Chinese Scientists in Dubna (1956–1965)

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Abstract: The work of Chinese scientists conducted at the Joint Institute for Nuclear Research (JINR) (1956–1965) was inextricably linked to the Sino-Soviet relations in the 1950s–1960s. During the early stage of the JINR, with the aid of advanced equipment and the international cooperation mechanism, Chinese scientists yielded significant results, such as the discovery of the antisigma-minus hyperon and the proof of the law of partial conservation of axial current (PCAC). After the Sino-Soviet split, Chinese scientists’ activities at the institute were hampered by political tensions, eventually resulting in China’s withdrawal from the JINR in 1965. But through the involvement at the JINR, Chinese scientists were trained in scientific practices and participated in international exchange and cooperation which turned them into a new force in China’s nuclear industry, boosting its nuclear weapons, particle physics theory, and accelerator technology. In the meantime, the scientists’ activities extended the international influence of the JINR. The withdrawal of China from the institute impacted both the JINR and the development of science in China.

Keywords: Chinese scientists, JINR, Dubna, high energy physics, PCAC, antisigma-minus hyperon

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From 1949, close cooperation between the People’s Republic of China and the Soviet Union endured for more than a decade, encompassing such fields as economy, science and technology, culture, and military affairs (Zhang, Tian, and Zhang 2017, 90). Nuclear physics research and weapon production was one of the key areas where the Soviet Union aided China, providing essential equipment and technical data, and assigning Soviet experts in China’s prospecting of uranium mines, construction of nuclear facilities, and training of professionals. In the areas of nuclear physics and high-energy physics, along with sending students abroad, China participated in one of the first institutions for multilateral international scientific research—the Joint Institute for Nuclear Research (Объединенный Институт Ядерных Исследований, ОИЯИ, hereafter JINR). There, Chinese scientists attained significant research results, enhancing both the international influence of the institute and the development of physics in China.

Abundant research has been carried out by authors from China, the Soviet Union, and other countries regarding the Sino-Soviet cooperation in science and technology (Zhang et al. 2004; Mamaeva, Sotnikova, and Verchenko 2018; Zazerskaya 2000, 210; Shen 2015; Romanova 2018; Ichikawa 2019). Nevertheless, special studies on Chinese scientists in the Soviet Union, especially in Dubna, have been a rarity. To commemorate the fiftieth anniversary of the JINR, Dubna—An Island of Stability: Essays on the History of the Joint Institute for Nuclear Research (1956–2006) (Дубна—остров стабильности: Очерки по истории объединенного института ядерных исследований [1956–2006 гг.]) was compiled in Russia (Kadychevsky, Sissakian, and Vylov 2006), which mentions the activities of Chinese scientists at the institute. On the part of China, stories on Chinese scientists in Dubna were collected (Wang 2017). Based on archives in Chinese and Russian and other publications, this article centers on Chinese scientists’ research at the JINR and its impacts, as well as the interconnectedness between their scientific work and Sino-Soviet relations.

1 The establishment of the Joint Institute for Nuclear Research

Soviet scientists had a keen eye on new discoveries in nuclear physics research and were early to embark on explorations in the field. Having learned of O. Hahn (1879–1968) and F. W. Strassmann (1902–1980) revealing the phenomenon of uranium fission, Soviet physicists immediately began the relevant research. With two atomic bombs dropped

1 The Soviet physicists made fruitful attainments in research on nuclear physics. For instance, G. N. Flerov (1913–1990) and K. N. Petrzhak (1907–1998) uncovered the spontaneous fission of uranium atoms (1940); Ya. I. Frenkel (1894–1952) improved the liquid drop model of nuclear fission (1936–1939); Y. B. Zel’dovich (1914–1987) and Y. B. Khariton (1904–1996) proved the most advanced chain reaction of uranium and described the pertinent conditions (1940).
on Japan by the United States, I. V. Stalin (1878–1953) prioritized the development of atomic bombs in the national agenda, and in 1946 proposed to the Soviet scientists the goal of catching up with and surpassing the United States in nuclear technology (Kojevnikov 2004, 131). In August 1949, the Soviet Union successfully tested a nuclear bomb, elevating the social rank of nuclear physicists. Thereafter, most physicists returned to basic research and demanded the same support for non-military projects. Given the practical value and far-reaching influence of nuclear physics and particle physics, the Soviet government willingly supported their research.

Since the mid-1940s, Soviet physicists had been attentive to the basic research of nuclear physics. In August 1946, with the endeavors of I. V. Kurchatov (1903–1960), the central government decided to build a 500 MeV proton synchrocyclotron. In 1947, the construction of the accelerator and a settlement, a future city of Dubna, was initiated near Novo-Ivan’kovo village on the bank of Volga River (125 kilometers north of Moscow), and the Hydrotechnical Laboratory of the Academy of Sciences (ГТЛ АН) of the Union of Soviet Socialist Republics (USSR) was also established. In December 1949, this synchrocyclotron was successfully put into use. By 1953, it could accelerate protons to the energy of 680 MeV, setting the highest record for proton accelerators of the same period. The laboratory was renamed the Institute for Nuclear Problems of the USSR Academy of Sciences (ИИП АН СССР). Additionally, in 1951, the USSR Academy of Sciences began to build the Electrophysical Laboratory (ЭФЛ АН СССР) three kilometers from the Hydrotechnical Laboratory, and V. I. Veksler (1907–1966) 4

2 I. V. Kurchatov was the major leader in the development of Soviet nuclear weapons and the nuclear energy industry. He graduated from the Crimea State University in 1923, worked at the Leningrad Institute for Physics and Technology from 1925 to 1942, and served as director of the Institute of Atomic Energy of the USSR Academy of Sciences from 1955 to 1960. After 1943, he was involved in the development of the Soviet atomic bomb and led the successful tests of the first Soviet atomic and hydrogen bombs. He was also able to integrate scientific research and significant national affairs, and was committed to the basic research, such as nuclear physics and particle physics.

3 The laboratory was organized as a cyclotron department No. 4 of the Laboratory of Measuring Instruments of the USSR Academy of Sciences (also known as Laboratory No. 2 or LIPAN). Most of the laboratory staff came from the cyclotron physics sector of the Laboratory No. 2 and the physics sector of the Laboratory No. 11 of the Physical Institute of the USSR Academy of Sciences. The Hydrotechnical Laboratory detached from the Laboratory No. 2 and became autonomous in 1953.

4 V. I. Veksler was a renowned Soviet experimental physicist. In 1931, he graduated from the Moscow Power Engineering Institute, and in 1936 began to study particle detectors and cosmic rays at the Lebedev Physical Institute. In 1944, he started to explore the field of accelerator physics, and discovered the phase stability principle of accelerators with the help by E. L. Feinberg (1912–2005) in independence to E. M. McMillan (1907–1991). The principle of phase stability was a new method of particle acceleration which provided the basis for a new and more powerful type of particle accelerator, the synchrophasotron. This discovery led to the breakthrough in the energy limit of the cyclotron, and new types of accelerators—such as the synchrocyclotron, the modern proton linear accelerator, and the synchrotron—were developed. Veksler was granted the Stalin Prize and Lenin Prize in 1951 and 1959, respectively. For the biography Vladimir Iosifovich Veksler, see Shafranova (2003). For the building of the synchrophasotron in Dubna, see Zinovieva (2007).
was responsible for the design and construction of a new type of accelerator—the synchrophasotron. After its completion, this accelerator achieved what was at the time a world-record proton energy of 10 GeV, which was regarded by the Soviets as a landmark scientific and technological success, equivalent to the launch of the first artificial earth satellite in 1957 (Kadyshevsky and Sissakian 2006).

