Kazakh Physical Society

KAZAKH KBTU BRITISH TECHNICAL UNIVERSITY

Second Annual Meeting of Kazakh Physical Society

June 6-8, 2019, Almaty

SECOND ANNUAL MEETING OF KAZAKH PHYSICAL SOCIETY

June 6-8, 2019, Kazakh-British Technical University

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PROGRAM
SECOND ANNUAL MEETING OF KAZAKH PHYSICAL SOCIETY
Kazakh-British Technical University

Day 1
June 6, 2019

08:30 – 09:30	**REGISTRATION OF PARTICIPANTS OF THE CONFERENCE** **LONDON ROOM (404 ROOM)**
09:30 – 09:50	**ANNUAL MEETING OPENING** **Maratbek Gabdullin**, Head of Almaty Branch of KPS **Tolegen Kozhamkulov,** President of KPS **Kanat Baigarin,** Head of Astana Branch of KPS **Erlan Batyrbekov**, General Director of the RSE NNC RK **Bum-Hoon Lee,** President, Korean Physical Society
09:50 – 10:10	**Bum-Hoon Lee** Sogang University, Seoul, South Korea **Black Holes in the dilatonic Einstein-Gauss-Bonnet theory**
10:10 – 10:30	**Hernando Quevedo** National Autonomous University of Mexico, Mexico City, Mexico **Quasi-homogeneous black hole thermodynamics**
10:30 – 10:50	**Tlekkabul Ramazanov** Institute for Experimental and Theoretical Physics, Al-Farabi Kazakh National University, Almaty, Kazakhstan **Polarization and magnetic field effects in complex plasmas**
10:50 – 11:10	**Sergey Maiorov** Prokhorov General Physics Institute of the Russian Academy of Sciences, Moscow, Russia Joint Institute for High Temperature of the Russian Academy of Sciences, Moscow, Russia **On the ion drift in cold gas**
11:10 – 11:30	**Anton Desyatnikov** Nazarbayev University, Nur-Sultan, Kazakhstan **Optical vortex rings in nonlinear media**
11:30 – 11:50	**Alexander Shepetov** P.N.Lebedev Physical Institute (LPI), Tien-Shan Mountain Cosmic Ray Station, Moscow, Russia **Simultaneous observation of lightning emission in different wave ranges of the electromagnetic spectrum in Tien Shan mountains**
11:50 – 12:10	**Nassurlla Burtebayev** Institute of Nuclear Physics, Almaty, Kazakhstan **The interaction processes of the charged particles and light ions**

	with the p- and sd-shell nuclei for astrophysical and thermonuclear applications
12:10 – 12:30	**Alexandr Vurim** NNC RK (National Nuclear Center of the Republic of Kazakhstan), Kurchatov, Kazakhstan **Experimental Researches to Ensure Nuclear Power Safety at the Base of NNC RK Facilities**
12:30 – 14:00	**LUNCH BREAK**
14:00 – 14:15	**Nurzhan Beisenkhanov** Kazakh-British Technical University, Almaty, Kazakhstan **Physical Properties of Epitaxial Silicon Carbide Films, Grown by Atomic Substitution on the High-resistance (111) Oriented Silicon**
14:15 – 14:30	**Askhat Jumabekov** Department of Physics, Nazarbayev University, Nur-Sultan, Kazakhstan **Semitransparent Back-Contact Perovskite Solar Cells**
14:30 – 14:45	**Vladimir Kossov** **Olga Fedorenko** Abai Kazakh National Pedagogical University, Almaty, Kazakhstan **Special Regimes under Diffusion in Gaseous Mixtures**
14:45 – 15:00	**Askar Davletov** Al-Farabi Kazakh National University, Almaty, Kazakhstan **Roton structure of dust-acoustic wave spectrum of complex plasmas with finite-size particles**
15:00 – 15:15	**Vladimir Dzhunushaliev** Institute for Experimental and Theoretical Physics, Al-Farabi Kazakh National University, Almaty, Kazakhstan **Non-Abelian Proca-Dirac-Higgs theory: particle-like solutions and a mass gap**
15:15 – 15:30	**Vladimir Messerle** Combustion Problems Institute of Ministry of Education and Science of Kazakhstan, Almaty, Kazakhstan **Plasma Application for Uranium-Containing Solid Fuels Processing**
15:30 – 16:00	**COFFEE BREAK**
16:00 – 16:15	**Nurgali Takibayev** al-Farabi Kazakh National University, Almaty, Kazakhstan **Induced Processes and Reactions in Neutron Star Crusts**
16:15– 16:30	**Alma Dauletbekova** L.N. Gumilyov Eurasian National University, Nur-Sultan, Kazakhstan **Synthesis of nanocrystals in SiO2/Si track template by**

