# LXXI International conference "NUCLEUS – 2021. Nuclear physics and elementary particle physics. Nuclear physics technologies"

**Monday, 20 September 2021 - Saturday, 25 September 2021**

# Scientific Programme

# Section 1. Experimental and theoretical studies of the properties of atomic nuclei.

evolution of shells in neutron-rich nuclei;
nuclei remote from the valley of stability and nucleosynthesis processes;
giant and pigmy resonances;
multiphonon and multiquasiparticle states of nuclei;
high-spin and superdeformed states of nuclei;
binding energy of nuclei;
beta decay of nuclei and decay of highly charged ions;
synthesis of superheavy elements;
processes on the border of atomic and nuclear physics.
the nuclear problem of many bodies;
a microscopic description of collective degrees of freedom and their interaction with single-particle degrees of freedom;
nonlinear nuclear dynamics;
meson and quark degrees of freedom in the nuclei, mesic atoms;
hypernuclei and other exotic systems;
interaction of the nucleus with the electrons of the atomic shell;
verification of theories of interaction of elementary particles and conservation laws;
clusters in nuclei and Bose-Einstein condensation.

# Section 2. Experimental and theoretical studies of nuclear reactions.

reactions with radioactive nuclear beams;
reactions with polarized particles;
reactions with electrons and gamma rays;
reactions with heavy ions;
fusion and fission of nuclei;
multifragmentation of nuclei;
the theory of direct nuclear reactions;
multiple scattering theory;
statistical theory of nuclear reactions;
the theory of reactions involving clusters and heavy ions;
relativistic theory of nuclear collisions;
the theory of polarization phenomena in nuclear reactions;
theories of proton, two-proton and cluster radioactivity and fission cores;
theory of photonuclear reactions.

# Section 3. Modern nuclear physics methods and technologies.

instruments and methods of nuclear physics experiments;
modeling of a nuclear physics experiment and data analysis;
nuclear databases;
detector technologies;

accelerator technologies in low energy physics;
radiation technologies in micro- and nanoelectronics to create new materials;
problems of radiation reliability and radiation resistance of microelectronics products and spacecraft systems;
radiation materials science;
nuclear and radiation safety, radioecology;
problems of nuclear reactors and radioactive waste;
experience and problems of training specialists in the field of nuclear physics and nuclear energy.

## Section 4. Relativistic nuclear physics, elementary particle physics and high-energy physics.

experimental methods in high energy physics and relativistic nuclear physics;
theory in elementary particle physics and relativistic nuclear physics;
computer technology and processing of experimental information in high-energy physics;
research and development of accelerators and storage rings of charged particles.

## Section 5. Neutrino physics and astrophysics.

cosmology and astrophysics of high energies;
the theory of astrophysical nucleosynthesis;
physics of the nucleus and particles as applied to astrophysical objects;
theoretical and experimental studies in the field of neutrino physics.

## Section 6. Plasma physics and thermonuclear fusion.

experimental and theoretical studies of plasma physics and thermonuclear fusion;
fundamental problems of thermonuclear energy.

## Section 7. Synchrotron and neutron studies and infrastructure for their implementation.

sources of neutrons and synchrotron radiation;
reactions with neutrons and ultracold neutrons;
tasks and prospects of research using synchrotron radiation and neutrons;
new experimental research methods and new results;
infrastructure for conducting synchrotron and neutron studies: state and prospects.

## Section 8. Nuclear medicine.

methods of nuclear physics in medicine;
methods for producing radiopharmaceuticals;
nuclear-physical aspects of hadron and ion therapy;

fundamental aspects of gamma therapy;
fundamental problems of radioinuclide therapy;
the use of nuclear physical methods for the diagnosis of diseases;
theranostics: problems and prospects.

# Section 9. Nuclear-physical methods in the study of cultural heritage objects.

historical materials science, modern nuclear physics techniques for conducting research on cultural heritage sites;
the use of nuclear-physical research methods to obtain new information about museum collections, archaeological and historical monuments;
neutron physics methods in the study of cultural heritage objects,
radioisotope dating of artifacts.