessions
Monday, September 20	9.00–11.00	NWP-1, NWP-3 sessions, Russian-Chinese w/sh 1
	11.00–11.20	*Coffee break*
	11.20–13.20	NWP-1, NWP-3 sessions, w/sh Nonlinear and quantum optics in confined systems 2
	13.30–14.30	*Lunch*
	14.30–16.30	NWP-1, NWP-3 sessions, w/sh Nonlinear and quantum optics in confined systems 3
	16.30–16.50	*Coffee break*
	16.50–18.50	NWP-1, NWP-3 sessions, W\sh EM environment of the Earth, w/sh Nonlinear and quantum optics in confined systems 4
	18.50–19.10	*Coffee break*
	19.10–20.00	Plenary talk. Martin Fullekrug (NWP-3)
	20.00–20.50	Plenary Talk. Earle Williams (NWP-3)
Tuesday, September 21	9.00–11.00	NWP-1, Russian-Chinese w/sh 2
	11.00–11.20	*Coffee break*
	11.20–13.20	NWP-1, NWP-2, NWP-3 sessions
	13.30–14.30	*Lunch*
	14.30–16.30	NWP-1, NWP-2, NWP-3 sessions
	16.30–16.50	*Coffee break*
	16.50–17.40	Plenary talk. Wulfram Gerstner (NWP-1)
	17.40–18.30	Plenary talk. Robert Boyd (NWP-2)
	19.00–20.40	NWP-1 session
Wednesday, September 22	9.00–11.00	NWP-1 session, Young Sc. Sch. "Laser-plasma sources of X-ray radiation"
	11.00–11.20	*Coffee break*
	11.20–13.20	NWP-1 session, Young Sc. Sch. "High-power sources of electromagnetic radiation"
	13.30–14.30	*Lunch*
	14.30–15.20	Plenary talk. Gerd Leuchs (NWP-2)
	15.20–16.10	Plenary talk. Juergen Kurths (NWP-1)
	16.10–16.30	*Coffee break*
	16.30–17.20	Plenary talk. Björn Manuel Hegelich (NWP-2)
	17.20–17.50	Discussion
	18.30–21.30	Round table

Nonlinear Dynamics of Oscillatory Systems (NWP-1)

HALL Standard 2

Sunday, September 19

8.00–9.00 Registration

9.00–9.20 Opening Session

9.20–11.00 **Complex dynamical systems 1**

S. Boccaletti (Italy). Processes and dynamics in networks beyond pairwise interactions

N. Kuznetsov (Russia). Global stability boundary, hidden oscillations, and non-equilibrium

A. Pisarchik (Spain). Secure communication using extreme multistability

B. Schaefer (Norway). Data-driven analysis of the power grid frequency

11.00–11.20 *Coffee break*

11.20–13.20 **Synchronization of complex systems**

A. Pikovsky (Germany). Deterministic dynamics of active particles: chaos and synchronization

P. Colet (Spain). Effects of high penetration of renewables in power grid synchronization and frequency fluctuations

J. Sawicki (Germany). Effect of topology upon relay synchronization in three-layer networks

O. Moskalenko (Russia). Peculiarities of intermittent generalized synchronization in unidirectionally and mutually coupled chaotic oscillators

A. Provata (Greece). The role of reflecting connectivity in synchronization of neuronal oscillators

13.30–14.30 *Lunch*

14.30–15.20 **Plenary Talk.** *Itamar Procaccia (Israel).* Oscillatory instabilities and surprises in frictional granular matter

15.20–16.10 **Plenary Talk.** *Alexey Eliseev (Russia).* Earth system models hierarchy

16.10–17.00 **Plenary Talk.** *Phillip Russel (Germany)*. Nonlinear optical phenomena in photonic crystal fibres

17.00–17.20 *Coffee break*

17.20–18.40 **Nonlinear dynamics in neuroscience 1**

V. Hakim (France). On the oscillatory bursts and traveling waves of neural activity in motor cortex

D. Hansel (France). Recurrent dynamics and competition in basal ganglia

A. Roxin (Spain). Bursting activity in rat hippocampus reveals mixed replay of correlated memories

19.00–20.40 **Nonlinear dynamics in neuroscience 2**

A. Longtin (Canada). Unified amplitude-phase representation for delay-coupled stochastic limit cycles and quasi-cycles with application to brain rhythms