	electrochemical deposition of Zn"
16:30 – 16:45	**Leonid Chechin** Fesenkov Astrophysical Institute, Almaty, Kazakhstan **Ergali Kurmanov** Al-Farabi Kazakh National University, Almaty, Kazakhstan **On the theory of light propagation in the non-stationary gravitational lens. Problem formulation**
16:45 – 17:00	**Alexandr Ustimenko** Institute for Experimental and Theoretical Physics, Al-Farabi Kazakh National University, Almaty, Kazakhstan **Plasma Technology for Biomedical Waste Processing**
17:00 – 17:15	**Karlygash Dzhumagulova** Department of Physics, al–Farabi KazNU, Almaty, Kazakhstan **Optical reflectivity and dynamical conductivity of the dense semiclassical plasma on the basis of the effective potentials**
17:15 – 17:30	**Vyacheslav Somsikov** Physics of the geo-cosmos relation, Almaty, Kazakhstan **Nature of the determinism in physics**
17:30 – 17:45	**Zhandos Moldabekov** Institute for Experimental and Theoretical Physics, Al-Farabi Kazakh National University, Almaty, Kazakhstan **Dynamical structure factor of strongly coupled ions in warm dense matter**
17:45 – 18:00	**Alexander Tikhonov** Nazarbayev University **New high-current pulsed ion INURA accelerator facility at Nazarbayev University: new opportunities for advanced materials, nano science, plasma and charged beams physics**
18:00 – 18:15	**Koblandy Yerzhanov** L.N.Gumilyov Eurasian National University, Nur-Sultan, Kazakhstan **F(R,T,X,ϕ) cosmology solution involving one arbitrary function**
18:15 – 18:30	**Turlan Sadykov, Yernar Tautayev** Satbayev University, Institute of Physics and Technology, Almaty, Kazakhstan **Investigation of structures in the distribution of particles from the central area of extensive air showers on Hadron-55 installation**
18:30 – 18:45	**Aizhan Kuratova** Al-Farabi Kazakh National University, Almaty, Kazakhstan **Observation of CTA 102 Blazar on Tien-Shan Astronomical Observatory**
18:45 – 19:00	**Ruslan Irkimbekov** National Nuclear Center of the Republic of Kazakhstan, Kurchatov, Kazakhstan **IVG.1M research reactor conversion**

PROGRAM

SECOND ANNUAL MEETING OF KAZAKH PHYSICAL SOCIETY

Kazakh-British Technical University

Day 2
June 7, 2019

09:00 – 09:15	**Maratbek Gabdullin** Kazakh-British Technical University, Almaty, Kazakhstan **Dynamical and structural properties of dense plasmas**
09:15 – 09:30	**Medeu Abishev** Al Farabi National University, Almaty, Kazakhstan **Propagation of gravitational and electromagnetic waves through the magnetic field of the magnetar**
09:30 – 09:45	**Nurlan Tokmoldin** Institute of Physics and Technology, LLP, Satbayev University, Almaty, Kazakhstan **Heterojunction silicon solar cells**
09:45 – 10:00	**Zhandos Utegulov** Nazarbayev University, Nur-Sultan, Kazakhstan **Elastic property assessment of nanoscale-thick refractory metal films by nanosecond laser acoustics**
10:00 – 10:15	**Mukhit Muratov** NNLOT, Al-Farabi Kazakh National University, Almaty, Kazakhstan **Grain Surface Heating in Cryogenic Environment**
10:15 – 10:30	**Sandybek Kunakov** Al Farabi National University, Almaty, Kazakhstan **Fission fragments' and electrons'coupled Boltzmann equations and degradation energy spectra formation in a weakly ionized plasma irradiated by fission fragments**
10:30 – 10:50	**COFFEE BREAK**
10:50– 11:05	**Bolysbek Utelbayev** Kazakh-British Technical University, Almaty, Kazakhstan **The Hypothesis about Mechanism of Heat Transfer and The Nature of Its Carrier**
11:05 – 11:20	**Didar Batryshev**

