ARMENIA 2023

JOINT INSTITUTE FOR NUCLEAR RESEARCH
EVENT DIGEST 2023

DIGEST OF JINR EVENTS IN ARMENIA 2023

The year 2023 marked a significant chapter in the scientific and collaborative efforts of the Joint Institute for Nuclear Research (JINR) in Armenia. JINR, renowned for its pioneering contributions to nuclear and particle physics research, continued its mission to foster international cooperation and advance the frontiers of science. Armenia, as one of JINR's member states, played a pivotal role in hosting and participating in various events throughout the year.

This report provides a summary of the diverse range of events, conferences, workshops, and scientific activities organized by JINR in Armenia during the year 2023, including activities organized by JINR Information Center in Yerevan. These events created a platform for the exchange of knowledge, ideas, and collaborations in the fields of nuclear physics, particle physics, and related disciplines.

Throughout this report, we will delve into the key highlights and outcomes of these events, that emerged as a result of JINR's initiatives in Armenia. From symposiums exploring the latest advancements in physical science to educational outreach programs inspiring the next generation of scientists to advancing the frontiers of human understanding.

IX JINR – Armenia workshop, "Supersymmetry in Integrable Systems"

February 20-22, 2023. Dubna

The IX JINR – Armenia workshop, "Supersymmetry in Integrable Systems" (SIS'23), took place at the Bogoliubov Laboratory of Theoretical Physics, JINR. Approximately 50 scientists from Armenia, Bulgaria, Russia, and Turkey participated.

The workshop traditionally covers topics such as supersymmetric quantum mechanics, classical and quantum integrable systems, superfield approach, and the application of supersymmetric integrable systems in field theory and condensed matter physics. This year, modern mathematical physics subjects including holographic duality, higher spin theory, noncommutative geometry, and mirror symmetry were also discussed, resulting in a total of 28 presentations.

Sergey Krivonos (BLTP JINR) and Armen Nersessian (Yerevan Physics Institute and BLTP JINR) served as co-chairs. Distinguished experts in quantum field theory and mathematical physics, such as Dmitri Bykov (Steklov Mathematical Institute of RAS), Artur Ishkhanyan (Institute for Physical Research, Armenia), Andrei Mironov (Lebedev Physical Institute of RAS, Moscow), Dmitri Orlov (Steklov Mathematical Institute), Radoslav Rashkov (Sofia University), Stepan Sidorov (BLTP JINR), and others, attended the event. Numerous young scientists from JINR, Yerevan, Moscow, and Tomsk also actively participated, fostering new scientific connections.

Photo by https://indico.jinr.ru/event/3338/

For more information, please visit the workshop's website at https://indico.jinr.ru/event/3338/.

Meeting of Working Group under the Chairman of the CP on Financial Issues

February 27-28, 2023. Yerevan

Yerevan hosted a meeting of Working group under the Chairman of the Committee of Plenipotentiary Representatives on Financial Issues of JINR. The event discussed critical financial matters related to the scientific research conducted at JINR. With the institute's commitment to advancing nuclear science and its applications, this meeting prepared the ground for important discussions and recommendations for the next Finance Committee of JINR.

Yerevan, known for its rich history and vibrant culture, served as the perfect backdrop for this international gathering. Participants had the opportunity not only to engage in substantive discussions but also to explore the city's cultural heritage during their stay.

International conference “Heaviest Nuclei and Atoms”

April 25-30, 2023. Yerevan

The National Academy of Sciences of the Republic of Armenia hosted a conference in Yerevan, co-chaired by Yuri Oganessian, NAS RA President Ashot Sagyan, and Rector of Yerevan State University Hovhannes Hovhannisyan. This event commemorates the 90th anniversary of the world-famous scientist RAS Academician Yuri Oganessian, who is also the Scientific Leader of the Laboratory of Nuclear Reactions.

Yuri Oganessian presented the results of his extensive scientific work, addressing challenges in nuclear physics and the history of superheavy element synthesis. His report highlighted developments in heavy ion physics and the recent accomplishments of the Laboratory of Nuclear Reactions JINR, including the Superheavy Element Factory program.