G. Mindlin (Argentina). The physics of birdsong and its use to listen to a bird's dream

N. Brunel (USA). Response of networks to optogenetic stimulation: Experiment vs theory of spiking neurons

C. Canavier (USA). The phase response curve under pulse coupled assumptions determines synchrony and clustering in networks of neurons

Monday, September 20

9.00–11.00 **Nonlinear dynamics in neuroscience 3**

T. Fukai (Japan). Learning hierarchical and probabilistic input structures in neural networks

T. Geisel (Germany). Dynamical mechanisms of information routing in the brain

A. Chizhov (Russia). Modeling of cortical tissue activity: epileptic waves and visual responses

S. Petkoski (France). Spatio-temporal structure of the connectome organizes the large scale brain activity

A. Hramov (Russia). Extreme synchronization events in the epileptic brain: data analysis and models

11.00–11.20 *Coffee break*

11.20–13.20 **Neural mass models**

A.Torcini (France). Exact neural mass model for synaptic-based working memory

S. Olmi (Italy). Theta-nested gamma oscillations in next generation neural mass models

M. di Volo (France). Synchronous oscillations in spiking network of neurons

D. Goldobin (Russia). Low dimensional macroscopic dynamics of populations of quadratic integrate-and-fire neurons beyond the Lorentzian ansatz

G. Huguet (Spain). Phase dynamics and neuronal communication for exact firing rate models of neural networks

13.30–12.30 *Lunch*

14.30–16.30 **Stochastic systems**

J. Touboul (USA). Noise-induced synchronization in networks of excitable systems and applications to Parkinson's disease

R. Toral (Spain). Non-markovian effects in stochastic modelling: the role of aging

A. Zakharova (Germany). Constructive role of noise in multilayer networks

L. Ryashko (Russia). Stochastic effects in coupled population systems

N. Semenova (Russia). The general aspects of noise in analogue hardware deep neural networks

16.30–16.50 *Coffee break*

16.50–18.50 **Complex dynamical systems 2**

A. Luo (USA). On infinite homoclinic orbits induced by unstable periodic motions on the (m, l, n)-period-doubling bifurcation trees in the Lorenz system

V. Vanag (Russia). Distance dependent types of coupling of chemical micro-oscillators immersed in water-in-oil microemulsion

D. Smirnov (Russia). General framework for diverse quantifiers of causal couplings between processes

C. Masoller (Spain). Time crystal like oscillations in a weakly modulated stochastic time delayed system

P. Makarov (Russia). FDTD simulation of electromagnetic waves dynamics in nonlinear and stochastic media

18.50–19.10 *Coffee break*

19.10–20.00 **Plenary Talk.** *Martin Fullekrug (UK).* Earth-ionosphere cavity resonances

20.00–20.50 **Plenary Talk.** *Earle Williams (USA).* The role of aerosol in the sources for the global electrical circuits

Tuesday, September 21

9.00–11.00 **Collective dynamics**

S. Kashchenko (Russia). Dynamics of advectively coupled Van der Pol equations chain
M. Wolfrum (Germany). Mode-locking and coherence echoes in systems of globally coupled phase oscillators
E. Montbrio (Spain). Kuramoto model for populations of quadratic integrate and fire neurons
D. Pazó (Spain). The Kuramoto model with higher-order interactions: Secondary instabilities and collective chaos
O. D'Huys (Netherlands). Canard resonance: on noise-induced ordering in heterogeneous networks of slow-fast systems

11.00–11.20 *Coffee break*

11.20–13.20 **Chimeras and patterns 1**

E. Schöll (Germany). Partial synchronization patterns in the brain: epilepsy and unihemispheric sleep
T. Kapitaniak (Poland). Chimera states for coupled pendula
C. Laing (New Zeland). Dynamics and stability of chimera states in two coupled populations of oscillators
K. Krischer (Germany). Between synchrony and turbulence: Intricate hierarchies of coexistence patterns
R. Berner (Germany). Adaptivity induced synchronization patterns in complex dynamical networks

