



KAZAKH PHYSICAL SOCIETY



NATIONAL NUCLEAR CENTER
of the Republic of Kazakhstan

PROGRAM

Third Annual Meeting of Kazakh Physical Society

June 7–11, 2023
Kurchatov, Kazakhstan

CONFERENCE ORGANIZERS

- **Kazakh Physical Society**
- **National Nuclear Center of the Republic of Kazakhstan**

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Co-Chairs:

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LOCAL ORGANIZING COMMITTEE

- **The National Nuclear Center of the Republic of Kazakhstan**
- **International Scientific Technology Center**

MEETING SCHEDULE

Astana time
(GMT+6)

June 7,
Wednesday

- Arrival and registration of the participants, technical tours to facilities of RSE NNC RK
- **Dinner 18.30**

June 8,
Thursday

- **Breakfast.....07.30–08.30**
- Opening 09.00–09.40
- Plenary Session..... 09.40–10.40
- **Coffee break, Poster Session.....10.40–11.00**
- Plenary Session..... 11.00–13.00
- **Lunch 13.00–14.00**
- Plenary Session..... 14.00–18.40
- **Side event..... 14.40–15.20**
- **Coffee break, Poster Session..... 15.20–15.45**
- **Round table 18.05–18.40**
- **Official Reception 19.00**

June 9,
Friday

- **Breakfast 08.00–09.00**
- Session..... 09.00–13.00
- **Coffee break, Poster Session 10.30–10.55**
- **Lunch..... 13.00–14.00**
- Technical tours to facilities of RSE NNC RK 14.00–18.30
- **Dinner..... 18.30**

June 10,
Saturday

- **Breakfast.....07.30–08.30**
- Technical tours to facilities of RSE NNC RK..... 08.30–18.00
- **Lunch 14.00–15.00**
- **Dinner 18.30**
- Departure of the participants from Kurchatov

June 11,
Sunday

- **Breakfast 08.00–09.00**
- Departure of the participants from Kurchatov

PROGRAM

June 7 (Wednesday)

09.00–18.30

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| – | Arrival and registration of the workshop participants | 09.00–18.00 |
| – | Technical tours to the facilities of RSE NNC RK:
- Exposition Hall of the STS history;
- KTM Tokamak;
- Laboratory buildings;
- Laboratory areas of hydrogen and plasma technology;
- EAGLE test bench | 14.00–18.00 |

Dinner

18.30

June 8 (Thursday)

09.00–18.40

Conference Hall of NNC RK

Chairs: Tolegen Kozhamkulov, Erlan Batyrbekov

OPENING CEREMONY

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| 1 | Opening remarks
<i>Director General of the National Nuclear Center
of the Republic of Kazakhstan
Erlan Batyrbekov</i> | 09.00–09.10 |
| 2 | Welcome speech
<i>Minister of Energy of the Republic of Kazakhstan
Almasadam Satkaliyev</i> | 09.10–09.20 |
| 3 | Welcome speech
<i>President of the National Academy of Science
of the Republic of Kazakhstan
Kunsulu Zakariya</i> | 09.20–09.30 |
| 4 | Welcome speech
<i>President of Kazakh Physical Society
Tolegen Kozhamkulov</i> | 09.30–09.40 |

