

NATIONAL ACADEMY OF SCIENCES OF UKRAINE
NATIONAL SCIENCE CENTER
“KHARKIV INSTITUTE OF PHYSICS AND TECHNOLOGY”



PROGRAM

XVI International Workshop
**“PLASMA ELECTRONICS
AND NEW METHODS OF ACCELERATION”**

(September 5-6, 2023)

NSC KIPT, Kharkiv, Ukraine

Kharkiv-2023



Workshop timetable

<i>Day</i>	<i>Time</i>	
<i>Tuesday, September 5</i>	9 ⁰⁰ – 9 ³⁰	Opening
	9 ³⁰ – 11 ¹⁵	Section 1. Non-relativistic plasma electronics
	11 ³⁰ – 13 ¹⁵	Section 3. High-current relativistic electronics
	13 ³⁰ – 14 ³⁰	Lunch
	14 ³⁰ – 17 ⁰⁰	Section 2. New methods of charged particle acceleration
	17 ¹⁵ – 18 ³⁰	Section 4. Ion beams for inertial confinement fusion, materials science and other applications
<i>Wednesday, September 6</i>	9 ⁰⁰ – 10 ⁰⁰	Section 4. Ion beams for inertial confinement fusion, materials science and other applications
	10 ¹⁵ – 11 ³⁰	Section 5. Collective processes in space plasmas
	11 ⁴⁵ – 13 ⁴⁵	Section 6. Beam-plasma discharge. Plasma chemistry
	14 ⁰⁰ – 15 ⁰⁰	Lunch
	15 ⁰⁰ – 17 ⁴⁵	Section 7. Applications and technologies
	18 ⁰⁰ – 18 ¹⁵	Closing

Tuesday, September 5

9:00 – 9:30

Opening ceremony

9:30 – 11:15

Section 1. Non-relativistic plasma electronics

Chairs: Vyacheslav Buts / Igor Girka

Features of new cyclotron resonances, as well as conditions for resonant acceleration of charged particles in a vacuum without a magnetic field

V.A. Buts (*NSC KIPT, Kharkiv, Ukraine; Institute of Radio Astronomy of NAS of Ukraine, Kharkiv, Ukraine*),

A.G. Zagorodny (*Bogolyubov Institute for Theoretical Physics NAS of Ukraine, Kyiv, Ukraine*)

The role of higher moments on the distribution of particles in the space of impulses at cyclotron resonances

V.A. Buts (*NSC KIPT, Kharkiv, Ukraine; Institute of Radio Astronomy of NAS of Ukraine, Kharkiv, Ukraine*),

V.V. Kuzmin (*NSC KIPT, Kharkiv, Ukraine*)

Do the dispersion properties of electromagnetic surface waves at the sharp boundary plasma-metal in slab Voigt geometry represent the limiting case of those for the interface of two plasmas?

I.O. Girka (*Max-Planck-Institut für Plasmaphysik, Garching, Germany*;

V.N. Karazin Kharkiv National University, Kharkiv, Ukraine),

M. Thumm (*Karlsruhe Institute of Technology, IHM and IHE, Karlsruhe, Germany*)

Frequency of parametric X-ray radiation

A.V. Shchagin (*Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany*;

NSC KIPT, Kharkiv, Ukraine),

G. Kube (*Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany*)

Slow electromagnetic waves in planar three-component waveguide structure with mu-negative metamaterial

V.K. Galaydych, A.E. Sporov, V.P. Olefir (*V.N. Karazin Kharkiv National University, Kharkiv, Ukraine*),

N.A. Azarenkov (*V.N. Karazin Kharkiv National University, Kharkiv, Ukraine*;

NSC KIPT, Kharkiv, Ukraine)

Drift-kinetic equations in magnetized current-carrying plasmas

N.I. Grishanov (*V.N. Karazin Kharkiv National University, Kharkiv, Ukraine; Ukrainian State University of Railway Transport, Kharkiv, Ukraine*),