13.30–14.30 *Lunch*

14.30–16.30 **Systems with time delays**

S. Yanchuk (Germany). Deep learning with a single neuron: Folding a deep neural network in time using feedback-modulated delay loops
K. Lüdge (Germany). Stabilizing delay-coupled nanolasers via polarization lifetime tuning
Y. Kyrychko (UK). Dynamics of coupled Kuramoto oscillators with distributed delays
Y. Maslova (Russia). Dual delayed feedback control in solid-state lasers
V. Khramenkov (Russia). Partial stability criterion for a hub structure power grid

16.30–16.50 *Coffee break*

16.50–17.40 **Plenary Talk.** *Wulfram Gerstner (Switzerland).* Dynamics of memory retrieval in hippocampus

17.40–18.30 **Plenary Talk.** *Robert Boyd (USA, Canada).* Tailoring light propagation by controllable phase and group velocities

19.00–20.40 **Complex dynamical systems 3**

D. Gauthier (USA). Next-generation reservoir computing
A. Motter (USA). Converse symmetry breaking
R. Viana (Brazil). Fractal structures in open Hamiltonian systems
M. Sanjuan (Spain). Binary black hole shadows: Chaos in general relativity
A. Isah (France). Comparison of the coupling effect of the memristor and memristor fuse in 2D cellular nonlinear network

Wednesday, September 22

9.00–11.00 **Dynamics of biological systems**

E. Volkov (Russia). The effect of characteristic times on collective modes of two quorum sensing coupled identical ring oscillators
A. Dmitriev (Russia). Interaction of microwave radiation with ensembles of biological objects
L. Lücken (Germany). Dynamic deep ocean: chaotic dynamics in a complex network model of organic compounds and microbial heterotrophs
K. Blyuss (UK). Dynamics of a predator-prey model with ratio dependence and Holling type III functional response
N. Stankevich. Hyperchaos in three repressilators coupled via quorum-sensing mechanism

11.00–11.20 *Coffee break*

11.20–13.20 **Chimeras and patterns 2**

R. Andrzejak (Spain). Fractal patterns and chimera states generated by a two-population network of quadratic maps
A. Polezhaev (Russia). Mathematical modeling of autowaves and inhomogeneous structures formation at a travelling reaction front
I. Franović (Serbia). Bumps, chimera states, and Turing patterns in systems of coupled active rotators
O. Omel'chenko (Germany). Chimera states that breathe and move
M. Rosenblum (Germany). Remote synchrony explained by high-order phase reduction

13.30–14.30 *Lunch*

14.30–15.20 **Plenary Talk.** *Gerd Leuchs (Germany)* Soliton quantum dynamics in a two mode fibre

15.20–16.10 **Plenary Talk.** *Juergen Kurths (Germany).* Quantifying stability in complex networks and its application to power grids

16.10–16.30 *Coffee break*

16.30–17.20 **Plenary Talk.** *Björn Manuel Hegelich (USA)*. Study of isochorically heated warm dense carbon foam at the Texas Petawatt Laser

17.20–17.50 Discussion

18.30–21.30 Round table

Extreme Photonics (NWP-2)
HALL LUX

Sunday, September 19

8.00–9.00 Registration

9.00–9.20 Opening Session

9.20–11.25 **Advanced laser technologies / Workshop "Nonlinear and quantum optics in confined systems" 1**

9.20–9.50 *A. Andrianov (Russia).* Widely stretchable soliton crystals in an ultrafast mode-locked fiber laser (invited)

9.50–10.05 *A. Osipov (Russia).* The alexandrite laser-assisted synthesis of linear carbon chains stabilized by noble metal particle

10.05–10.20 *A. Shepelev (Russia).* Research of a mid-IR quantum cascade laser

10.20–10.35 *A. Putilov (Russia).* High-power tunable alexandrite laser with dual wavelength operations