Photo by NAS RA

The conference emphasized JINR's pivotal role in uniting scientists from various countries and advancing significant scientific projects and facilities. The anniversary conference brought together distinguished scientists from leading global universities and research centers, including the University of Notre Dame (USA), the Joint Institute for Nuclear Research in Dubna, the University of Naples, the GSI Centre (Germany), iThemba Labs (South Africa), the National Centre for Nuclear Research (Poland), Paul Scherrer Institute (Switzerland), Tel Aviv University (Israel), and various Russian scientific centers.

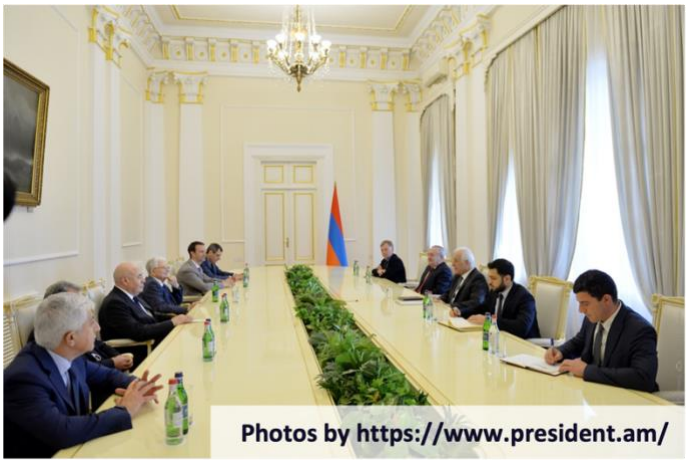
The event, jointly organized by the National Academy of Sciences of Armenia, Yerevan State University, and the International Union of Pure and Applied Physics (IUPAP), is scheduled to continue until April 29th.

Meeting of the President of Armenia with the JINR delegation

April 29, 2023. Yerevan

President of Armenia Vahagn Khachaturyan hosted JINR Director RAS Academician Grigory Trubnikov and Scientific Leader of the Laboratory of Nuclear Reactions RAS Academician Yuri Oganessian. He warmly welcomed scientists from JINR, along with Special Representative of the Russian President on International Cultural Cooperation, Mikhail Shvydkoy. This meeting coincided with the Super-heavy Nuclei and Atoms international conference, dedicated to celebrating Yuri Oganessian's 90th anniversary.

During the meeting, President Khachaturyan extended his heartfelt congratulations to the esteemed scientist, wishing him good health and continued scientific achievements. He emphasized the significance of hosting international conferences and seminars in Yerevan, expressing his readiness to provide support for such endeavors.



Photos by https://www.president.am/

The discussions at the meeting encompassed a wide range of topics, including the enhancement of Armenian-Russian scientific and cultural collaboration. They explored the utilization of existing potential in areas like high technologies, agriculture, and various scientific domains, while also shaping a comprehensive cooperation agenda. As the meeting concluded, an agreement was reached to regularly host international multidisciplinary conferences and joint cultural events in Armenia. President Khachaturyan underscored the importance of preserving and advancing the rich traditions of Armenian-Russian cooperation in fields such as culture, science, and education, among others.

The event also saw the participation of NAS RA President Ashot Sagyan, RAS Institute for System Programming Director Arutyun Avetisyan, Moscow Aviation Institute Rector Mikhail Poghosyan, and NAS RA Academician Ruben Harutyunyan.

Delegation from the MLIT Visits Yerevan

July, 17-20, 2023. Yerevan

A delegation consisting of director Sergei Shmatov, deputy director Samvel Harutyunyan and assistant director Edik Ayryan, embarked on a significant visit to Yerevan in July of this year. The primary objective of the delegation's visit was to engage in discussions regarding further collaborations and to attract young researchers and specialists to contribute to scientific projects at the Joint Institute for Nuclear Research (JINR).

During their visit, the delegation held productive meetings with key figures in Armenia's educational and scientific landscape. These included discussions with the leadership of the Committee for Higher Education and Science of Armenia, meetings with the President of the National Academy of Sciences of Armenia, interactions with the management team of the A. Alikhanyan National Science Laboratory (Yerevan Physics Institute), discussions with the Rector of Yerevan State University, and fruitful exchanges with the leadership of the Institute for Informatics and Automation Problems of the National Academy of Sciences of Armenia.

The visit of the delegation from the Meshcheryakov Laboratory of Information Technologies makes new step in strengthening the international collaboration and knowledge exchange, with the aim of advancing scientific research and innovation in the field of computational physics and information technologies. It also underscores the commitment to involving young talents in cutting-edge scientific projects at the Joint Institute for Nuclear Research.