	Al Farabi National University, Almaty, Kazakhstan **Investigation of carbon nanowalls synthesis by pecvd method**
11:20 – 11:35	**Daniele Malafarina** Nazarbayev University, Nur-Sultan, Kazakhstan **Observable properties of a black hole mimicker**
11:35 – 11:50	**Essen Suleimenov** Kazakh-British Technical University, Almaty, Kazakhstan **Effect of Non-Stationary Electric Current on The Oxide Meline System - Gas Phase**
11:50 – 12:05	**Chingiz Akniyazov** Fesenkov Astrophysical Institute, Almaty, Kazakhstan **Space debris cloud evolution; De-orbiting small space debris**
12:05 – 12:20	**Almasbek Utegenov** Institute for Experimental and Theoretical Physics, Al-Farabi Kazakh National University, Almaty, Kazakhstan **Properties of the Complex Plasma in the Radiofrequency Discharge With Imposed DC Field**
12:20 – 12:35	**Aigerim Tazhen** Institute for Experimental and Theoretical Physics, Al-Farabi Kazakh National University, Almaty, Kazakhstan **Experimental investigation of the properties of plasma-dust formations on pulsed plasma accelerator**
12:35 – 14:00	**LUNCH BREAK**
14:00 – 14:15	**Sagi Orazbayev** Institute for Experimental and Theoretical Physics, Al-Farabi Kazakh National University, Almaty, Kazakhstan **Synthesis of carbon nanoparticles in plasma medium and their application**
14:15 – 14:30	**Farid Umarov** Kazakh-British Technical University, Almaty, Kazakhstan **Particle-solid surface interactions**
14:30 – 14:45	**Gulzipa Sataeva** L.N. Gumilyov Eurasian National University, Nur-Sultan, Kazakhstan **Nanostructured Potassium Sulfate Crystals**
14:45 – 15:00	**Saken Toktarbay** Department of Theoretical and Nuclear Physics, Al-Farabi Kazakh National University, Almaty, Kazakhstan **Investigation of the stability of orbits by using the adiabatic theory of motion in General Relativity.**
15:00 – 15:15	**Nurlan Bakranov** Kazakh National Research Technical University after K.I. Satpayev, Almaty, Kazakhstan **Photoelectrochemical Application of Heterostructured Semiconductors**
15:15 – 15:30	**Timur Kulsartov** IETP, Al-Farabi Kazakh National University, Almaty, Kazakhstan Kazakh-British Technical University, Almaty, Kazakhstan