10.35–10.50 *V. Gribko (Russia).* Growing profiled monosectorial KDP crystals for making Pockels cells

10.50–11.05 *A. Antipov (Russia).* Laser ablation of metal targets in a liquid by microsecond laser pulses

11.00–11.20 *Coffee break*

11.20–13.20 **High-power laser systems and applications 1**

11.20–12.05 *T. Kuehl (Germany).* Novel nuclear physics opportunities with high intensity particle bunches from laser acceleration (keynote talk)

12.05–12.20 *I. Khairulin (Russia)*. The role of finite atomic size in the process of ultrahigh-order harmonic generation in gases

12.20–12.50 *L. Ji (China)*. Extreme field physics using the 10/100 PW laser at Shanghai (invited)

12.50–13.20 *M. Büscher (Germany)*. Polarized beams from plasma accelerators (invited)

13.30–14.30 *Lunch*

14.30–15.20 **Plenary Talk.** *Itamar Procaccia (Israel).* Plasticity and screening in amorphous solids

15.20–16.10 **Plenary Talk.** *Alexey Eliseev (Russia).* Earth system models hierarchy

16.10–17.00 **Plenary Talk.** *Phillip Russell (Germany)*. Nonlinear optical phenomena in photonic crystal fibres

17.00–17.20 *Coffee break*

17.20–19.20 **High-power laser systems and applications 2**

17.20–17.50 *C. Hernandez-Gomez (UK)*. Developing high peak power, high average power lasers for the EPAC facility (invited)

17.50–18.20 *C. Dorrer (USA)*. MTW-OPAL – a technology development platform for ultra-intense OPCPA systems (invited)

18.20–18.35 *A. Kotov (Russia)*. CafCA enhanced optical probing of relativistic plasma singularities

18.35–18.50 *N. Mikheytsev (Russia)*. Doppler effect in transparent laser plasmas

18.50–19.20 *L. Labun (USA)*. A signal of the Unruh effect in laser wakefield acceleration (invited)

9.00–11.00 **Russian-Chinese Workshop**
"Ultra intense laser technology and intense field physics" 1

9.00–9.25 *K. Feng (China)*. High-quality electron beams and free-electron lasing based on laser wake field accelerator at SIOM

9.25–9.50 *E. Efimenko (Russia)*. Dense pair plasma generation by laser beams forming a dipole wave structure

9.50–10.15 *W. Fan (China)*. The performance of SGII serials facilities and the progress of high power laser control technologies at NLHPLP

10.15–10.40 *A. Shaykin (Russia).* Toward few-period optical pulses: 1.5 PW, 10 fs at PEARL facilities

10.40–11.05 *L. Yu (China)*. Improvement of focus ability of SULF-10PW laser

11.00–11.20 *Coffee break*

11.20–13.20 **Workshop "Nonlinear and quantum optics in confined systems" 2**

11.20–11.50 *E. Anashkina (Russia).* Theoretical and experimental study of rare-earth ion-doped tellurite glass microlasers (invited)

11.50–12.20 *P. Del'Haye (Germany)*. Bound states of dark and bright soliton pairs in microresonators (invited)

12.20–12.50 *J. Alnis (Latvia).* Kerr comb generation in silica WGM micro-resonators and application to telecommunications (invited)

12.50–13.05 *M. Marisova (Russia)*. Dispersion engineering and four-wave mixing in silica microresonators covered by a germanosilicate microlayer

13.05–13.20 *A. Sorokin (Russia).* The analysis of quantum noise squeezing for soliton pulses in optical fibers

13.30–12.30 *Lunch*

14.30–16.30 **Workshop "Nonlinear and quantum optics in confined systems" 3**

14.30–15.00 *R. Ganeev (Latvia).* High-order harmonics generation in quantum dots (invited)

15.00–15.30 *E. Romanova (Russia).* Peculiarities of nonlinear optical effects observation in chalcogenide microspheres (invited)

15.30–15.45 *E. Popov (Russia).* Effective squeezing of radio-field in one-atom maser with regularized atomic beam