N.A. Azarenkov (*V.N. Karazin Kharkiv National University, Kharkiv, Ukraine; NSC KIPT, Kharkiv, Ukraine*)

Including the own fields of quantum emitters in describing generation regimes

V.M. Kuklin, E.V. Poklonskiy (*V.N. Karazin Kharkiv National University, Kharkiv, Ukraine*)

11:30 – 13:15

Section 3. High-current relativistic electronics

Chairs: Viktor Sinitsyn / Anatoliy Ponomarev

Excitation of durable VHF oscillations in ferrite-filled coaxial lines

I. Magda, V. Mukhin, V. Sinitsyn, S. Karelin, O. Lebedenko, M. Volovenko, O. Rak (*NSC KIPT, Kharkiv, Ukraine*)

The simulation of emergency action on construction materials by high current relativistic electron beams

S.E. Donets, V.V. Bryukhovetsky, O.A. Startsev, V.V. Lytvynenko (*Institute of Electrophysics and Radiation Technologies NAS of Ukraine, Kharkiv, Ukraine*),
Yu.F. Lonin, A.G. Ponomarev, V.T. Uvarov (*NSC KIPT, Kharkiv, Ukraine*)

A method for measuring the power of a high-amplitude pulsed-modulated microwave signal for the ECR plasma heating

D.Yu. Zalesky (*NSC KIPT, Kharkiv, Ukraine*),

V.A. Buts (*NSC KIPT, Kharkiv, Ukraine; Institute of Radio Astronomy of NAS of Ukraine, Kharkiv, Ukraine*),

G.V. Sotnikov (*NSC KIPT, Kharkiv, Ukraine*)

Magnetic field dynamics in plasma opening switch: inhomogeneous plasma density distribution

O.V. Manuilenko (*NSC KIPT, Kharkiv, Ukraine; V.N. Karazin Kharkiv National University, Kharkiv, Ukraine*),

I.N. Onishchenko, A.V. Pashchenko, I.A. Pashchenko, V.B. Yuferov (*NSC KIPT, Kharkiv, Ukraine*)

Effect of electron collisions with residual neutral gas on characteristic oscillation frequencies in systems of electron flows with a virtual cathode

O. Manuilenko (*NSC KIPT, Kharkiv, Ukraine; V.N. Karazin Kharkiv National University, Kharkiv, Ukraine*),

V. Novikov (*Proton – 21, Kyiv, Ukraine*),

I. Onishchenko, A. Pashchenko, I. Pashchenko, I. Shapoval, V. Yuferov
(*NSC KIPT, Kharkiv, Ukraine*)

Influence of the energy parameters of the primary circuit on the current characteristics of the DIN-2K accelerator

D.V. Vinnikov, V.V. Katrechko, O.M. Ozerov, V.I. Tkachev, S.V. Marchenko, V.B. Yuferov (*NSC KIPT, Kharkiv, Ukraine*),
O.V. Manuilenko (*NSC KIPT, Kharkiv, Ukraine*; *V.N. Karazin Kharkiv National University, Kharkiv, Ukraine*)

Excitation of TM mode by a relativistic electron beam in an azimuthally corrugated waveguide

V.V. Ognivenko (*NSC KIPT, Kharkiv, Ukraine*)

13:30 – 14:30 LUNCH

14:30 – 17:00

Section 2. New methods of charged particle acceleration

Chairs: Gennadiy Sotnikov / Vasyl Maslov

Investigation of parameters of electron and positron bunches in a plasma-dielectric wakefield accelerator

P.I. Markov, R.R. Kniaziev, G.V. Sotnikov (*NSC KIPT, Kharkiv, Ukraine*)

Excitation of wake surface plasmon-phonon oscillations by a relativistic electron bunch in a polar semiconductor waveguide

V.A. Balakirev, I.N. Onishchenko (*NSC KIPT, Kharkiv, Ukraine*)

Wake excitation of plasma and electromagnetic oscillations by a relativistic electron bunch in a plasma resonator

V.A. Balakirev, I.N. Onishchenko (*NSC KIPT, Kharkiv, Ukraine*)