In the 1950s, research on nuclear physics and particle physics not only required increasingly expensive equipment and instruments, but also coordination between scientific institutions and industries, as well as international cooperation. Both physicists and governments came to the realization that nuclear science should not be confined to secret laboratories, but needed extensive international collaboration, to ensure the peaceful uses of atomic energy. On December 8, 1953, President of United States D. D. Eisenhower (1890–1969) delivered his “Atoms for Peace” speech before the United Nations General Assembly. This speech launched a program of the same name, which aimed at providing technology and educational resources for countries wanting to develop peaceful nuclear applications. In September 1954, after several years of negotiations the Conseil Européen pour la Recherche Nucléaire (CERN) was founded in Geneva to entrench Western Europe’s position in the research on the microscopic world of materials.

The Soviet Union and the United States had divergent considerations in their interests and policies concerning nuclear physics and the control and proliferation of its applications. On January 18, 1955, the Council of Ministers of the USSR (Совет Министров СССР) issued the declaration5 that

attributing great importance to the use of atomic energy for peaceful purposes, the Soviet Government has decided to render scientific, technical and production aid to other States in setting up experimental bases for developing research in nuclear physics and in utilizing atomic energy for peaceful purposes.

On April 27, 1955, the Soviet Union and China signed an aid agreement.6 The agreement stipulated that the Soviet Union would assist China in building a 7000-kilowatt experimental atomic reactor and a 1.2-meter-diameter cyclotron, and accept

5 Сообщение о решении Советского правительства оказать научно-техническую и производственную помощь Китайской Народной Республике, Польской Народной Республике, Чехосlovakской Республике, Румынской Народной Республике и Германской Демократической Республике [Communication on the Decision of the Soviet Government to Provide Scientific, Technical, and Production aid to People’s Republic of China, Polish People’s Republic, Republic of Czechoslovakia, Romanian People’s Republic, and the German Democratic Republic]. Published in Izvestiya, January 18, 1955.

6 Соглашение о помощи Китаю в развитии исследований по ядерной физике и использовании атомной энергии для нужд народного хозяйства [Agreement on Assistance to China in the Development of Research in Nuclear Physics and the Use of Atomic Energy for the Needs of the National Economy] (Permyakov 2015).
Chinese personnel to investigate and study in the USSR. Later, in October, Qian Sanqiang 钱三强 (1913–1992), Peng Huanwu 彭桓武 (1915–2007), and others led an “internship group” to learn the principles and operation of nuclear reactors and accelerators in the Soviet Union, as well as the production and usage of their instruments.

From July 1 to 5 of the same year, the Conference of the Academy of Sciences of the USSR on the peaceful uses of atomic energy was held at Moscow State University.7 The conference was intentionally organized just before the International Conference on the Peaceful Uses of Atomic Energy, which had been planned to take place in Switzerland in August. The purpose of the conference was to provide fuller coverage of the work on nuclear physics and technology in the USSR. The conference program did not include any reports scheduled for presentation in Geneva. After the meeting, President of the USSR Academy of Sciences A. N. Nesmeyanov (1889–1980) invited scientists from socialist countries to visit the Institute for Nuclear Problems to learn about synchrocyclotron experiments.8 During the visit, the Soviet Union suggested that scientists from socialist countries jointly conduct experimental research on accelerators.9

The first International Conference on the Peaceful Uses of Atomic Energy was held in Geneva from August 8 to 20, 1955. As the conference was a great success, the Soviet Government felt that several socialist countries would be willing to join CERN to be able to use its experimental installations for conducting basic research. The first vice-minister of the Ministry of Medium Machine Building of the USSR10 B. L. Vannikov (1897–1962) wrote in his top-secret letter on November 4, 1955 to the Central Committee of the Communist Party of the Soviet Union (CPSU), that there is a risk that investments to CERN, possibly made by the USSR and other socialist countries, could be lost in case of sudden political changes. He argued that the

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7 “Zhi Duiwai Wenhua Lianluoju guanyu nipai Wang Ganchang, Xue Yugu chuxi Sulianjiang yuanzinen gongyu mudi de dahui de han (fu jianli ji Sulian laidian yiwen yifen)” 致对外文化联络局关于拟派王淦昌、薛禹谷出席苏联将原子能用于和平目的的大会的函（附简历及苏联来电译文一份） [Letter to the Bureau for External Cultural Relations about the Proposed Dispatch of Wang Ganchang and Xue Yugu to the Soviet Union’s Conference on the Uses of Atomic Energy for Peaceful Purposes (with Resumes and a Translation of the Soviet Telegram)]. Archives of Chinese Academy of Sciences (CAS): 1955-02-082-14.
8 China assigned two attendees: Wang Ganchang 王淦昌 (Wang Kang-chang, 1907–1998), professor at the Institute of Physics of CAS, and Xue Yugu 薛禹谷 (1923–) from the Division of Mathematics, Physics and Chemistry of the Academic Secretariat of CAS.
9 For more information on the political-historical study on the Conference of the Soviet Academy of Sciences on the Peaceful Uses of Atomic Energy in Moscow and the United Nations’ Conference on the Peaceful Uses of Atomic Energy in Geneva, please see Krige (2006) and Ichikawa (2016).
10 The Ministry of Medium Machine Building of the USSR supervised the Soviet nuclear industry, including production of nuclear weapons.
better strategy would be to establish another “Eastern” laboratory, aimed at research in nuclear physics and technology, and then to encourage collaboration between this laboratory and CERN.

On November 16, 1955 the CPSU CC Presidium chaired by N. S. Khrushchev (1894–1971) issued the resolution that it is appropriate to consider the establishment of the Eastern laboratory for nuclear research. Several locations were considered, including Kiev or Prague. After talks with governments and Communist parties of the socialist countries, another resolution of the CPSU CC Presidium followed on January 14, 1956. This resolution proposed inviting China, North Korea, Mongolia, Yugoslavia, and possibly India to participate in the Eastern Institute for Nuclear Research along with the European socialist states; it defined the Bol’shaya Volga locality near Novo-Ivan’kovo as a site, and accelerators located there as a Soviet contribution, and suggested organizing an international meeting in Moscow in February 1956 to discuss the foundation of the institute. Following this resolution, the memorandum on the organization of an international research institute was sent to all socialist countries, addressed to Communist party leaders, including Mao Zedong (1893–1976).

The meeting was finally held during March 20–26, 1956 in Moscow. The Presidium of the USSR Academy of Sciences convened the meeting (Figure 1). The participants included governmental representatives from eleven countries, including the USSR, China, Albania, Bulgaria, Hungary, the German Democratic Republic, North Korea, Mongolia, Poland, Romania, and Czechoslovakia. For the new scientific center, the conferees discussed the site location, naming, work objectives, regulations, organizational structure, the construction projects of laboratory facilities, and the expenditure sharing of member states. Eventually they designated the center as the Joint Institute for Nuclear Research. On March 26, representatives from eleven countries signed the Agreement on the Establishment of a Joint Institute for Nuclear Research (Соглашение об организации ОИЯИ, referred to as the Agreement). It stipulated that the member states contribute financial support ranging from 0.05% to 47.25% to the JINR, with the Soviet Union and China responsible for 47.25% and 20%, respectively. At the conference, the Committee of Plenipotentiaries of the Governments of the JINR Member States was established as the supreme governing body of the institute. The Scientific Council was set up to define the research policy of the institute, and the Finance Committee was responsible for the institute’s budget.

11 During the preparation, the center was once named “the Eastern Institute for Nuclear Research” (Восточный институт ядерных исследований). Nonetheless, most representatives voted down this designation with geographical implication and suggested naming the center “the International Institute for Nuclear Research.” The conclusive name “Joint Institute for Nuclear Research” was proposed by N. S. Khrushchev and V. M. Molotov. See Starchenko et al. (2015).
12 The Soviet government was also responsible for the municipal expenses of Dubna.
The Directorate was responsible for managing the institute. D. I. Blokhintsev (1908–1979) was elected director, while the Polish cosmic ray expert, M. Danysz (1909–1983), best known for his discovery of hypernuclei in 1952, and the Czechoslovakian theoretical physicist V. Votruba (1909–1990) were appointed vice directors.