	Simulation of hydrogen isotopes absorption by metals under uncompensated pressure conditions
15:30 – 16:30	**COFFEE BREAK** **POSTER PRESENTATIONS** **Tour of KBTU (Center of Alternative Energy and Nanotechnologies and Round Hall)**
16:30 – 16:40	**Yerbolat Ussenov** NNLOT, Al-Farabi Kazakh National University, Almaty, Kazakhstan **Diagnostics of dusty plasmas with nanoparticles**
16:40 – 16:50	**Oxana Lyakhova** Branch "Institute of Radiation Safety and Ecology" NNC RK, Kurchatov, Kazakhstan **System of radiation monitoring of water and air environment on the Semipalatinsk Test Site**
16:50 – 17:00	**Askar Kassymov** Shakarim State University of Semey, Semey, Kazakhstan **Quantum concentration of the liquid**
17:00 – 17:10	**Kuralay Nurgaliyeva** Al Farabi National University, Almaty, Kazakhstan **Regular effects of non-equilibrium atmospheric gas – solar radiation system in theory and experiment**
17:10 – 17:20	**Ayan Mitra** Nazarbayev University, Nur-Sultan, Kazakhstan **Probing Uncertainty Relations in Non-Commutative Space through space based laser system: the case of nano- and pico-satellites fleet**
17:20 – 17:30	**Aiymgul Markhabayeva** Al-Farabi Kazakh National University, Almaty, Kazakhstan **Improved pseudocapacitive performance of w@wo3 structure**
17:30 – 17:40	**Yessenbek Aldakulov** Institute for Experimental and Theoretical Physics, Al-Farabi Kazakh National University, Almaty, Kazakhstan **Impact of neutral shadowing force on dust particles' structural and dynamical properties in cryogenic environment**
17:40 – 17:50	**Dina Bakranova** Kazakh-British Technical University, Almaty, Kazakhstan **Structural Properties of Epitaxial Silicon Carbide Films, Grown by Atomic Substitution on the Silicon**
17:50 – 18:00	**Kuralay Dyussebayeva** NNLOT, Al-Farabi Kazakh National University, Almaty, Kazakhstan **Study of the mechanisms of formation of modulation effects in the angular distributions of differential cross sections of elastically scattered alpha particles on light multi-cluster nuclei**
18:00 – 18:10	**Farida Kapsalamova** Kazakh-British Technical University, Almaty, Kazakhstan **Structural and phase transformations in wear resistant Fe-Ni-Cr-Cu-Si-B-C coatings**
18:10 – 18:30	**AWARDING CEREMONY** **ANNUAL MEETING CLOSING**

Study of the mechanisms of formation of modulation effects in the angular distributions of differential cross sections of elastically scattered alpha particles on light multi-cluster nuclei

Dyachkov V.V.[1], Dyussebayeva K.S.[2], Zaripova Yu.A. [1], Yushkov A.V. [1]

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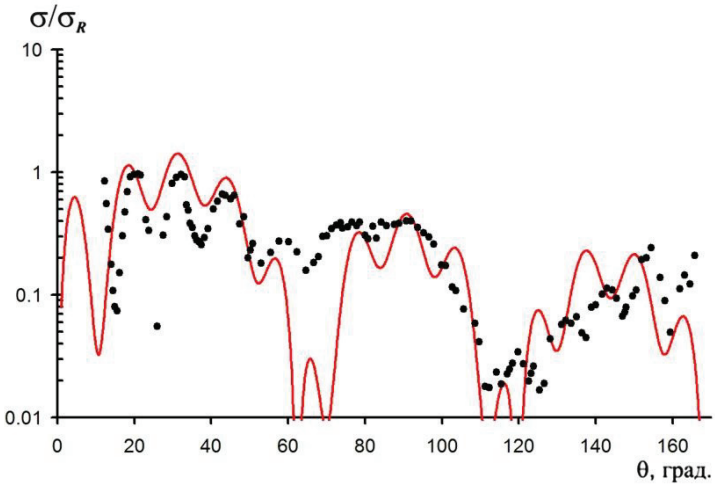
One of the methods of experimental detection of a multi-cluster structure is the decomposition of experimental angular distributions of differential cross sections for elastic diffraction scattering into multi-cluster components. Within the framework of the diffraction theory and under the assumption of total absorption inside the sphere of interaction, the authors obtained a decomposition of the total amplitude into several multi-cluster modes [1], and for the first time measurements of nuclear clustering by two direct methods on medium-energy alpha particle beams [2] were performed.



Points are global experimental data; curve - own calculation.

Fig – Angular distributions of elastic diffraction scattering $^{20}Ne(\alpha,\alpha)^{20}Ne$ E_α=54.1 MeV

The authors described experimental data on the angular distributions of light alpha-cluster nuclei. The analysis of the angular distributions of the elastic scattering of alpha particles was performed on the assumption of total absorption within the sphere of the cluster structure and the sphere of the interaction nucleus. These assumptions made it possible to expand the scattering amplitude into components-scattering on the nucleus itself, on the alpha cluster, and on a smaller cluster structure. As a result of the proposed model, the following was obtained. The authors proposed a model in which the amplitude for describing the diffraction elastic scattering of 4n±1 light nuclei in the framework of the theory of diffraction scattering as superpositions of wave functions in the approximation on an absolutely black core and on its absolutely black substructures. In the total scattering amplitude, an important contribution is made to the alpha-partial mode, as well as scattering modes on the correlated motion of nucleons and on isolated nucleons. This can be manifested as growth in angular distributions due to the interference of the alpha-cluster mode with the modes of smaller cluster structures and nucleons. Due to these effects, it is possible not only to unevenly raise the angular distributions of the differential cross sections over the Rutherford cross section, but also to rise at the rear angles.