Simultaneous compensation of second and third order dispersion in CPA laser systems

V.P. Leshchenko, A.V. Vasyliiev, K.V. Galaydych, A.I. Povrozin, G.V. Sotnikov, I.N. Onishchenko (*NSC KIPT, Kharkiv, Ukraine*)

Simulation of the identical plateaus formation on plasma wakefield for long driver-bunch and witness-bunches

D.O. Shendryk (*V.N. Karazin Kharkiv National University, Kharkiv, Ukraine*; *Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany*; *Ruhr-Universität, Bochum, Germany*),

R.T. Ovsianikov (*V.N. Karazin Kharkiv National University, Kharkiv, Ukraine; NSC KIPT, Kharkiv, Ukraine*),
V.I. Maslov (*Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany; NSC KIPT, Kharkiv, Ukraine*),
J. Osterhoff, M. Thevenet (*Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany*)

A method for maintaining the acceleration rate and increasing the energy of self-injected bunch due to the use of inhomogeneous plasma

D.S. Bondar (*V.N. Karazin Kharkiv National University, Kharkiv, Ukraine; NSC KIPT, Kharkiv, Ukraine*),
V.I. Maslov, I.N. Onishchenko (*NSC KIPT, Kharkiv, Ukraine*)

Profiling and variation of laser pulse parameters as a way to preserve the stability of self-injected bunches during excitation of a wakefield in plasma

D.S. Bondar (*V.N. Karazin Kharkiv National University, Kharkiv, Ukraine; NSC KIPT, Kharkiv, Ukraine*),
V.I. Maslov, I.N. Onishchenko (*NSC KIPT, Kharkiv, Ukraine*)

Regularization of wakefield in a weakly nonlinear regime

I.V. Demydenko (*V.N. Karazin Kharkiv National University, Kharkiv, Ukraine; NSC KIPT, Kharkiv, Ukraine*),
V.I. Maslov (*NSC KIPT, Kharkiv, Ukraine*)

Electron cyclotron resonance accelerator – eCRA

Y. Jiang, X. Chang (*Yale University, New Haven, CT, USA*),
J.L. Hirshfield (*Yale University, Omega-P R&D, Inc. and Particle Accelerator Research Foundation, New Haven, CT, USA*),
M.A. Palmer, M. Fedurin, W. Stern (*Brookhaven National Laboratory, Upton, NY, USA*)

Technology development for modern SRF accelerators

V. Yakovlev (*Fermi National Accelerator Laboratory, Batavia, Illinois USA*)

17:15 – 18:30

Section 4. Ion beams for inertial confinement fusion, materials science and other applications

Chairs: Oleg Manuilenko / Vadim Makhlai

Effect of transient layers on energy transfer to different surfaces at the plasma-surface interaction in QSPA

V.A. Makhlai, I.E. Garkusha (*NSC KIPT, Kharkiv, Ukraine; V.N. Karazin Kharkiv National University, Kharkiv, Ukraine*),

S.S. Herashchenko, Yu.V. Petrov, N.N. Aksenov, N.V. Kulik (*NSC KIPT, Kharkiv, Ukraine*),

Y.E. Volkova (*NSC KIPT, Kharkiv, Ukraine; V.N. Karazin Kharkiv National University, Kharkiv, Ukraine*),

T.M. Merenkova, D.V. Yelisyeyev, P.B. Shevchuk (*NSC KIPT, Kharkiv, Ukraine*)

Modernization of the helium ion accelerator microwave power supply system

N.I. Gaponenko (*NSC KIPT, Kharkiv, Ukraine*),

O.V. Manuilenko (*NSC KIPT, Kharkiv, Ukraine; V.N. Karazin Kharkiv National University, Kharkiv, Ukraine*),

V.A. Soshenko, B.V. Zajtsev, V.G. Zhuravlyov (*NSC KIPT, Kharkiv, Ukraine*)

Features of structural damages of surface of tungsten as a result of irradiation with helium ion beams with energy 4 MeV