Three days before the meeting which founded the JINR, in Beijing on March 17, 1956 Premier Zhou Enlai 周恩来 (1898–1976), Vice Premier Bo Yibo 薄一波 (1908–2007), and Liu Jie 刘杰 (1915–2018) exchanged views on China’s delegation to the conference. In the evening that day, Premier Zhou telegraphed the Chinese Ambassador to the Soviet Union Liu Xiao 刘晓 (1908–1988): “China has decided to assign Liu Jie (vice minister of Ministry of Geology), Qian Sanqiang, Peng Huanwu, and Zhao Zhongyao to the conference as a delegation. . . . China has instructed them on the issues to be discussed at the conference” (Party Literature Research Office of the CPC Central Committee 2007, 559). Thus, four scientists attended the conference, with Liu Jie as the plenipotentiary.
The earliest Chinese members of the Scientific Council included Professor Zhao Zhongyao 赵忠尧 (1902–1998) and Professor Wang Ganchang from the Institute of Physics of Chinese Academy of Sciences (CAS), and Professor Hu Ning 胡宁 (1916–1997) from Peking University. Li Yi 李毅 (1913–2000), vice director of the Institute of Physics, was among the first members of the Finance Committee of the JINR. After the meeting, Liu Jie and Qian Sanqiang stayed in Moscow for the discussions on the Soviet Union’s assistance to China’s development of atomic energy. On April 7 the same year, China and the Soviet Union signed the Agreement on the Soviet Union’s Assistance to China in the Development of Selected Branches of Industry. This agreement stipulated Soviet aid in supplying expert assistance and equipment for fifty-five more enterprises of nuclear industry.

(Figure 2). The earliest Chinese members of the Scientific Council included Professor Zhao Zhongyao 赵忠尧 (1902–1998) and Professor Wang Ganchang from the Institute of Physics of Chinese Academy of Sciences (CAS), and Professor Hu Ning 胡宁 (1916–1997) from Peking University. Li Yi 李毅 (1913–2000), vice director of the Institute of Physics, was among the first members of the Finance Committee of the JINR. After the meeting, Liu Jie and Qian Sanqiang stayed in Moscow for the discussions on the Soviet Union’s assistance to China’s development of atomic energy. On April 7 the same year, China and the Soviet Union signed the Agreement on the Soviet Union’s Assistance to China in the Development of Selected Branches of Industry. This agreement stipulated Soviet aid in supplying expert assistance and equipment for fifty-five more enterprises of nuclear industry.

Figure 2: Chinese representatives attending the conference for the establishment of the Committee of Plenipotentiaries of the Governments of the JINR Member States. The second to the fifth from the right in the front row: Peng Huanwu, Qian Sanqiang, Liu Jie, and Zhao Zhongyao (courtesy of the JINR).

15 The Institute of Modern Physics of CAS was established in 1950. In 1953 and 1958, it was renamed the Institute of Physics and then the Institute of Atomic Energy. The Institute of Atomic Energy consisted of two divisions, one in Zhongguancun and the other at the newly-built research base in Tuoli, Fangshan, a suburb of Beijing. In 1973, the Institute of High Energy Physics was founded on the basis of the first division of the Institute of Atomic Energy.

16 “Guanyu canjia Lianhe Yuanzihe Yanjiusuo de baogao” 关于参加联合原子核研究所的报告 [Report on Joining the Joint Institute for Nuclear Research]. Archives of CAS: 1957-02-0120-05-084.

17 Bai Wenzhi 白文治 was head of the Atomic Energy Group of the Third Office of the State Council; Liu Wei 刘伟 and Feng Lin 冯麟 were respectively director and vice director of the Bureau for Construction Technology of the State Construction Commission.

18 Соглашение о помощи Китаю в развитии некоторых отраслей промышленности.
In September 1956, at the meeting in Dubna, the JINR member states discussed the institute’s rules and regulations, determined its authorized size and budget, elected laboratory directors and members of the Scientific Council, and talked over the planning of the laboratories. The meeting also saw the decision to include the People’s Republic of Vietnam as a member state. The JINR was primarily based on the Institute for Nuclear Problems and the Electrophysical Laboratory, both of which were renamed the Laboratory of Nuclear Problems and the Laboratory of High Energy Physics. Subsequently, the Laboratory of Theoretical Physics, the Laboratory of Neutron Physics, and the Laboratory of Nuclear Reactions were successively founded. V. I. Veksler, V. P. Dzhelepov (1913–1999), N. N. Bogolyubov (1909–1992), I. M. Frank (1908–1990), and G. N. Flerov served as directors of the above-mentioned laboratories (Figure 3). Wang Ganchang

**Figure 3:** The first-generation of JINR leaders (from left to right) mainly included: Director I. M. Frank of the Laboratory of Neutron Physics, JINR Vice Director M. Danysz, Director V. P. Dzhelepov of the Laboratory of Nuclear Problems, JINR Vice Director V. Votruba, JINR Director D. I. Blokhintsev, JINR Administrative Director V. N. Sergienko, Director V. I. Veksler of the Laboratory of High Energy Physics, JINR Assistant Director A. M. Ryzhov, Director N. N. Bogolyubov of the Laboratory of Theoretical Physics, Director G. N. Flerov of the Laboratory of Nuclear Reactions (Dubna, 1957) (Matveev 2016, 219).

19 The small town where the JINR was established quickly expanded into Dubna city, which was later transferred from the Kalinin region to the Moscow region to improve the direct management from the capital.
20 The Laboratory of Theoretical Physics focused on the basic principles of high-energy particle interaction and quantum field theory, and had a computing department and an electronic computing machine.
21 The basic equipment of the Laboratory of Neutron Physics included a one-kilowatt pulse reactor, with four groups focusing on physical manipulation, automatic control, machinery, and electrical equipment. The large number of reactor staff was mainly to generate neutrons. This laboratory primarily explored nuclear fission, neutrons, and cross sections of non-fissile materials.
22 On May 25, 1957, the Laboratory of Nuclear Reactions was established for the research on low-energy physics, equipped with a three-meter-diameter heavy ion accelerator.
and Hu Ning were elected members of the Scientific Council of the Laboratory of High Energy Physics and the Laboratory of Theoretical Physics, respectively.

Since its founding, the JINR has made prominent scientific achievements, which constituted half of the accomplishments in nuclear physics during the Soviet period (Kadyshevsky, Sissakian, and Vylov 2006, 41). In the 1950s and 1960s, the JINR conducted theoretical research mainly on the derivation of the dispersion relation (Bogolyubov and Shirkov 1957; Bogolyubov, Medvedev, and Polivanov 1958) and the interaction of low-energy elementary particles using the dual dispersion relation (Shirkov 1964); first proposed the existence of oscillation between different types of neutrinos (Pontecorvo 1959); researched the symmetry of hadrons and classification methods (Markov 1958; Bogolyubov, Tavkhelidze, and Struminskii 1965), and constructed the quark “bag model”; independently proved the superconductivity theory and proposed a phonon model to describe the nuclear spectrum. Regarding experiments, the JINR researched and developed propane bubble chambers, electrostatic generators, and technologies for storing and researching ultracold neutrons; discovered the antisigma-minus hyperon, and specialized in the research on nuclear properties and interactions, meson physics, and the synthesis of new chemical elements. In 1968, a new element (atomic number 105) was discovered. In 1997, the International Union of Pure and Applied Chemistry named this element “Dubnium” in recognition of the contribution of the JINR.