15.45–16.00 *S. Korsakova (Russia).* Using the sensing and dispersion properties of higher-order modes of chalcogenide fibers for all-fiber spectroscopic sensors design

16.00–16.30 *V. Antonov (Russia).* Petahertz-bandwidth amplifier in the XUV/X-ray range based on IR-field-dressed plasma-based X-ray laser (invited)

16.30–16.50 *Coffee break*

16.50–18.50 **Workshop "Nonlinear and Quantum Optics in Confined Systems" 4**

16.50–17.05 *N. Kalinin (Russia).* Coherent propagation of the out-of-phase supermode in a multicore fiber with a square grid of cores

17.05–17.20 *L. Skladova (Latvia).* Spectrum slicing technique to increase transmitted data rate in PAM-4 modulated next-generation fiber-optic communication systems

17.20–17.35 *I. Lyashuk (Latvia).* FWM-based optical frequency combs for next-generation WDM fiber-optic communication system

17.35–17.50 *A. Ostrovskis (Latvia).* Hybrid mm-wave ARoF Super-PON system for fast 5G and optical broadband network deployment

17.50–18.05 *K. Zakis (Latvia).* Fiber optical parametric amplifiers: Challenges and recent developments

18.05–18.20 *T. Salgals (Latvia).* Microsphere-based OFC-WGMR multi-wavelength source and its applications in telecommunications

18.20–18.30 *I. Khairulin (Russia).* Attosecond recombination plasma-based X-ray laser

18.30–18.40 *I. Khairulin (Russia).* Compression of the waveform of synchrotron Mössbauer X-ray photon in an optically deep oscillating recoilless resonant absorber

18.50–19.10 *Coffee break*

19.10–20.00 **Plenary Talk.** *Martin Fullekrug (UK).* Earth-ionosphere cavity resonances

20.00–20.50 **Plenary Talk.** *Earle Williams (USA).* The role of aerosol in the sources for the global electrical circuits

Tuesday, September 21

9.00–11.00 **Russian-Chinese Workshop**
"Ultra intense laser technology and intense field physics" 2

9.00–9.25 *I. Mukhin (Russia)*. Design of the front-end laser system for a sub-exawatt XCELS facility

9.25–9.50 *X. Wang (China)*. New development of laser glass and optical functional glass at SIOM

9.50–10.15 *A. Soloviev (Russia).* Adaptive correcting of dynamic and nonlinear optical aberrations in high-power lasers

10.15–10.40 *Z. Cao (China)*. Application of laser polishing in the processing of fused silica with super-smooth surface and high damage resistance

10.40–11.05 *D. Silin (Russia).* Nonlinear polarization interferometer for increasing the contrast and power of intense laser pulses

11.00–11.20 *Coffee break*

11.20–13.20 **High-power laser systems and applications 3**

11.20–11.50 *V. Malka (Israel)*. Commissioning and first results from the new 2x100 TW laser at the WIS (keynote talk)

11.50–12.20 *M. Starodubtsev (Russia).* High power laser driven laboratory astrophysics (invited)

12.20–12.50 *S. Pikuz (Russia)*. Solid-density plasma directly and indirectly created by sub-PW picosecond laser pulses (invited)

12.50–13.20 *K. Burdonov (France)*. Laboratory modeling of accretion process in young stellar objects with high-power lasers (invited)

13.30–14.30 *Lunch*

14.30–16.30 **Laser driven secondary sources**

14.30–15.00 *A. Pukhov (Germany).* Prospects of plasma-based particle acceleration (invited)

15.00–15.15 *S. Perevalov (Russia)*. High harmonic generation and electron acceleration in intense laser–solid interactions at parallel incidence

15.15–15.45 *N. Andreev (Russia)*. Laser sources of ultrarelativistic electrons and radiation (invited)

15.45–16.15 *M. Murakami (Japan)*. Laser scaling for generation of megatesla magnetic fields by microtube implosions (invited)

16.30–16.50 *Coffee break*

16.50–17.40 **Plenary Talk.** *Wulfram Gerstner (Switzerland).* Dynamics of memory retrieval in hippocampus