1. Dyachkov V.V., Zaripova Yu.A., Yushkov A.V., Zholdybayev T.K., Kerimkulov Zh.K. Kinematic Method for Separating Dominant Types of Cluster Configurations in a Complex Nucleus // Bulletin of the Russian Academy of Sciences: Physics. 81 (10), 2017, pp. 1174 – 1178.

2. Yu.A. Zaripova, V.V. Dyachkov, A.V. Yushkov, T.K. Zholdybayev, D.K. Gridnev. Direct experimental detection of spatially localized clusters in nuclei on alpha-particle beams // International Journal of Modern Physics E. 27 (2). 2018. pp. 18500171 – 185001716

Study of variations in ground-level radiation background from natural terrestrial radionuclides and their influence on the occurrence of cancer risks among the population

Dyachkov V.V.[1], Zaripova Yu.A.[1], Yushkov A.V.[1], Shakirov A.L.[1], Bigeldiyeva M.T.[1], Dyussebayeva K.S.[2], Abramov K.E.[1]

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Nowadays, special attention of public and international institutions is given to reasoning and creating ways to ensure the safety of the population from natural radioactive radon. Radiologically, radon is the predominant source of exposure to the public. The contribution of radon to the total radiation dose of people reaches more than 50%. The study of the mechanisms of alpha radiation of radon on biological organisms and the study of the concentration of radon and its daughter decay products in the habitable human environment is the main urgent task and the subject of study of this problem by this team of authors over 10 years. Within the framework of the previous and present projects, the authors obtained the following results on the study of variations in the prism background radiation from natural terrestrial radionuclides and their influence on the occurrence of cancer risks among the population.

To study the effect of natural alpha radiation from radon isotopes on biological organisms, a series of experiments were conducted to register radon emanation in the vicinity of tectonic faults and to collect relevant data on the incidence of lung cancer in people living in their immediate vicinity [1]. Mechanisms have been proposed that lead to the occurrence of such diseases.

The authors measured radon activity over a long period of time from 2016 to 2018 with a measurement frequency of 2 hours and revealed diurnal, seasonal variations. For the first time, in addition to the well-known daily variations, periodic 4-day variations in the emanation of soil radon were experimentally detected, measured, and determined. Experiments were carried out on the content of beta radionuclides of the daughter products of the decay of radon contained in the soil of the surface layer of the earth at various places in Almaty. The result of these experiments was a map of the beta contamination of the city of Almaty [2].

Based on the complex study of sources, diffusion and accumulation of radon and its DPR, a concept was developed based on the ventilation system of the building [3].

The work was supported by the state grant financing of basic research (project No. IRN AP05131884)

1. Khamdieva O.H., Biyasheva Z.M., Zaripova Yu.A., Dyachkov V.V., Yushkov A.V. Tectonic faults influence that reinforce radon emanation and cancer lung risk // 41st FEBS Congress, Molecular and Systems Biology for a Better Life Journal, 283 (Supplement S1), 03-08 September, 2016, Ephesus/Kuşadasi, Turkey, pp. 254 – 255
2. Dyachkov V.V., Zaripova Yu.A., Yushkov A.V., Shakirov A.L., Biyasheva Z.M., Bigeldiyeva M.T., Dyussebayeva K.S., Abramov K.E. A Study of the Accumulation Factor of the Daughter Products of Radon Decay in the Surface Layer Using Beta Spectrometry // Physics of Atomic Nuclei, 81 (10), 2018, pp. 1509 – 1514
3. Dyachkov V.V., Zaripova Yu.A., Yushkov A.V., Shakirov A.L. Building ventilation system. Patent for useful model. № 2017/0623.2.