O.V. Manuilenko (*NSC KIPT, Kharkiv, Ukraine; V.N. Karazin Kharkiv National University, Kharkiv, Ukraine*),

E.M. Prokhorenko (*Institute of Electrophysics and Radiation Technologies, Kharkiv, Ukraine*),

K.V. Pavlii, B.V. Zajtsev, S.N. Dubniuk (*NSC KIPT, Kharkiv, Ukraine*),

V.V. Lytvynenko (*Institute of Electrophysics and Radiation Technologies, Kharkiv, Ukraine*),

T.G. Prokhorenko (*Kharkiv National Automobile and Highway University, Kharkiv, Ukraine*)

New concept of the main part of multicharged ions linear accelerator on the combined RF focusing basis

S.S. Tishkin, O.F. Dyachenko (*NSC KIPT, Kharkiv, Ukraine*)

TiO₂-2 radiating damages as a result of the irradiation helium ions with energies of 0.12 and 4 MeV on the linear accelerator

V.I. Butenko (*NSC KIPT, Kharkiv, Ukraine*),

A. Cenian (*Institute of Fluid-Flow Machinery, Polish Academy of Sciences, Gdansk, Poland*),

O.F. Dyachenko (*NSC KIPT, Kharkiv, Ukraine*),

O.V. Manuilenko (*NSC KIPT, Kharkiv, Ukraine; V.N. Karazin Kharkiv National University, Kharkiv, Ukraine*),

K.V. Pavlii (*NSC KIPT, Kharkiv, Ukraine*),

M. Sawczak (*Institute of Fluid-Flow Machinery, Polish Academy of Sciences, Gdansk, Poland*),

B.V. Zajtsev, V.I. Zhurba (*NSC KIPT, Kharkiv, Ukraine*)

Wednesday, September 6

09:00 – 10:00

Section 4. Ion beams for inertial confinement fusion, materials science and other applications

Chairs: Oleg Manuilenko / Vadim Makhelai

Conceptual design of a radiation-free 800 MeV proton linac

S.O. Vdovin (*NSC KIPT, Kharkiv, Ukraine*),

O.V. Manuilenko (*NSC KIPT, Kharkiv, Ukraine; V.N. Karazin Kharkiv National University, Kharkiv, Ukraine*),

M.G. Shulika, O.M. Shulika (*NSC KIPT, Kharkiv, Ukraine*)

High-voltage modulator for ion linac injector with smooth pulse duration control

O.V. Manuilenko (*NSC KIPT, Kharkiv, Ukraine; V.N. Karazin Kharkiv National University, Kharkiv, Ukraine*),

V.A. Soshenko, A.V. Zabolotin, B.V. Zajtsev, V.G. Zhuravlyov (*NSC KIPT, Kharkiv, Ukraine*)

Isolation of electrons by the magnetic field of a cusp for ion acceleration

O.V. Fedorivska, V.I. Maslov, I.N. Onishchenko (*NSC KIPT, Kharkiv, Ukraine*)

Lens for focusing beams of negative hydrogen ions by means of a field of positive ions bulk charge

V.P. Goretskii, V.Yu. Bazhenov (*Institute of Physics NAS of Ukraine, Kyiv, Ukraine*)

10:15 – 11:30

Section 5. Collective processes in space plasmas

Chair: Vasyl Maslov

Cosmic ray source and solar energetic particles

M. Cassé (*Astrophysical and cosmological center of Fleurance, a delocalized laboratory (Ukraine-England-France), Fleurance, France*)

Structures of vortexes near the poles of planets of the solar system

V.I. Maslov (*NSC KIPT, Kharkiv, Ukraine; Astrophysical and cosmological center of Fleurance, a delocalized laboratory (Ukraine-England-France), Fleurance, France*),

M. Cassé (*Astrophysical and cosmological center of Fleurance, a delocalized laboratory (Ukraine-England-France), Fleurance, France*),

O.K. Cheremnykh (*Space Research Institute, Kyiv, Ukraine*),

A.P. Fomina (*Bogolyubov Institute for Theoretical Physics NAS of Ukraine, Kyiv, Ukraine*),