5	ACTIVITY OF THE NATIONAL NUCLEAR CENTER OF THE REPUBLIC OF KAZAKHSTAN IN THE PEACEFUL USE OF ATOMIC ENERGY <i>Vladimir Vityuk (National Nuclear Center of RK, Kazakhstan)</i>	09.40–10.00
6	ACCEPTANCE TESTS OF WCTC WITH LEU FUEL AT THE IVG.1M RESEARCH REACTOR SITE IN KAZAKHSTAN <i>Igor Bolshinsky (Idaho National Laboratory, USA)</i>	10.00–10.20
7	SYNTHESIS AND COORDINATION OF ALUMINA NANO- PORES AND CARBON NANOWALLS FOR THE GENERATION OF DISTINCTIVE GEOMETRIC NANOSTRUCTURES <i>Maratbek Gabdullin (Kazakh-British Technical University, Kazakhstan)</i>	10.20–10.40
<i>Coffee break, Poster Session</i>		10.40–11.00
8	EFFECTIVE POTENTIALS AND PHYSICAL PROPERTIES OF A DENSE PLASMA <i>Tlekkabul Ramazanov (Al-Farabi Kazakh National University, Kazakhstan)</i>	11.00–11.20
9	CEA – NNC COOPERATION: THE SAIGA IN-PILE EXPERIMENTAL PROGRAM TO QUALIFY THE SIMMER CALCULATION TOOL IN SFR SEVERE ACCIDENT CONDITIONS <i>Frederic Payot (French Alternative Energies and Atomic Energy Commission (CEA), France), Alexander Vurim (Institute of Atomic Energy of NNC RK, Kazakhstan)</i>	11.20–11.40
10	MORE ON GRAVITATIONAL WAVES FROM DOUBLE MONODROMY INFLATION <i>Medeu Abishev (Al-Farabi Kazakh National University)</i>	11.40–12.00
11	CURRENT CHALLENGES OF THE NATIONAL RESEARCH CENTER “KURCHATOV INSTITUTE” IN CONTROLLED FUSION AND FUSION FISSION HYBRID SYSTEMS <i>Boris Kuteyev (NRC “Kurchatov Institute”, Russia)</i>	12.00–12.20
12	THE ITER PROJECT: PROGRESS AMID CHALLENGES <i>Mario Merola (ITER, France)</i>	12.20–12.40
13	THE SIGNIFICANCE OF INTERFACIAL ENGINEERING FOR PEROVSKITE PHOTOVOLTAICS <i>Annie Ng (Nazarbayev University, Kazakhstan)</i>	12.40–12.50

14	IMPACT OF DIFFERENT CARBON NANOMATERIALS ON CHARGE PROPAGATING PROPERTIES OF ENERGY STORAGE DEVICES <i>Vladimir Pavlenko (Al-Farabi Kazakh National University, Institute of Combustion Problems, Kazakhstan)</i>	12.50–13.00
Lunch		13.00–14.00
Chairs: Tlekkabul Ramazanov, Vladimir Vityuk		
15	THE RESEARCH COOPERATION WITH THE NATIONAL NUCLEAR CENTER OF THE REPUBLIC OF KAZAKHSTAN TO ENHANCE THE SAFETY OF SODIUM-COOLED FAST REACTORS <i>Kenji Kamiyama (Japan Atomic Energy Agency)</i>	14.00–14.20
16	EXPERIMENTS AT THE GLOBUS-M2 TOKAMAK: CURRENT RESULTS AND PROSPECTS <i>Nikolay Bakharev (Ioffe Physical Technical Institute, Russia)</i>	14.20–14.40
	SIDE EVENT “EPOCHAL DISCOVERIES IN PHYSICS AND DEVELOPMENT OF CONTEMPORARY MUSIC” Key speaker: Rakhat-Bi Abdyssagin (Kazakhstan) Moderator: Vladimir Vityuk	14.40–15.20
Coffee break, Poster Session		15.20–15.45
17	COMPARATIVE STUDY OF THE TRIBOLOGICAL AND CORROSION CHARACTERISTICS OF TICN, TICRCN AND TIZRCN COATING <i>Wieleba Wojciech (Wroslaw University of Technology, Poland)</i>	15.45–15.55
18	INVESTIGATION OF STRUCTURAL AND ELECTRO-CHEMICAL PROPERTIES OF $\text{SrFe}_x\text{Co}_{1-x}\text{O}_{3-\delta}$ PEROVSKITE OXIDES AS A SUPERCAPACITOR ELECTRODE MATERIAL <i>Ali Coruh (Sakarya University, Turkey)</i>	15.55–16.05
19	NEW NANO-FABRICATION FACILITY AT NAZARBAYEV UNIVERSITY <i>Alexander Tikhonov (Nazarbayev University, Kazakhstan)</i>	16.05–16.15
20	CONVERSION OF THE IVG.1M REACTOR TO THE LOW ENRICHED URANIUM FUEL <i>Vyacheslav Gnyrya (Institute of Atomic Energy of NNC RK, Kazakhstan)</i>	16.15–16.25
21	SILICON CARBIDE SYNTHESIZED BY RF MAGNETRON SPUTTERING IN THE COMPOSITION OF A DOUBLE LAYER ANTIREFLECTION COATING SiC/MgF_2 <i>Nurzhan B. Beisenkhanov (Kazakh-British Technical University)</i>	16.25–16.35