The achievements of the JINR relied on both the eminent physicists working there and on broad academic cooperation. Leading physicists from the Soviet Union, China, and other countries worked at the institute, including Blokhintsev, Bogolyubov, Frank, Wang Ganchang 王淦昌 (Wang Kang-chang, 1907–1998), and Zhou Guangzhao 周光召 (K. C. Chou, 1929–). Such renowned physicists as F. Joliot-Curie (1900–1958), P. A. M. Dirac (1902–1984), N. Bohr (1885–1962), and L. D. Landau (1908–1968) visited the JINR upon its founding. But the institute also dispatched scientists from member states to international conferences, and proactively organized the International Conference on High-Energy Accelerators (1963) and the International Conference on High Energy Physics (1964). Acclaimed as the “JINR school” (Kadyshevsky and Sissakian 2006, 298), the institute trained a number of high-level physicists and leaders of scientific bodies for the member states, including the following former leaders: Vice-President of the USSR Academy of Sciences A. A. Logunov (1926–2015), CAS President Zhou Guangzhao, President of the Mongolian Academy of Sciences N. Sodnom (1923–), President of the Vietnam Academy of Science and Technology N. Van Hieu (1938–2018), President of the Georgian National Academy of Sciences A. N. Tavkhelidze (1930–2010), President of the Academy of Sciences of the Republic of Uzbekistan B. Yuldashev (1945–), and Vice-President of the Hungarian Academy of Sciences N. Kroo (1934–).
# 2 Research conducted by Chinese scientists in Dubna

China placed a high premium on the cooperative research in Dubna. The threshold for personnel selection was set no lower than that for the Chinese postgraduate candidates studying in the Soviet Union. An additional requirement was that participating scientists must have at least two years of scientific research experience and have a reading proficiency sufficient to read professional books in Russian. According to the regulations, scientists could usually work in Dubna for two years, but around half of them extended their stay, the longest for over five years. China also made explicit requests for their research focuses. From September 1956, Chinese scientists researched nuclear physics and particle physics under the favorable conditions at the JINR, producing theoretical and experimental results of great influence (Figure 4), which were exemplified by the

![Figure 4: The JINR main building (left) and the apartment for Chinese scientists (right) (photo by Liu Jinyan in April 2019).](image_url)

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23 “Guanyu xuanba yanjiu renyuan fu Su canjia Lianhe Yuanzihe Yanjiusuo gongzuo de tongzhi” 关于选拔研究人员赴苏参加联合原子核研究所工作的通知 [Notice on Selecting Researchers to Work at the Joint Institute for Nuclear Research in the Soviet Union]. Archives of CAS: 1961-10-028-01-001.

24 The JINR wanted to extend the stay of some Chinese scientists due to their outstanding performance. For example, in 1958, the JINR acknowledged Wang Shufen 王树芬 (1923–) for the large amount of work that she had already accomplished at the Emulsion Department of the Laboratory of High Energy Physics, and for her great value as a researcher to the department, thus hoping to extend her stay to benefit both the institute and Wang Shufen herself.

25 For example, in 1959, Wang Naiyan 王乃彦 (1935–), Wang Shiji 王世绩 (1932–), Zeng Naigong 曾乃工 (1934–), and others were assigned to the Laboratory of Neutron Physics to learn about reactor startup. Li Yi 力一 (1913–1996), vice director of the Institute of Atomic Energy, led the team for accelerator design to learn how to build accelerators. In 1962, Yang Fuqing 杨芙清 (1932–) was sent to the Computing Center to study hardware and software. In addition, the focuses at different stages could vary. In 1962, for instance, the focuses suggested by the Ministry of Education were nuclear electronics, radiochemistry, and neutron physics, while in 1964, the suggestions were computing technology, electronics, and radiochemistry.
Wang Ganchang group’s discovery of the antisigma-minus hyperon and Zhou Guangzhao’s theoretical research.

2.1 The discovery of the antisigma-minus hyperon ($\Sigma^-$)

Wang Ganchang graduated from the Department of Physics at Tsinghua University in 1929, received a doctorate degree from the University of Berlin in 1933, and in 1934 returned to China to work. In 1941, he proposed to seek the neutrinos by K-electron capture, which was later confirmed by experiments (Li and Yang 1986). In September 1956, after attending the meeting of JINR member states with Li Yi 李毅, Wang began to work at the Laboratory of High Energy Physics as a senior researcher. From 1959 to 1960, he acted as vice director of the institute (Figure 5).

Upon his arrival in Dubna, Wang Ganchang suggested that, based on the popular topics in high-energy physics and the characteristics of the JINR accelerators, the research focus on the law of elementary particle generation under the influence of high-energy nuclei and the search for new strange particles such as antihyperons (Wang 2017, 64).
Wang Ganchang was also interested in novel experimental techniques, like those based on particle detection using diffusion and bubble chambers. At the point, the synchrophasotron and the supporting detectors of the Laboratory of High Energy Physics were still under construction. While debugging the accelerator the laboratory members designed a variety of detectors and auxiliary equipment (Figure 6). In the spring of 1957, for instance, Wang Ganchang’s team began to design a propane bubble chamber (fifty centimeters long with a twenty-four-liter volume). The reason for making this chamber was that the JINR was experienced in making small bubble chambers, which could save time in building the apparatus. On the other hand, the propane bubble chamber could facilitate the comprehensive observation of the generation, flight, and interaction of particles, thus conducive to displaying tracks of the extremely short-lived antihyperon (Ding 1989). In the summer of 1958, the design of this bubble chamber was completed—the largest of its kind in the same period. Other research groups in the Laboratory of High Energy Physics improved the method using a thick emulsion layer, the advanced electronics, and spectrometers. On April 17, 1957, the synchrophasotron succeeded in accelerating protons to the energy of 10 GeV, and started regular operation in mid-1958.

Figure 6: Wang Ganchang and team members checking the bubble chamber at the JINR (courtesy of Rossiya Segodnya).

26 At this time, the synchrophasotron was equipped with only one set of scintillation telescope system to determine the secondary particles and their tracks, expansion cloud chamber, and large diffusion cloud chamber.
In the summer of 1957, Wang Ganchang started planning to employ the high-energy $\pi^-$ beams to interact with hydrogen and carbon nuclei in the liquid of the bubble chamber to look for antihyperons (Wang 1997, 103–115). Although the large background was a disadvantage for this method, the main advantages were that there were no antibaryons in the original reaction and that the antihyperons found in the final state were new particles. In the fall of 1958, Wang’s group searched for antihyperons using this method (Wang 1997, 103–115). According to the characteristics of hyperons, Wang came up with the selection criteria that the antihyperon event should meet, and demonstrated to his team members how to scan the bubble chamber photos. In the autumn of 1959, the team found a candidate event from over 40,000 bubble chamber negatives (Ding 1987). The track in this event photo indicated that $\Sigma^-$ could be generated by the interaction between the incoming particle $\pi$ and the proton $p$ of the hydrogen nucleus. $\Sigma^-$ was reconstructed from its decay products $\pi$ and $\bar{\pi}$, and $\bar{\pi}$ was identified by the fact that its annihilation with carbon nuclei could produce a high-energy event (Wang 1987, 141–144) (Figure 7).

From July 15 to 25, 1959, the Ninth International Conference on High Energy Physics was held in Kiev. Fifteen Chinese physicists, including Peng Huanwu,
Zhang Wenyu 张文裕 (1910–1992), and Wang Ganchang were present at the conference. Quoted in the conference reports of Soviet physicists, their activities were made known to the international counterparts. In the group discussion session, Ding Dazhao 丁大钊 (1935–2004), member of Wang’s team, introduced the experiment of collision between \( \pi \)-mesons (6.8 MeV) and a nucleon.\(^{31}\) However, the focus of the Chinese delegation during the exchange was “a kind of new particle that might be discovered” (可能发现的一种新粒子) presented by Wang, namely the \( D^+ \) particle found

Figure 7: A group of participants of the discovery of the antisigma-minus hyperon: A. Kuznetsov, M. Soloviev, A. Nikitin, E. Kladnitskaia, N. Viryasov (USSR); V. Veksler, Ding Dazhao (China), Kim Hi In (North Korea), Nguyen Dinh Tu (Vietnam), A. Mihul (SRR). Shown in front of the microscope is a photograph of an event of production of the antisigma-minus hyperon (Sissakian 2006, 9).

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\(^{31}\) “Canjia Dijiujie Guoji Gaoneng Wuli Huiyi de baogao.” Archives of CAS: 1959-04-060-04-020.