D. Grasso (*Istituto dei Sistemi Complessi – CNR and Dipartimento di Energia, Politecnico di Torino, Torino, Italy*),

R.I. Kholodov, O.P. Novak (*Institute of Applied Physics NAS of Ukraine, Sumy, Ukraine*),

R.T. Ovsianikov (*V.N. Karazin Kharkiv National University, Kharkiv, Ukraine; NSC KIPT, Kharkiv, Ukraine*)

Self-consistent equilibrium of a helical magnetic flux rope

O.K. Cheremnykh (*Space Research Institute, Kyiv, Ukraine*),

V. Fedun (*The University of Sheffield, Sheffield, United Kingdom*),

V.M. Lashkin (*Institute for Nuclear Research, Kyiv, Ukraine*)

Temporal evolution of the plasma density cavity caused by inhomogeneous stochastic electric fields

N.A. Azarenkov (*V.N. Karazin Kharkiv National University, Kharkiv, Ukraine; NSC KIPT, Kharkiv, Ukraine*),

D.V. Chibisov (*V.N. Karazin Kharkiv National University, Kharkiv, Ukraine*),

O.D. Chibisov (*H.S. Skovoroda Kharkiv National Pedagogical University, Kharkiv, Ukraine*)

Modeling the interaction of Jupiter's magnetospheric plasma ions with satellites

O.V. Khelemelia (*Institute of Applied Physics NAS of Ukraine, Sumy, Ukraine*),

A.P. Fomina (*Bogolyubov Institute for Theoretical Physics NAS of Ukraine, Kyiv, Ukraine; University Paris-Saclay, CNRS, IAS, Orsay, France*),

O.P. Novak, R.I. Kholodov (*Institute of Applied Physics NAS of Ukraine, Sumy, Ukraine*)

11:45 – 13:45

Section 6. Beam-plasma discharge. Plasma chemistry

Chairs: Grigoriy Taran / Volodymyr Golota

Two stage plasma source for large scale beam generation

V.Yu. Bazhenov, A.M. Dobrovolskiy, V.V. Tsiolko, V.M. Piun (*Institute of Physics NAS of Ukraine, Kyiv, Ukraine*)

Penning-type H^- ion source with metal hydride cathode in pulsating regime

I. Sereda, Ya. Hrechko (*V.N. Karazin Kharkiv National University, Kharkiv, Ukraine*),

N. Azarenkov (*V.N. Karazin Kharkiv National University, Kharkiv, Ukraine; NSC KIPT, Kharkiv, Ukraine*)

Study of the dependence of the characteristics of the pulse negative corona on the parameters of the combined high voltage power supply

G.V. Taran, B.B. Kadolin, V.M. Ostroushko, I.A. Paschenko (*NSC KIPT, Kharkiv, Ukraine*)

Study of the fungicidal properties of ozone treatment, Ag and Cu nanoparticles and their combined action on the model sanitary significant mold saprophyte *Aspergillus flavus*

G.V. Taran, B.B. Kadolin (*NSC KIPT, Kharkiv, Ukraine*),
M.O. Yaroshenko, B.T. Stegnyy (*NSC "Institute of Experimental and Clinical Veterinary Medicine", Kharkiv, Ukraine*)

Effect of plasma chemical oxidation of ethylene impurities on the efficiency of kiwifruit storage

M.O. Yegorov, G.V. Taran, O.O. Zamuriev, P.O. Opalev (*NSC KIPT, Kharkiv, Ukraine*)

Numerical simulation of reproduction of the development conditions of the next Trichel pulse in negative corona

V.M. Ostroushko (*NSC KIPT, Kharkiv, Ukraine*)

The physico-topological simulation of a transmission X-ray tube with induction heating of the cathode

S.O Maikut, A.I. Kuzmichev, L.Yu. Tsybul'skyi, N.V. Shynkarenko
(*National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Kyiv, Ukraine*)