Joint Workshop Physics of Strong Interacting Systems

September 3-9, 2023. Yerevan

The Bogoliubov Laboratory of Theoretical Physics (BLTP) at the Joint Institute for Nuclear Research (JINR) and the Key Laboratory in Theoretical Physics (KLTP) at the Chinese Academy of Sciences (CAS) were joining forces to host the Joint Workshop on the "Physics of Strong Interactions."

Bringing together a diverse group of prominent researchers, the workshop's primary goal was to facilitate collaborations between theoreticians and experimentalists to deepen our understanding of various aspects of nuclear physics.

Leading theoreticians and experimentalists, brought together, delved into the properties of low-lying excitations of nuclei, especially those located far from stability, and explore the mechanisms of fusion in atomic nuclei.

Armen Tumasyan Elected as Deputy Chair of SPD Collaboration Board

April 24-27, 2023

Armen Tumasyan, a prominent scientist from the A. I. Alikhanian National Science Laboratory, has been elected as the Deputy Chair of the SPD Collaboration Board during the recent SPD Collaboration Meeting in April.

The board, chaired by professor Egle Tomasi-Gustaffson, is primary responsibe to include charting the project's strategic course, overseeing research endeavors, and fostering partnerships with scientific centers and organizations worldwide.

Armen Tumasyan, with his background in particle physics and a distinguished career in scientific research, is well-equipped to support the SPD Collaboration in achieving its goals and objectives. His election is expected to enhance the synergy between participating institutions and foster new avenues for collaboration and research excellence.

Photo from LinkedIn

Events in Which JINR Scientists Took Active Part

Armenian meeting – 2023. Climate changes: adaptation
March 27–28, 2023, AANL (YerPhI), Yerevan
https://indico.jinr.ru/event/3444/

The conference, focused on climate change adaptation, considered the problems of climate change in Armenia's mountainous terrain, with a particular emphasis on adaptation, evolution, and speciation. It addressed critical topics such as cellular changes induced by environmental factors and the identification of high-risk mutation zones for bacteria. The event primarily centered around the adaptation of biota communities, including pathogenic bacteria, to the changing radiation landscape of mountainous regions.

Conference on High Energy Physics
September 11-14, 2023. AANL (YerPhI), Yerevan
http://chep-2023-yerevan.yerphi.am

The current high-energy physics event has zeroed in on critical subjects, including Precise Tests of the Standard Model, Physics of Higgs Boson, Physics Beyond the Standard Model, Heavy Ion Physics, Advanced Computational and Analysis Tools, and more. Focusing primarily on high-energy physics experiments conducted at facilities like LHC, SPS, NICA, KEK, and others, the workshop drew the participation of over 80 scientists. With more than 50 talks delivered, 19 of them were presented by scientists from JINR, underscoring the institute's significant contributions to the field.

International Conference on Particle Physics and Cosmology
October 2-7, 2023. AANL (YerPhI), Yerevan
http://rubakov-conf.aanl.am

The International Conference on Particle Physics and Cosmology recently honored the memory of Valery Rubakov, a respected physicist who passed away in October 2022. This gathering brought together leading experts and budding researchers in theoretical particle physics. The conference featured plenary talks and select parallel sessions. JINR scientists contributed significantly, delivering nine talks, including one by Prof. Dmitry Kazakov, which was an invited presentation.

RDP School and Workshop on Mathematical Physics
August 19-24, 2023. AANL (YerPhI), Yerevan
http://rdp-mathphys.yerphi.am/

The RDP School and Workshop on Mathematical Physics, chaired by Prof. Armen Nersessian, were organized by the Yerevan Physics Institute and the Institute of Radiophysics and Electronics. Sponsored by the Volkswagen Foundation, the event, held on 19-21 August (workshop) and 22-24 August (school), continued the tradition of previous schools in Yerevan and Tbilisi. Focused on geometric aspects of field/string theories and integrable systems, the school featured three 6-hour lectures by Professors Professors Gleb Arutyunov (Hamburg University), Andrey Mironov (Lebedev Physical Institute, Moscow) and Karapet Mkrtchyan (Imperial College, London). The workshop included 32 talks, with nine researchers from JINR delivering presentations. Attendees included young researchers and PhD students from Armenia, Georgia, Iran, Turkey, and Russia.