22	VAVILOV-CHERENKOV DIPOLE RADIATION <i>Seil Sautbekov (Al-Farabi Kazakh National University, Kazakhstan)</i>	16.35–16.45
23	DETERMINATION OF THE ACTIVATION ENERGY OF TRITIUM DIFFUSION IN CERAMIC BREEDERS BY REACTOR POWER VARIATION <i>Inesh Kenzhina (Satbayev University, Kazakhstan)</i>	16.45–16.55
24	PRODUCTION OF A CEMENTITIOUS WASTE FORM FOR IRRADIATED GRAPHITE FUEL <i>Yerbolat Koyanbayev (Institute of Atomic Energy of NNC RK, Kazakhstan)</i>	16.55–17.05
25	INTENSE PULSED ION BEAM APPLICATION FOR THIN- FILMS AND NANOMATERIALS MODIFICATION <i>Marat Kaikanov (Nazarbayev University, Kazakhstan)</i>	17.05–17.15
26	STUDY OF THE TEMPERATURE DEPENDENCE A CARBIDIZED LAYER FORMATION ON THE TUNGSTEN SURFACE UNDER PLASMA IRRADIATION <i>Gainiya Zhanbolatova (Institute of Atomic Energy of NNC RK, Kazakhstan)</i>	17.15–17.25
27	OPTICAL RADIATION FROM THE SPUTTERED SPECIES DURING NOBLE GASES AND THEIR MIXTURES EXCITATION BY PRODUCTS OF ${}^6\text{Li}(n,\alpha){}^3\text{H}$ NUCLEAR REACTION <i>Kuanysb Samarkhanov (Institute of Atomic Energy of NNC RK, Kazakhstan)</i>	17.25–17.35
28	STRUCTURAL, MORPHOLOGICAL, AND ELECTRICAL PROPERTIES OF CARBON NANOWALLS OBTAINED BY ICP-PECVD METHOD <i>Rakhymzhan Zhumadilov (Kazakh-British Technical University, Kazakhstan)</i>	17.35–17.45
29	INVESTIGATION OF THE PLASMA FLUX INTERACTION WITH FUSION REACTORS FIRST-WALL CANDIDATE MATERIALS <i>Aigerim Tazhen (Al-Farabi Kazakh National University, Institute of Experimental and Theoretical Physics, Kazakhstan)</i>	17.45–17.55
30	DISSOCIATION OF QUARKONIUM IN VISCOUS QUARK-GLUON PLASMA <i>Yernur Kuanysbbauly (Al-Farabi Kazakh National University, Kazakhstan)</i>	17.55–18.05

ROUND TABLE

18.05–18.40

”TRAINING OF HUMAN RESOURCES FOR NUCLEAR
INDUSTRY”**Key speaker:** *Daniyar Janseitov (Institute of Nuclear Physics,
Kazakhstan)***Co-speakers:** *Al-Farabi Kazakh National University;
National Nuclear Center RK*

*Official Reception***19.00**

June 9 (Friday)**09.00–18.30***Chairs: Mazhyn Skakov, Kanat Baigarin*

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| 1 | INTERFACIAL PHONON THERMAL TRANSPORT ACROSS
GRAPHENE-CARBON NITRIDE AND SILICON CARBIDE
STRUCTURES | 09.00–09.10 |
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Omid Farzadian (Nazarbayev University, Kazakhstan)

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| 2 | OVERVIEW OF THE FIRST EXPERIMENTAL RESULTS
AT THE KTM TOKAMAK | 09.10–09.20 |
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*Baurzhan Chektybayev (Institute of Atomic Energy of NNC RK,
Kazakhstan)*

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| 3 | COMBINING INTERSTELLAR DUST AND GAS OBSERVA-
TIONS TO STUDY THE ROLE OF THE MAGNETIC FIELDS
IN STAR FORMATION | 09.20–09.30 |
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Dana Alina (Nazarbayev University, Kazakhstan)

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| 4 | SCANNING TUNNELING MICROSCOPY AND
SPECTROSCOPY OF LAYERED MATERIALS | 09.30–09.40 |
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*Kuanysh Zhussupbekov (School of Physics, The University
of Dublin)*

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| 5 | HEAT TRANSPORT ACROSS NANOSCALE DAMAGE
PROFILE AND THERMAL ANISOTROPY IN SAPPHIRE
IRRADIATED BY SWIFT HEAVY IONS | 09.40–09.50 |
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Zhandos Utegulov (Nazarbayev University, Kazakhstan)