Wang mentioned that he had presented the possible existence of the \( \Sigma^- \) event at the Kiev conference (1997, 103–115). However, the authors of this article found that both “The Overview of the Kiev Conference on High Energy Physics” (基辅高能物理会议的概况) published by Zhou Guangzhao (1959, 185) and the CAS archives clearly recorded Wang’s report was on \( D^+ \) particle. A. A. Kuznetsov and E. N. Kladnitskaia, who were the Soviet members of Wang Ganchang’s team, mentioned in particular that the group presented three separate reports at the 1959 conference in Kiev: one by Veksler, one by Wang Ganchang, and one by Ding Dazhao (Kuznetsov 2003; Kladnitskaia 2019).
in July, which was not substantiated by experiments.\footnote{Based on the conference summary report submitted by Peng Huanwu and others after returning to China, this bubble chamber photo was found on July 5, 1959. But in the absence of rigorous measurement and analysis due to the lack of time, the photo could only display the $D^+$ particle decay within the margins of error. The JINR leaders invited Wang Ganchang to make the announcement at the Kiev conference. To ensure scientific rigorousness, the Chinese Embassy sent Wang Zhuxiang 王祝翔 (1932–) and Lü Min 吕敏 (1931–) to carefully measure and analyze this photo. Prior to the meeting, they came to Kiev with the data and believed that within the margins of error, this photo might be explained by the decay of $D^+$ particles, as well as by the charge exchange nuclear reaction of $K^+$ mesons. Wang’s report brought this to the attendees’ attention.}

In March 1960, the $\Sigma^-$ event was eventually corroborated by experiments. On April 24, Wang returned to China for the Third Meeting of Members of Chinese Academy of Sciences, where he presented the discovery process of $\Sigma^-$. The Conference Chair Qian Sanqiang, after the conference, stated that

This result points to the large-scale cooperation among twelve socialist countries. The seventeen-member team includes three Chinese, led by Wang Ganchang. This team involves the reputable Corresponding Academician V. I. Veksler. The Soviet Union attaches great importance to this work as well. The JINR also belongs to China, and we deem this discovery as one of the major accomplishments of China this year. I hope Wang Ganchang will bring the high regard and encouragement for this work from the Meeting of Members of CAS to the JINR, spurring the Chinese members to make greater achievements.\footnote{“这工作说明 12 个社会主义国家的大协作。做工作的 17 人中，我国有 3 人，组长是王淦昌同志。组内包括著名的维克斯勒通讯院士。这个工作，苏联也很重视。联合所也是我们中国的，我们也把这个工作当作我们今年的重大成就之一。希望王淦昌同志把学部大会对这项工作的重视和鼓励带回联合所，从而激励身边的中国同志做出更大的成绩。”}

In July 1960, the experimental results of Wang Ganchang’s team were officially published in the Soviet Journal of Experimental and Theoretical Physics (JETP) (Wang et al. 1960a) and China’s Acta Physica Sinica (Wuli xuebao 物理学报) (Wang et al. 1960b). The discovery of $\Sigma^-$ proved for the first time that charged hyperons have antiparticles, bridging a gap in the particle-antiparticle table. This was the first significant experimental result of the JINR. In 1960, three JINR prizes were awarded for the first time for outstanding research. One was awarded for “The discovery of antisigma-minus hyperon and a set of works on studying the properties of strange particles produced by pions with an energy of 7–8 GeV in a propane bubble chamber with a magnetic field” (Kadyshevsky, Sissakian, and Vylov 2006, 30).\footnote{“Открытие антисигма-минус-гиперона и комплекс работ по изучению свойств странных частиц, рожденных пионами с энергией 7–8 ГэВ в пропановой пузырьковой камере с магнитным полем” (Ван Ганчан, В.И. Векслер и коллектив В. Г. Кадышевский [Wang Ganchang, V. I. Veksler, and the team of V. G. Kadyshevsky]).} In a commemorative
article on the tenth anniversary of the JINR, Director Blokhintsev wrote that he believed the JINR’s research on inelastic interactions of pions and nucleons was “crowned” by the discovery of \( \Sigma^- \) (Blokhintsev 1966, 333). Even at the sixtieth anniversary of the JINR, the discovery of \( \Sigma^- \) was still seen as one of the “events of epochal significance” in the field of nuclear physics where the JINR is specialized, and as “a triumph for Dubna scientists” (Matveev 2016, 218). To remember Wang Ganchang’s contribution, the institute named a path “Wang Ganchang Path” (Figure 8). In 1982, “The Discovery of the Antisigma (\( \Sigma^- \)) Minus Hyperon” won the top honor of China’s National Natural Science Award.

The Laboratory of High Energy Physics was the most internationalized research group at the JINR (Lebedenko 1969). Initially Wang Ganchang’s team only had three Soviet members. To support the team’s experimental work, in late 1956 he transferred Ding Dazhao and Wang Zhuxiang from the Institute of Atomic Energy to Dubna. By 1960, Wang’s team had included over twenty members from China, the Soviet Union, North Korea, Romania, Poland, the Democratic Republic of Germany, Czechoslovakia, Vietnam, and other countries (Figures 9–11). Wang took into consideration the specialties of members when assigning work, and organized regular meetings along with overseeing the research progress. In 1960, a Soviet member proposed\(^{35}\) to Wang the development of a two-meter propane bubble chamber. Despite his understanding of the challenges of developing a giant bubble chamber, Wang fully supported this proposal in view of its importance for future research on high-energy nuclear effects and elementary particles. The two-meter propane bubble chamber later became the main equipment of the JINR and the new Russian 76-GeV proton synchrotron at Serpukhov (Ding 1987). Apart from that, in order to promote theoretical and experimental exchanges, Wang organized amateur seminars for Chinese scholars. Theoreticians gave lectures to experimentalists on a weekly basis. These exchanges were conducive not only to facilitating experimentalists’ understanding of theories of particle physics, but also to deepening theoreticians’ comprehension of experimental knowledge. Such seminars gradually evolved into internal academic seminars held by various research departments and groups.

\(^{35}\) This member most likely was Mikhail Solovyev. He was Wang’s deputy in the group at that time.
Figure 9: Some members of the experimental team led by Wang Ganchang (from left to right: Wang Ganchang, L. N. Strunov, E. N. Kladnitskaya, M. I. Solovyev, Ding Dazhao) in the summer of 1958 (courtesy of the JINR).

Figure 10: Members of the experimental team led by Wang Ganchang in September 1960. From left to right: Nguyen Dinh Tu (Vietnam), Wang Yongchang, Chen Lingyan (China), V. A. Belyakov, N. A. Smirnov (USSR), Wang Zhuxiang (China), T. Hofmokl (Poland), A. A. Kuznetsov (USSR), Wang Ganchang (China), A. V. Nikitin, M. I. Solovyev (USSR), J. Vrana (Czechoslovakia), Ding Dazhao (China), Z. Trka (Czechoslovakia) (courtesy of the JINR).
2.2 Proving the law of partial conservation of axial current

After graduation from Tsinghua University in 1951, under the supervision of Peng Huanwu, Zhou Guangzhao studied elementary particle physics and quantum field theory at Peking University, where he stayed to teach after graduation with a master’s degree. In late January 1957, on the recommendation of Hu Ning, Zhou visited the JINR for theoretical research on particle physics as associate professor of Peking University. At the JINR, he explored the basic problems of quantum field theory and elementary particle theory with Soviet physicists. To satisfy the requirements of analyzing the high-energy scattering amplitude and the Regge theory, in 1958 Zhou and M. I. Shirokov introduced the relativistic spin operator to provide a relativistic description of any spin state of massive particles (Chou and Shirokov 1958). In 1959, he independently extended the above theory to the massless particles (such as photons and neutrinos) based on the group theory method (Chou 1959a; Chou 1959b). Almost simultaneously, M. Jacob (1933–2007) and G. C. Wick (1909–1992) were examining such problems, proposing the concept of helicity, and establishing the systematic helicity theory (Jacob and Wick 1959). This theory was then widely applied in the theoretical research of elementary particles and the analysis of high-energy physics experiments.