17.40–18.30 **Plenary talk.** *Robert Boyd (USA, Canada)*. Tailoring light propagation by controllable phase and group velocities

Wednesday, September 22

9.00–10.30 **Young Scientists School "Laser-plasma sources of X-ray radiation"**

9.00–9.30 *J.-C. Kieffer (Canada)*. Applications of laser-wakefield-based X-ray sources (invited)

9.30–10.00 *N. Andreev (Russia).* Radiations sources based on laser-plasma interaction with near critical density targets (invited)

10:00–10:30 *V. Bychenkov (Russia)*. Radiation and radioactive sources based on laser-plasma interaction (invited)

11.00–11.20 *Coffee break*

11.20–14.30 **Young Scientists School "High-power sources of electromagnetic radiation of the terahertz, optical and X-ray ranges based on photoinjector complexes"**

11.20–11.50 *A. Pukhov (Germany).* Basic concepts of plasma based particle acceleration (invited)

11.50–12.20 *A. Golovanov (Russia).* On generation of IR radiation by an intense few-cycle laser pulse in plasma

12.20–12.50 *S. Mironov (Russia).* Laser pulse shaping for electron photoinjectors (invited)

12.50–13.20 *M. Martyanov (Russia)*. Focusing of PW laser pulses after nonlinear compression

13.20–13.50 *N. Bonod (France)*. Diffraction gratings and optical mirrors for high-power lasers (invited)

13.50–14.20 *O. Vais (Russia).* Complementary diagnostics of ultra-intense femtosecond laser pulses via vacuum acceleration of electrons and protons (invited)

14.30–15.20 **Plenary Talk.** *Gerd Leuchs (Germany).* Soliton quantum dynamics in a two mode fibre

15.20–16.10 **Plenary Talk.** *Juergen Kurths (Germany).* Quantifying stability in complex networks and its application to power grids

16.10–16.30 *Coffee break*

16.30–17.20 **Plenary Talk.** *Björn Manuel Hegelich (USA)*. Study of isochorically heated warm dense carbon foam at the Texas Petawatt Laser

17.20–17.50 Discussion

18.30–21.30 Round table

Nonlinear Phenomena in the Atmosphere and Ocean (NWP-3)

HALL Standard 1

Sunday, September 19

8.00–9.00 Registration

9.00–9.20 Opening Session

9.20–10.50 **Climate systems**

9.20–9.50 *S. Kravtsov (USA, Russia).* Multi-scale inverse modeling of precipitation: Model development and applications (invited)

09.50–10.10 *A. Seleznev (Russia).* Investigation of the North Atlantic oscillation variability and its response to anthropogenic forcing using nonlinear time series models

10.10–10.30 *M. Tarasevich (Russia).* The initial states influence on the NAO index predictability in seasonal hind casts of the INM RAS climate model for the 2009–2010 winter season

11.00–11.20 *Coffee break*

11.20–13.20 **Electromagnetic environment of the Earth**

11.20–11.50 *C. Price (Israel).* The impact of the Schumann resonance on photosynthesis of plants (invited)

11.50–12.20 *Y. Shlyugaev (Russia).* Effect of the state of the sea surface on the overwater air conductivity

12.20–12.40 *A. Evtushenko (Russia).* The plasma-chemical model of daytime sprite and halo

12.40–13.00 *S. Dementyeva (Russia).* Mesoscale numerical modeling of turbulent and aerosol effects in thunderstorm electrification

13.00–13.20 *E. Svechnikova (Russia).* Structure of clouds producing energetic radiation

13.30–14.30 *Lunch*

14.30–15.20 **Plenary Talk.** *Itamar Procaccia (Israel).* Plasticity and screening in amorphous solids

15.20–16.10 **Plenary Talk.** *Alexey Eliseev (Russia).* Earth system models hierarchy

16.10–17.00 **Plenary Talk.** *Phillip Russel (Germany)*. Nonlinear optical phenomena in photonic crystal fibres

9.00–11.00 **Nonlinear phenomena in the ocean**

9.00–9.30 *A. Slunyaev (Russia).* Long-living nonlinear patterns and related extreme events in the direct numerical simulation of deep-water waves (invited)