School on physics at NICA Accelerator Complex at JINR

February 3-24, 2023. Yerevan

Yerevan State University has launched a Physics School at the NICA Accelerator Complex at JINR as part of an intensive High Energy Physics Training program running from January to April 2023. Its overarching goal was to inspire participants to engage in or continue research in high-energy physics, equipping them with a solid foundation and advanced experimental skills.

Successful participants in the program got the opportunity to work within research groups as well as international scientific collaborations. The School's curriculum includes training on NICA Collider physics and data processing methods, featuring lecturers like Alexey Aparin, a senior researcher at JINR's Laboratory of High Energy Physics, and Grigory Nigmatkulov, a leading software engineer at VBLHEP JINR, who lectured about the MPD experiment at NICA. A third JINR scientist, Vladimir Papoyan, offered a short course on "Identification of particles using machine learning methods."

Beyond the NICA Accelerator Complex, the three-month program covered various aspects of major scientific experiments like CMS at CERN's Large Hadron Collider and Belle II at the KEK Laboratory in Japan. Distinguished lecturers included Norair Akopov, Gevorg Karyan, Alexandre Nikitenko, Olga Kodolova, and Armen Tumasyan, who introduced CMS's work. Professor Hrachya Asatryan discussed the Matinyan Centre for Theoretical Physics at the A. I. Alikhanyan National Science Laboratory.

The program combined lectures with practical exercises to reinforce knowledge and demonstrate its real-world applications.

YEREVAN STATE UNIVERSITY

Training program in High Energy Physics

A. ALIKHANYAN National Laboratory

Scientific Seminars

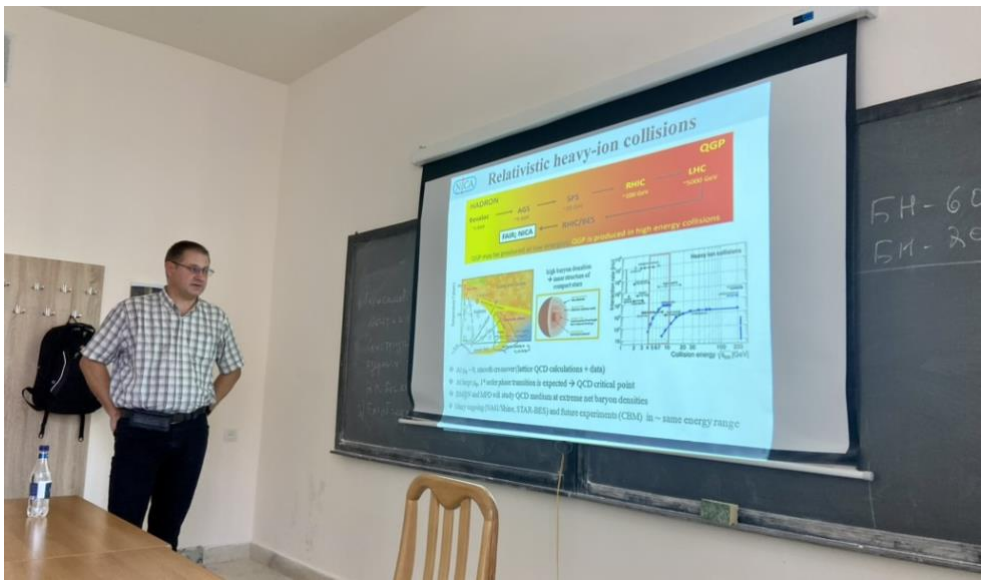
JINR Information Centre in Yerevan has organized a number of scientific seminars in field of JINR research program:

Alexey Aparin (Senior Researcher, VBLHEP, JINR). *Recent developments in the MPD experiment at NICA complex*.
February 21, 2023. Alikhanyan National Science Laboratory (Yerevan Physics Institute), Yerevan.

Grigory Nigmatkulov (Lead Developer, VBLHEP, JINR). *Relativistic heavy-ion and spin physics in the STAR experiment at RHIC*.
February 21, 2023. Alikhanyan National Science Laboratory (Yerevan Physics Institute), Yerevan.

Victor Riabov (Principal Researcher, VBLHEP, JINR). *Current status of the MPD experiment at NICA*. (see photo below)
September 8, 2023. Yerevan State University, Yerevan.