Another important contribution that Zhou made was in the basic symmetry of particles. In 1956, Li Zhengdao 李政道 (Tsung-Dao Lee, 1926–) and Yang Zhenning 杨振宁 (Chen Ning Yang, 1922–) proposed the law of non-conservation of parity in weak interactions (Lee and Yang 1956). This was followed by doubt among physicists over
whether the fundamental interactions were conserved under the transformations of charge conjugation (C), charge conjugation-time reversal (CP), or time reversal (T). In 1958, S. Okubo (1930–2015) obtained experimental measurements of the branching ratios of the decay of $\Sigma^+$ and $\bar{\Sigma}$ using the low-order approximation theory in weak interaction. The differences in branching ratios indicated the conservation violation of C or T transformations. Zhou later proved the universality of Okubo’s methods. Meanwhile, Zhou pointed out that measuring the angular correlation between $\Sigma$ particles and their antiparticles, the simplest case of which being to measure the decay of $\Sigma^+$ and $\bar{\Sigma}^+$, can also lead to the information of the conservation of CP transformation (Chou 1958/59; Chou 1959c).

Zhou was most reputable at the JINR for proving the law of partial conservation of axial current (PCAC) through a more concise and clear method, a work of great significance in the field of hadrons. After the proposal of the law of non-conservation of parity in weak interactions, particle physicists gradually delved into the nature of weak interactions. In 1958, two groups of theoretical physicists, R. Feynman (1918–1988) and M. Gell-Mann (1929–2019) (Feynman and Gell-Mann 1958) and E. C. G. Sudarshan (1931–2018) and R. E. Marshak (1916–1992) (Sudarshan and Marshak 1958), almost simultaneously worked out the universal form of weak interactions, namely, the V-A Fermi weak interaction (V for vector and A for axial vector), which is transmitted by the intermediate vector boson. This paved the way for the development of the unified electroweak theory. Furthermore, their activities embodied the idea of Vector Current Conservation (CVC).

In 1960 in the United States, Gell-Mann, Feynman, and M. Lévy collaborated to study the Goldberger-Treiman relation that was consistent with experiments. To explain the Goldberger-Treiman relation, Gell-Mann and others proposed the Partial Conservation of Axial Current (PCAC), that is, the idea that the divergence of the axial-vector current is not zero and is proportional to the $\pi$ field. Almost at the same time in Dubna, Zhou Guangzhao realized the importance of explicating the Goldberger-Treiman relation. In 1960, utilizing the analytical properties of a certain matrix element, he showed that the Goldberger-Treiman relation for the decay $\pi \rightarrow \mu + \nu$ was also applicable to wider classes of strong interactions (Chou 1961). Previously, Feynman, Gell-Mann, and Lévy had proved that this relationship was only valid for the ordinary pseudoscalar theory with pseudoscalar coupling. Zhou resorted to the same method to handle the lepton decays of hyperons and K mesons in this research. The PCAC hypothesis derived from the Goldberger-Treiman relation corresponded to the CVC hypothesis. The PCAC, CVC,

36 The Goldberger-Treiman relation refers to the relationship between the $\pi$-decay constant $f_\pi$, the $\beta$-decay axial-vector coupling constant $g_A$, and the strong-interaction coupling constant $g$, namely: $gf_\pi = mg_A$. 

and the current algebra proposed by Gell-Mann based on the quark model refocused particle physicists’ attention on quantum field theory, which was of great significance to the construction of the gauge theory of electroweak interactions, prompting S. Glashow (1932–), A. Salam (1926–1996), and S. Weinberg (1933–) to put forward the unified electroweak theory.

Zhou’s achievement at the JINR drew attention from international counterparts (Figure 12). In the view of the co-supervisor Markov: “during his work at the Laboratory of Theoretical Physics of the JINR, Comrade Zhou Guangzhao performed a number of works. . . . He is an extremely talented and promising scientist and is undoubtedly qualified for his position.”37 When Zhou had spent nearly two years working at the JINR, Director Blokhintsev wrote to Qian Sanqiang, suggesting that Zhou’s stay be extended. In his letter, he emphasized that “Academician N. N. Bogolyubov especially singled out the young scientist Zhou Guangzhao,” and “keeping Zhou for at least one more year would significantly enrich his knowledge and would be helpful for the institute.”38 At the same time in the United States, Yang Zhenning and Li Zhengdao noticed Zhou’s research as well. Yang later wrote: “Zhou was prolific in this period, publishing many papers in the JETP. I was in the USA at the time and had studied several of his papers, especially his work on PCAC. In the USA he was famous as the most brilliant young theorist in Dubna” (Yang 2010, vii).

In addition to the activities of Wang Ganchang and Zhou Guangzhao, Chinese scientists pursued research in other fields at the JINR. With the guidance of Zhu Hongyuan 朱洪元 (Chou Hung-Yüan, 1917–1992), He Zuoxiu 何祚庥 (Ho Tso-Hsiu, 1927–) and Xian Dingchang 洗鼎昌 (1935–2014) cooperatively pointed out that there were serious divergence difficulties for the $\pi-\pi$ scattering integral equation derived by G. F. Chew (1924–2019) and S. Mandelstam (1928–2016) from the double dispersion relations (Chou 1961). In early December 1959, Li Yi 力一 (1913–1996)39 led the accelerator design team to the JINR, which included Fang Shouxian 方守賢 (1932–2020), Zeng Naigong, Wang Daji 汪达基 (1932–), and others (Figure 13). Guided by accelerator experts, they designed a 450-MeV medium-energy high-current accelerator and performed research on

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37 Отзыв о работе научного сотрудника ЛТФ ОИЯИ Чжоу Гуан-чжао. Архив ОИЯИ [Feedback on the work of Zhou Guangzhao at the Laboratory of Theoretical Physics of the JINR. JINR Archives, personal record of Zhou Guangzhao]. For the original Russian text, see Appendix 1.
38 Письмо Чен Сан-Чану от Блохинцева Д. И. Архив ОИЯИ. 21 июня 1958 г. [Letter No. 380/23 on June 21, 1958 from D. I. Blokhintsev to Qian Sanqiang]. JINR Archives: fond 3, opis 1, delo 79, list 36–38. For the original Russian text, see Appendix 1.
39 Li Yi was an expert in telecommunications and particle accelerators. Early in his career he worked in telecommunications, and then acted as vice director of the Bureau for Construction Technology (established in 1955), responsible for the development of “one reactor and one accelerator.” From 1955 to 1956, he was head of the cyclotron team, going to investigate and intern in the Laboratory of Heating Engineering (now Institute of Theoretical and Experimental Physics) in Moscow and the Institute of Physics of the National Academy of Sciences of Ukraine in Kiev.
Figure 12: Zhou Guangzhao (second from right) at an academic seminar of the JINR (courtesy of Hu Ning’s daughter Hu Bin 胡滨).

Figure 13: V. P. Dzhelepov, director of the Laboratory of Nuclear Problems (third from right), with Zhou Guangzhao (first from left), Li Yi 力一 (third from left), Wang Ganchang (fourth from left), Qian Sanqiang (second from right), and other Chinese scientists at the synchrocyclotron hall (1959) (courtesy of the JINR).
meson physics. Although the accelerator itself was not eventually produced, the experience was applicable in the other accelerator projects in China, including the design and engineering organization for construction of the Beijing Electron Positron Collider in the 1980s. Lü Min was responsible for measuring the pulse waveform output by the reactor in the Laboratory of Neutron Physics, and inferred the reactor power output based on the amplitude fluctuation; Wang Shiji, in cooperation with Soviet colleagues, successfully trial-produced the first high-resolution cadmium-loaded large liquid neutron scintillation detector.

Figure 14: Seminar at the Laboratory of Theoretical Physics (courtesy of the JINR).