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| 6 | DEVELOPMENT OF THE TECHNOLOGY OF NEUTRON-
TRANSMUTATION DOPING OF SILICON AT THE WWR-K
REACTOR | 09.50–10.00 |
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Natalya Romanova (Institute of Nuclear Physics, Kazakhstan)

7	DEPTH-DEPENDENT THERMAL CONDUCTIVITY AND DAMAGE IN SWIFT HEAVY ION IRRADIATED METAL OXIDES <i>Azat Abdullayev (Nazarbayev University, Kazakhstan)</i>	10.00–10.10
8	THE PROPERTIES OF DUSTY PLASMAS WITH MICRO- AND NANOPARTICLES IN A MODULATED RF DISCHARGE <i>Almasbek Utegenov (Institute of Applied Science and Information Technologies, Kazakhstan)</i>	10.10–10.20
9	EXPERIMENTAL STUDY OF Ga ⁺ ION INTERACTIONS WITH PMMA IN ION BEAM LITHOGRAPHY <i>Mukhit Muratov (Al-Farabi Kazakh National University)</i>	10.20–10.30
<i>Coffee break, Poster Session</i>		10.30–10.55
<i>Chairs: Maratbek Gabdullin, Viktor Baklanov</i>		
10	STUDIES OF TWO-PHASE LITHIUM CERAMICS Li ₄ SiO ₄ -Li ₂ TiO ₃ UNDER CONDITIONS OF NEUTRON IRRADIATION <i>Yevgeniy Chikhray (Al-Farabi Kazakh National University, Kazakhstan)</i>	10.55–11.05
11	WAVES IN THE COLLISIONAL AND VISCOUS QUARK-GLUON PLASMA <i>Kassymkhan Baiseitov (Al-Farabi Kazakh National University, Kazakhstan)</i>	11.05–11.15
12	DEVELOPMENT OF CYTOGENETIC BIOLOGICAL DOSIMETRY IN KAZAKHSTAN FOR PREPAREDNESS AND RESPONSE TO RADIATION EMERGENCIES <i>Laura Kenzhina (Institute of Radiation Safety and Ecology of NNC RK, Kazakhstan)</i>	11.15–11.25
13	ANALYSIS OF DEAD-ZONE FORMATION IN DIFFUSION-REACTION PROCESSES WITH GENERALIZED DIFFUSION FLUX <i>Bek Kabduali (Nazarbayev University, Kazakhstan)</i>	11.25–11.35
14	INVESTIGATION OF THE INFLUENCE OF ELECTRON AND PROTON IRRADIATION ON THE STRUCTURAL AND ELECTRONIC CHARACTERISTICS OF CARBON NANOWALLS <i>Yerassyl Yerlanuly (Kazakh-British Technical University, Kazakhstan)</i>	11.35–11.45
15	STUDY OF RESONANT REACTIONS AT ASTANA DC-60 CYCLOTRON <i>Aliya Nurmukhanbetova (Nazarbayev University, Kazakhstan)</i>	11.45–11.55

16	MODELING OF DYNAMIC OPERATION MODES OF IVG.1M REACTOR <i>Olzhas Zhanbolatov (Institute of Atomic Energy of NNC RK, Kazakhstan)</i>	11.55–12.05
17	ON THE ISSUE OF PHYSICAL AND BIOLOGICAL DOSIMETRY IN KAZAKHSTAN <i>Dina Biyakhmetova (Institute of Radiation Safety and Ecology of NNC RK, Kazakhstan)</i>	12.05–12.15
18	INFLUENCE OF THE CARBIDIZED TUNGSTEN SURFACE ON THE PROCESSES OF INTERACTION WITH HELIUM PLASMA <i>Arman Miniyazov (Institute of Atomic Energy of NNC RK, Kazakhstan)</i>	12.15–12.25
19	CHARACTERISTICS OF THE OPEN FUEL CYCLE OF IVG.1M RESEARCH REACTOR AFTER CONVERSION <i>Artur Surayev (Institute of Atomic Energy of NNC RK, Kazakhstan)</i>	12.25–12.35
	Closing remarks	12.35–13.00
	<i>Lunch</i>	13.00–14.00
	<i>Technical tours to “Baikal-1” Site/ IGR Site, Experimental Field</i>	14.00–18.30
	<i>Dinner</i>	18.30