Arkadiy Taranenko (Leading Researcher, VBLHEP, JINR). *Studies of dense nuclear matter at accelerator complex Nuclotron-NICA*.
September 8, 2023. Yerevan State University, Yerevan.



Nikolay Tyurin (Head of the Sector, BLTP, JINR), *Special Bohr-Sommerfeld Geometry I*.
April 26, 2023, A.Alikhanyan National Laboratory (Yerevan Physics Institute)

Alexei Isaev (Principal Researcher, BLTP, JINR). *Generalized Wigner operators and massless relativistic fields*.
April 27 2023, A.Alikhanyan National Laboratory (Yerevan Physics Institute)

Nikolay Tyurin (Head of the Sector, BLTP JINR), *Special Bohr-Sommerfeld Geometry II*.
April 28 ,2023, A.Alikhanyan National Laboratory (Yerevan Physics Institute)

JINR Exhibition at Yerevan University

May, 2023. Yerevan

The Yerevan State University hosts the "Big Science" photo exhibition, marking the anniversary of the Joint Institute for Nuclear Research Information Centre in Yerevan. The exhibition showcases the world of big science, advanced technology, and JINR's contributions to international experiments. Initially displayed digitally during the "Heaviest nuclei and atoms" conference in April at the National Academy

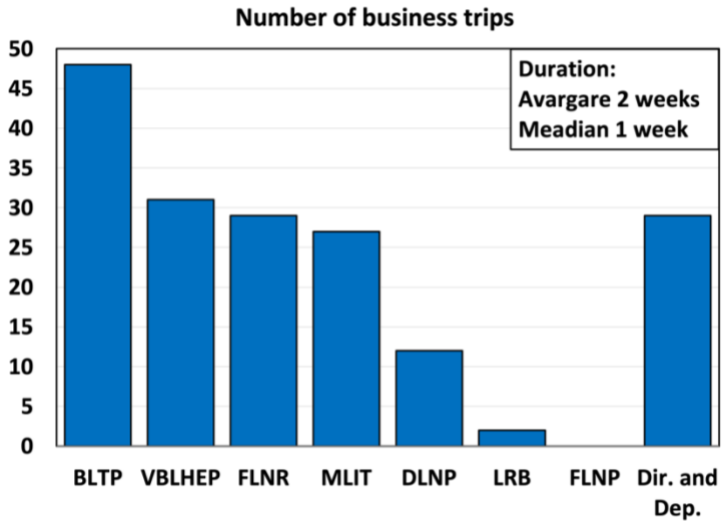
JINR Director Grigory Trubnikov described the photo exhibition as an attractive experiment, highlighting that science is driven by people and their dedication.

The exhibition is part of JINR's contribution to the International Year of Basic Sciences IYBSSD 2022/2023, emphasizing fundamental research's role in global sustainable development and the UN's 2030 Agenda. It aims to raise awareness among politicians, businesses, universities, and the public about the significance of basic sciences in achieving Sustainable Development Goals (SDGs).

ARMENIA-JINR in numbers

178 It is the number of times, JINR scientists were sent on missions to scientific centers in Armenia in 2023.

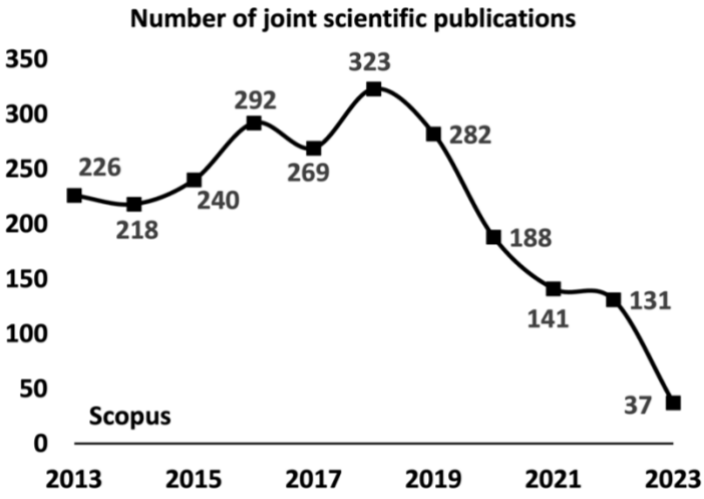
14 The average duration of business trips was precisely this many days, with most trips lasting 6 days.



The total number of days of cooperation in Armenia was about 6 and a half years in 2023.