3 Chinese scientists returning to China for research

In the late 1950s, there was a widening divergence between the Chinese and Soviet leaders in terms of their opinions on Stalin, national interests, internal affairs, and foreign policies. Against the backdrop of growing disagreements, the USSR considered it risky to further arm China with nuclear weapons. On June 20, 1959, in a letter to the Central Committee of the Communist Party of China (CPC), the CPSU Central Committee informed that USSR would not transfer the nuclear weapon technology to China for the sake of the success of test ban negotiations, which had resumed in Geneva. This statement caused a bitter reaction in China and led to, among other things, an increase in hostility towards Soviet specialists. Tensions between the two countries continued to worsen.

On July 16, 1960, the Soviet government delivered a memorandum to the Chinese government to withdraw all its experts as aids to China, rapidly splitting the Sino-Soviet relation (Zhang and Tian 2017, 96). China had to turn to “self-reliance” to
develop the nuclear industry. In November 1960, Qian Sanqiang attended a session of the Committee of Plenipotentiaries of the Governments of the JINR Member States, after which he explained to some Chinese scientists China’s decision to develop nuclear weapons and the situation of technological research. Wang Ganchang, with his expired vice directorship at the JINR, then decided to return to China to join in the development of nuclear weapons. This was immediately followed by the applications of Zhou Guangzhao, He Zuoxiu, and Lü Min for the research on nuclear weapons. Prior to this, Wang Shufen, Ding Dazhao, Tang Xiaowei 唐孝威 (1931–), and others had returned to China for research.

On January 28, 1961, Director Blokhintsev wrote to Qian Sanqiang in the hope that China could recommend candidates to succeed Wang Ganchang, as stated in the letter:

We learned that Professor Wang Ganchang will not continue to work at the JINR.

We fully understand that the interests of the development of science in China require that Professor Wang Ganchang works in his homeland, and taking this opportunity I would like to note that the interests of the development of science in China are also close and dear to us, but we still cannot but regret that Professor Wang Ganchang will no longer participate in the work of our international socialist institute.

In connection with Professor Wang Ganchang’s departure from the institute, we are now experiencing great difficulties in finding a group leader for the propane chamber of the Laboratory of High Energy Physics. We would be glad if you could recommend one of the Chinese scientists as the team leader to replace Professor Wang Ganchang.40

In the letter to Wang Ganchang, Blokhintsev hoped that Wang, during his work in China, could still assist the JINR to make greater achievements.41 Afterwards, Professor Zhang Wenyu, director of the Cosmic-Ray Laboratory of the Institute of Atomic Energy, succeeded Wang, and went to the JINR in November 1961 as the head of the Chinese side to continue the research on high-energy physics (Figures 15–16). Zhang received a doctorate from Cambridge University in 1938, supervised by E. Rutherford (1871–1937). Returning to China, he successively taught at Sichuan University, Southwest Associated University, and Yunnan University. In 1943, he left for the United States and became a visiting professor at Princeton University and Purdue University. After returning to his homeland in the autumn of 1956, he worked at the Institute of Physics, CAS. The major results of his research at the JINR were the summarization of the known baryon resonances into the excited states of nucleons and hyperons, the proposal of a baryon energy level transition scheme, and
in-depth research on the $\Lambda$-hyperon and nucleon scattering ("Zhang Wenyu" 1993).

With the deteriorated Sino-Soviet relations, Chinese scientists at the JINR found themselves in an atmosphere of unremitting tension which had nothing to do with the scientific work. While personal communication between the Chinese and their Soviet colleagues basically did not change, ideological clashes between local CPC and CPSU party committees played a significant role. In November 1961, China’s State Scientific and Technological Commission and the Second Ministry of Machine Building, with the central government’s consent, decided to adopt the policy of “continuous maintenance, full utilization” (继续维护，充分利用) for the activities at the JINR (Xu 2015, 41–42). Starting from 1962, however, the bilateral relation worsened, causing new recriminations between the Chinese and Soviet personnel at the JINR. The Chinese considered the political attacks of the Soviet party workers as hostile actions on the part of JINR. On the other hand, the Soviet authorities perceived the agitation in response as anti-Soviet activity. In the long run this led to the memorandum from the Soviet Ministry of Foreign Affairs to the Chinese Embassy on June 27, 1963, which declared

Figure 15: Zhang Wenyu’s experimental team. The front row: Zhang Wenyu (right) and Kim Hi In (North Korea) (left); the second row from right to left: V. N. Penev (Bulgaria), Nguyen Dinh Tu (Vietnam), and E. Kladnitskaya (Soviet Union) (courtesy of the JINR).
Yao Yi, Party branch secretary of the Chinese staff at the JINR, as “persona non grata” who should be “immediately recalled from the Soviet Union” by the Chinese government (Ta Kung Pao 1964, 269–270). Two days later, five people, including Yao Yi, returned to China. From then on, the Chinese scientists at the JINR would often “turn to countermeasures by pre-arranging the routes and number of people going out and attending to each other.” Meanwhile, China and the Soviet Union were at odds over the activities of Zhang Wenyu’s group. On July 30, 1964, Qian Sanqiang wrote to Blokhintsev, complaining of Zhang’s work being impeded at the JINR:

To collaboratively develop the research work in socialist countries, on your invitation, we have sent our highly qualified scientist Professor Zhang Wenyu to work at the JINR. As we learned, Professor Zhang Wenyu is currently undergoing various restrictions and difficulties at the institute: the research topic he had been working on was removed without any reason; his research group’s time on the computers was repeatedly reduced; there have been several attempts to transfer the laboratory technicians from his group to others. Professor Zhang Wenyu, as a scientist, was not treated respectfully at the institute: as a member of the Scientific Council of the institute, he is not invited to some meetings of the council. At the same time, up to the present time, Professor Zhang Wenyu does not yet have his own corresponding office. Due to all of the above, Professor Zhang Wenyu is unable to conduct his research normally.

The JINR leaders took Qian’s letter seriously. On August 29, Blokhintsev replied to Qian, claiming the complaint to be inconsistent with the facts:

Throughout his stay at the institute, Professor Zhang Wenyu was invited to all meetings of the Science and Technology Council and the Scientific Council of the Laboratory of High Energy Physics and directly engaged in drawing up and modifying the plans of scientific work both for the laboratory as a whole and for individual groups. The laboratory directorate repeatedly warned Professor Zhang Wenyu about the inadmissibility of multiple topics in his group’s work (five topics), but he stubbornly ignored all proposals to reduce the topics and to focus on two or three of the most pressing topics. Despite this, the directorate of the Laboratory of High Energy Physics, actually in order to consolidate the socialist camp and with good intentions, increased the number of laboratory assistants for the group of Professor Zhang Wenyu. Thus, for nine members of the group, by the middle of this year, he was equipped with twenty laboratory assistants, which was unprecedented in the history of

42 Those declared as “persona non grata” also included the embassy personnel: Mei Wengang, Lu Peixin, Wang Yaotong, and Liu Daoyu, a Chinese postgraduate student in the Soviet Union (People’s Daily 1963).
43 “采取反制措施，外出路线、人数等都事先安排，互相照应。” Interview with Professor Yao Zhiquan from the Shanghai Institute of Applied Physics, Chinese Academy of Sciences, May 27, 2019.
44 Letter on July 30, 1964 from Qian Sanqiang to Director Blokhintsev of the Joint Institute for Nuclear Research. JINR Archives: fond 3, opis 1, delo 332, list 45–49. For the original Russian text, see Appendix 1.
Moreover, the time that Professor Zhang Wenyu’s group spent on computers accounted for 20% of the time allotted to the entire laboratory. . . . No scientific group in any of the laboratories enjoyed such favorable work conditions as the group of Professor Zhang Wenyu did.

Some time before the International Conference on High Energy Physics, it was evident that Professor Zhang Wenyu and his group could not handle their work. The number of his topics was reduced from five to two, so that these last two could be completed and presented at the conference. Naturally, a certain number of laboratory assistants were transferred to other groups that successfully prepared work for the conference. Professor Zhang Wenyu was still left with ten laboratory assistants at his disposal, who could well ensure the successful completion of the two remaining topics. However, immediately prior to the conference, it turned out that Professor Zhang Wenyu was the only team leader who did not submit any work.