June 10 (Saturday)

09.00–18.00

<i>Technical tours to “Baikal-1” Site/ IGR Site, Experimental Field</i>	08.30–18.00
<i>Lunch</i>	14.00–15.00
<i>Dinner</i>	18.30
<i>Departure of the participants</i>	

June 11 (Sunday)

09.00 – 18.00

<i>Breakfast</i>	08.00–09.00
<i>Departure of the participants</i>	09.00–18.00

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- 1 THERMAL TRANSPORT IN SI NANOCOMPOSITE FILMS
Bayan Kurbanova (Nazarbayev University, Kazakhstan)

 - 2 NU'S EXPERIMENTAL SETUP FOR NUCLEAR PHYSICS RESEARCH
Dosbol Nauruzbayev (Nazarbayev University, Kazakhstan)

 - 3 A NEW PROTON SPECTRA FOR $^{nat}\text{Cu}(p,xp)$ REACTION AT $E_p=7$ AND 30 MeV
Timur Zholdybayev (Institute of Nuclear Physics, Kazakhstan)

 - 4 DEAD-CORE SOLUTIONS AND CRITICAL THIELE MODULUS FOR SLABS WITH A DISTRIBUTED CATALYST AND EXTERNAL MASS TRANSFER
Piotr Skrzypacz (Nazarbayev University, Kazakhstan)

 - 5 INVESTIGATION OF THE CHARACTERISTICS OF A PULSED PLASMA THRUSTER USING GRAPHITE AS A SOLID PROPELLANT
Moldir Nurusheva (Al-Farabi Kazakh National University, Kazakhstan)

 - 6 MICRO- AND NANOSCALE PARTICLES MANIPULATION AND SORTING BY ACOUSTOFLUIDIC METHODS
Andrei Megalinskii (Nazarbayev University, Kazakhstan)

 - 7 METHODS AND RESULTS OF DETERMINING THE IMPURITY GAS AMOUNT IN CERAMIC FUEL
Galina Vityuk (Institute of Atomic Energy of NNC RK, Kazakhstan)

 - 8 FORMATION OF "FUZZ" ON THE PRE-NITRIDED TUNGSTEN SURFACE
Timur Tulenbergenov (Institute of Atomic Energy of NNC RK, Kazakhstan)

 - 9 RESOURCE LIFE OF STRUCTURAL BERYLLIUM OF FUSION REACTORS
Igor Sokolov (Institute of Atomic Energy of NNC RK, Kazakhstan)

 - 10 EVOLUTION OF THE STRUCTURAL-PHASE STATE OF HYDROGEN-STORING MATERIALS BASED ON TI-25AL-25NB AT.%
Nuriya Mukhamedova (Institute of Atomic Energy of NNC RK, Kazakhstan)

 - 11 OBTAINING A CORIUM PROTOTYPE IN THE MELT TRAP OF THE LAVA-B FACILITY
Kuanyshebek Toleubekov (Institute of Atomic Energy of NNC RK, Kazakhstan)

 - 12 APPLICATION OF CRM-125A STANDARD MATERIAL FOR VERIFICATION OF NON-DESTRUCTIVE GAMMA SPECTROMETRIC METHOD FOR MONITORING URANIUM ENRICHMENT
Berik Medetbekov (Institute of Atomic Energy of NNC RK, Kazakhstan)

 - 13 MICROSTRUCTURE AND MECHANICAL PROPERTIES OF THE LWR SOLIDIFIED MELT PROTOTYPE OBTAINED BY THE OUT-OF-PILE EXPERIMENT
Nurzhan Mukhamedov (Institute of Atomic Energy of NNC RK, Kazakhstan)

 - 14 OPTICAL DIAGNOSTICS OF KTM TOKAMAK
Ademi Madiyanova (Institute of Atomic Energy of NNC RK, Kazakhstan)

 - 15 RESEARCH OF THE FREQUENCY RESPONSE PARAMETERS OF ANTENNA MODULE OF THE ADDITIONAL ION CYCLOTRON RESONANCE HEATING SYSTEM OF THE KTM TOKAMAK
Azizkhan Satibekov (Institute of Atomic Energy of NNC RK, Kazakhstan)
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