4 This is the number of protocols and agreements out of 9 in force, including additional agreements, on collaboration between JINR and Armenian scientific centers signed in 2023.

37 This is the number of joint scientific publications between JINR and Armenian scientific centers in 2023 by Scopus.



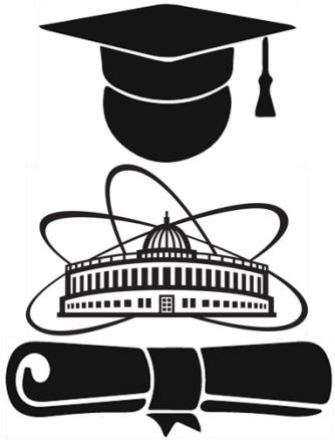
Regrettably, the trend of increasing number of joint scientific publications observed recent decades encountered an unexpected interruption. Initially, it was the far-reaching impact of the global COVID-19 pandemic that disrupted our momentum, followed by the emergence of acute political challenges in both Russia and Armenia. However, our unwavering mission remains to rekindle the vibrant spirit of cooperation that prevailed five years ago.

Fostering International Education Collaboration: Potential Role of Armenia

The Dubna State University, in collaboration with JINR (Joint Institute for Nuclear Research), is developing an innovative project in the field of higher education to prepare highly qualified specialists. As part of this initiative, the university is discussing the possibility of implementing a model of international network education that will involve leading universities from the participating countries of JINR.

The implementation of international network education will require significant work on the standardization of educational modules. To prepare the foundation for such standardization in the future, the organization of double diploma programs with the University of Dubna is seen as a promising prospect. This educational process is planned to actively utilize the unique scientific facilities and high scientific expertise of JINR and the leading scientific centers of the participating countries.

It is worth noting that this project aims to strengthen scientific and educational ties between leading universities in different countries and support the integration of higher education with modern scientific technologies. We envision that one of the first countries whose universities will actively participate in the proposed educational network could be Armenia, which can make a significant contribution to the development and advancement of such a model. In 2023, a series of preliminary negotiations were conducted regarding joint educational programs with leading universities in Armenia.

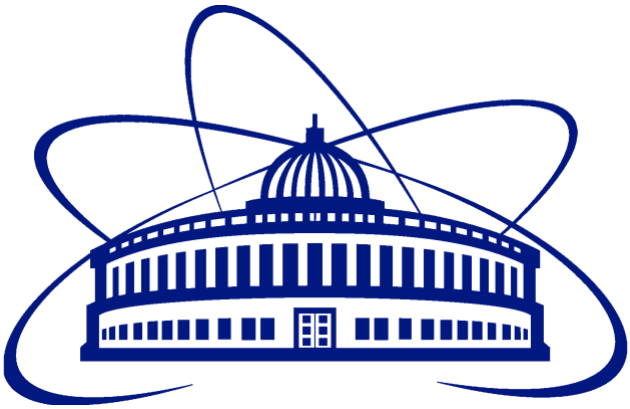


Development and Strengthen Scientific Partnership

In order to foster and maintain long-term strategic scientific and technical collaboration between JINR and scientific centers in Armenia, a series of crucial steps are planned to be developed and implemented:

1. Organization of Joint Events:	**There is a plan to increase the number of joint scientific conferences, seminars, and workshops where researchers from JINR and Armenian scientific centers can exchange ideas and expertise.**
2. Collaborative Research Projects:	**Support and funding for collaborative research projects between JINR and Armenian scientific centers will be encouraged to facilitate the exchange of knowledge and resources.**
3. Scientific Exchange:	**Discussions regarding potential exchange programs will be held, allowing researchers from JINR to work at Armenian scientific centers, and vice versa. This will help scientists better understand each other's needs and capabilities.**
4. Support for Students and Young Researchers:	**Initiatives such as internships, masterclasses, and educational programs will be organized for Armenian students and young researchers at JINR, including opportunities within UC's programs.**
5. Enhanced Communication:	**Regular exchanges of information, news, and publications between JINR and Armenian scientific centers will be established to maintain relevance and strengthen collaboration.**
6. Information Promotion:	**Active promotion of JINR's opportunities and achievements among the Armenian scientific community through journals, social media, exhibitions, and other means will be carried out.**

Content



Prepared by the use of ChatGPT 3.5.

January 24, 2024, Dubna.