9.30–10.00 *E. Pelinovsky (Russia).* Traveling waves in highly inhomogeneous media (invited)

10.00–10.20 *O. Shishkina (Russia).* Propagation of 3D non-linear internal and surface waves alg the transverse bottom profile of the step type

10.20–10.40 *O. Shishkina (Russia).* Peculiarities of propagation of the release wave of the Gorky electric power plant

10.40–11.00 *I. Repina (Russia).* Air-water carbon dioxide and methane transfer in inland water (invited)

11.00–11.20 *Coffee break*

11.20–13.20 **Climate systems**

11.20–11.50 *A. Gritsun (Russia).* The Earth climate changes forecast with the Earth system model of the INM RAS (invited)

11.50–12.20 *D. Mukhin (Russia).* Revealing modes of mid-latitude atmospheric variability by nonlinear data analysis

12.20–12.50 *E. Loskutov (Russia).* Stability of the Pleistocene climate against strong perturbations

12.50–13.10 *A. Gavrilov (Russia).* Empirical modeling of interrelated processes with different time scales

13.30–14.30 *Lunch*

14.30–16.30 **Atmosphere dynamics**

14.30–15.00 *R. Berkstein (Israel).* Has Deforestation in the Amazon resulted in a decrease in thunderstorm activity?

15.00–15.20 *J. Schröttle (Israel).* Tropical waves in stochastically excited moist two-dimensional turbulence

15.20–15.40 *E. Mortikov (Russia).* Direct numerical simulation of stably stratified turbulence

15.40–16.20 **Electromagnetic Environment of the Earth**

15.40–16.00 *M. Shatalina (Russia).* Fair weather criteria for ground-based atmospheric electric field observations

16.30–16.50 *Coffee break*

16.50–18.50 **Electromagnetic environment of the Earth**

16.50–17.20 *C. Price (Israel).* The link between lightning activity and the upper tropospheric water vapor (invited)

17.20–17.50 *K. Nicoll (UK).* Simultaneous vertical profiles of ionisation rates from the UK and Russia: preliminary findings (invited)

17.50–18.20 *Y. Liu (USA).* Clear evidence of aerosol effects on lightning characteristics (invited)

18.20–18.50 *A. Demekhov (Russia).* Generation of discrete electromagnetic emissions in the Earth's magnetosphere (invited)

18.50–19.10 *Coffee break*

19.10–20.00 **Plenary Talk.** *Martin Fullekrug (UK).* Earth-ionosphere cavity resonances

20.00–20.50 **Plenary Talk.** *Earle Williams (USA).* The role of aerosol in the sources for the global electrical circuits

Tuesday, September 21

11.00–11.20 *Coffee break*

11.20–13.20 **Electromagnetic environment of the Earth**

11.20–11.50 *E. Mareev (Russia).* On the numerical simulation of the main stage of the lightning discharge (invited)

11.50–12.20 *A. Shindin (Russia).* The study of nonlinear phenomena in ionospheric plasma at SURA heating facility (invited)

12.20–12.50 *M. Guschin (Russia).* Investigation of pulsed plasma processes on KROT large-scale device (invited)

16.30–16.50 *Coffee break*

16.50–17.40 **Plenary Talk.** *Wulfram Gerstner (Switzerland).* Dynamics of memory retrieval in hippocampus

17.40–18.30 **Plenary talk.** *Robert Boyd (USA, Canada).* Tailoring light propagation by controllable phase and group velocities

Wednesday, September 22

14.30–15.20 **Plenary Talk.** *Gerd Leuchs (Germany).* Soliton quantum dynamics in a two mode fibre

15.20–16.10 **Plenary Talk.** *Juergen Kurths (Germany).* Quantifying stability in complex networks and its application to power grids

16.10–16.30 *Coffee break*

16.30–17.20 **Plenary Talk.** *Björn Manuel Hegelich (USA).* Study of isochorically heated warm dense carbon foam at the Texas Petawatt Laser

17.20–17.50 Discussion

18.30–21.30 Round table


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