Direct water treatment by APGD with rotating electrodes

V. Golota, P. Mohanty (*University of Michigan, Dearborn, MI, USA*),
L. Zavada (*NSC KIPT, Kharkiv, Ukraine*)

14:00 – 15:00 LUNCH

15:00 – 17:45

Section 7. Applications and technologies

Chairs: Anatoliy Ponomarev / Alexey Goncharov

Temperature dynamics of the microdroplet fraction of metal plasma in plasma-optical devices with fast electrons

A.A. Goncharov, I.M. Litovko, A.V. Ryabtsev (*Institute of Physics NAS of Ukraine, Kyiv, Ukraine*)

Generation of compensated ion-electron flow in the combined magnetron-ion-plasma system

A. Zykov, N. Yefymenko, S. Dudin, S. Yakovin (*V.N. Karazin Kharkiv National University, Kharkiv, Ukraine*),
N. Azarenkov (*V.N. Karazin Kharkiv National University, Kharkiv, Ukraine; NSC KIPT, Kharkiv, Ukraine*)

Simulation of capacitively coupled RF discharge in argon

V. Lisovskiy, S. Dudin, A. Shakhnazarian, P. Platonov, V. Yegorenkov (*V.N. Karazin Kharkiv National University, Kharkiv, Ukraine*)

Properties of a secondary discharge plasma supported by a rotating gliding discharge

V.Ya. Chernyak, V.V. Iukhymenko, K.V. Iukhymenko, D.D. Tretiakov, S.S. Nedovesov, Z.O. Prokofieva (*Taras Shevchenko National University, Kyiv, Ukraine*)

Disproportionation reactions of ferrocene in a plasma-liquid system with a rotating gliding discharge

S.V. Shulga (*Institute of Hydromechanics, Kyiv, Ukraine*),
V.Ya. Chernyak, V.V. Iukhymenko, K.V. Iukhymenko, D.D. Tretiakov, S.S. Nedovesov, N.V. Matlakh (*Taras Shevchenko National University, Kyiv, Ukraine*)

On the possibility of obtaining a beam of heavy ions in the form of an "open umbrella" with subsequent deposition in the separator manifold

V.B. Yuferov, V.V. Katrechko, D.V. Vinnikov, V.I. Tkachev, S.V. Shariy, O.M. Ozerov, D.D. Sorokina (*NSC KIPT, Kharkiv, Ukraine*)

Simple pulse microwave waveguide calorimeter with temperature sensor LM 35

A.F. Linnik, D.Yu. Zalesky (*NSC KIPT, Kharkiv, Ukraine*)

Determination of charged and neutral particles activation yields for fundamental research and instrumental elemental analysis

V. Hrygorenko, S. Karpus, I. Timchenko (*NSC KIPT, Kharkiv, Ukraine*)

Application features of the electrostatic systems for measuring the secondary electron emission yield

S. Karpus, I. Shliahov (*NSC KIPT, Kharkiv, Ukraine*),
M. Liashchov (*V.N. Karazin Kharkiv National University, Kharkiv, Ukraine*),
V. Borisenko, S. Kochetov, E. Tsiats'ko, O. Shopen (*NSC KIPT, Kharkiv, Ukraine*)

Aluminum thin foil heating dynamics during high energy pulsed electron beam passage

M. Luhanko (*V.N. Karazin Kharkiv National University, Kharkiv, Ukraine*),
O. Shopen, S. Karpus, T. Malykhina (*NSC KIPT, Kharkiv, Ukraine*)

Plasma treatment of titanium dioxide film for black TiO₂

E.K. Frolova, V.O. Khomych, R.M. Kravchuk (*Institute of Physics NAS of Ukraine, Kyiv, Ukraine*),
O.F. Kolomys (*V. Lashkaryov Institute of Semiconductor Physics, Kyiv, Ukraine*),
Yu.M. Gudenko, O.S Pylypchuk, V.I. Styopkin, A.M. Dobrovolskiy (*Institute of Physics NAS of Ukraine, Kyiv, Ukraine*)

18:00 – 18:15

Closing ceremony