Thus, the problem, apparently, was not that Professor Zhang Wenyu did not have a separate office (by the way, most equally prominent scientists do not have their own offices), but the fact that he was unable, or rather, unwilling to utilize the advantageous opportunities provided for him to successfully conduct scientific work.

Other than the above, I would like to add that the directorate of the institute and the directorate of the laboratories had the right to regulate the arrangement of scientific and auxiliary personnel, depending on the changes in scientific plans and the development of certain areas of experimental and theoretical work. Thus, you realize that you have no reason to shuffle the responsibility of the unsuccessful work of Professor Zhang Wenyu off onto the institute.45

It was evident that the leaders on both sides attempted to shift the responsibility of the hindered cooperation onto each other.

It should be highlighted that China successfully tested the atomic bomb on October 16, 1964, and the hydrogen bomb on June 17, 1967, which is of great significance to China. Mao Zedong once remarked that N. S. Khrushchev (1894–1971) should be granted a one-ton-heavy medal (Zhang et al. 2004, 374), which supposedly referred to Khrushchev’s role in forcing China to be self-reliant.

In November 1964, Zhou Enlai led the Chinese delegation to the Soviet Union for the commemoration of the forty-seventh anniversary of the October Revolution, and met Chinese scientists working at the JINR in Moscow. It was in 1965 that the JINR promulgated the third five-year plan. Between China and the Soviet Union there rose disagreements about staffing, the 1965–1970 development plan, funding budgets, and foreign policy. While the number of researchers was fairly balanced between JINR member states, the permanent Soviet technical staff (approaching 2000) at the JINR far

45 Письмо Цянь Сан-цяну от Блохинцева Д.И. Архив ОИЯИ. 29 августа 1964 г. [Letter No. 875/23 of August 29, 1964 from D. I. Blokhintsev to Qian Sanqiang]. JINR Archives: fond 3, opis 1, delo 332, list 50. For the original Russian text, see Appendix 1.
outstripped that of other member states. Soviet scientists held multiple leadership positions, including the institute’s director, directors of laboratories, and the liaison officer. After Wang Ganchang’s departure from his office, no more Chinese scientists filled real-power positions. During the cooperation with the institute, China paid a total of twenty-nine million rubles, equivalent to around 114.45 million yuan (calculated at the exchange rate at that time).\textsuperscript{46} For equipment upgrade, the period of 1965–1971 witnessed a massive increase in the financial budget. The institute, for example, proposed to initially invest twenty-three million rubles to upgrade the 680-MeV accelerator at the Laboratory of Nuclear Problems. An additional plan was to construct the experimental installations of the 70-GeV accelerator at the Institute for High Energy Physics in Protvino (IHEP, also known as the Serpukhov Institute) through a ten-year cooperation with the IHEP, entailing a considerable amount of

\textsuperscript{46} Archives of CAS: 1965-10-025-02-024.

In order to avoid financing highly expensive equipment such as the huge particle accelerators for themselves alone, the member countries would have to pay allotments of the share of the expenses for the JINR. The Chinese government was allotted the largest proportion of the expenses for the JINR among the member-countries, except for the Soviet Union. Ichikawa Hiroshi (2013, 151) supposes that adding to this share, the Soviet Union could maintain its superior status in nuclear (weapon) development among its allies by keeping their research efforts focused in particle physics and accelerator research and thus keeping them away from the core fields for nuclear weapon development.
manpower and financial investment.\textsuperscript{47} China supported neither of these two plans. During the same period, the JINR had academic exchanges with CERN, and attempted to include India as a member state, which would be assisted in developing nuclear emulsion—all of which stood in contradiction to China’s foreign policy.\textsuperscript{48}

In April 1965, Vice Premier Deng Xiaoping instructed that “revolutionary measures should be adopted for the JINR, [from which China] should strive to withdraw, and [the projects] should be ‘blown off’ as soon as possible and be ceased” (Xu 2015, 41–42).\textsuperscript{49} By late May the same year, a Chinese delegation attended a session of the Scientific Council and of the Committee of Plenipotentiaries of the Governments of the JINR Member States. The delegation comprised Li Yi 力一, Wei Zhaolin 魏兆麟 (director of the Foreign Affairs Bureau of the Second Ministry of Machine Building), Zhang Wenyu, Zhu Hongyuan, Zhu Yongxing 朱永行 (head of the S&T Group of the Economic and Commercial Office of the Embassy of China in Moscow), and interpreters Cao Jing 曹经 and Cao Guozhen 曹国帧. On June 6, Li Yi announced at the closing ceremony of the session of the Committee of Plenipotentiaries that “China withdraws from the JINR in Dubna. Starting from July 1, 1965, China will be exempt from any obligations to the JINR in Dubna” (Ge 2017, 56).\textsuperscript{50}

According to the Agreement on the Establishment of a Joint Institute for Nuclear Research, “any Member State of the Joint Institute for Nuclear Research may withdraw from the Institute. Notice of withdrawal shall be given in writing to the Director of the Institute by the Plenipotentiary of a Member State wishing to leave the Institute not later than three months before the end of the current financial year” (JINR 1956).\textsuperscript{51} China’s sudden announcement of its withdrawal from the JINR astounded scientists of different countries. I. M. Frank, director of the Laboratory of Neutron Physics, asked Wang Naiyan if he could stay in Dubna. Wang expressed his gratitude to Professor Frank, but stated that China’s withdrawal from the JINR was driven by “the tension between the two parties and the two countries, which rendered it impossible for us to continue working at the JINR. This has nothing to do with you or me. We are highly grateful for your personal care, help, and cherishment for us” (Wang 2017, 177).\textsuperscript{52} Subsequently, the Chinese scientists transmitted the evacuation instructions, and made preparations under the disguise of picking mushrooms in the nearby forest in small groups, only notifying the JINR to arrange vehicles to send them to the railway

\textsuperscript{47} China held that after completion, the installations would not be conducive to the development of low-energy physics required by other member states (Poland and the German Democratic Republic).
\textsuperscript{48} Archives of CAS: 1965-10-025-02-024.
\textsuperscript{49} “对联合所采取革命的办法，应设法退出，尽快‘吹掉’，不再干。”
\textsuperscript{50} “中国退出杜布纳联合所。从 1965 年 7 月 1 日起，中方不再承担对杜布纳联合所的任何义务。”
\textsuperscript{51} For the original Russian text, see Appendix 1.
\textsuperscript{52} “两党、两国关系紧张，使得我们已经没法在联合所继续工作下去了，这和您我没有任何关系，我们很感谢您本人对我们的关心帮助和爱护。”
station one day before they left to return to China. On June 17, forty-seven members working at the institute left Moscow by train and arrived in Beijing on June 23 (People's Daily 1965). On the morning of June 26, Vice Premier Nie Rongzhen 聂荣臻 (1899–1992), who was in charge of scientific and technological development at the State Council, met all the returnees at the Beijing Science Hall.

By 1965, a total of 143 Chinese scientists had worked at the JINR (Table 1), including six senior researchers (or professors), four associate professors, and over one hundred young scientists. Seventeen of those visiting the JINR from 1956 to 1958 went on the recommendation of the Institute of Atomic Energy (IAE) of Chinese Academy of Sciences, Peking University, Tsinghua University, and Lanzhou University. The forty-nine people sent to Dubna in 1959 mostly came from the IAE and local research institutions of atomic energy. By the 1960s, the number of visitors to the JINR had decreased significantly, to around ten people per year, and the scope of personnel extended to teachers from Tianjin University, Yunnan University, and other universities, as well as those who had studied in the Soviet Union.

Table 1: Chinese personnel sent to work at the JINR (1956–1965)

| Year | Laboratory of High Energy Physics | Laboratory of Theoretical Physics | Laboratory of Neutron Physics | Laboratory of Nuclear Problems | Laboratory of Nuclear Reactions | Others | Number of people |
|------|----------------------------------|----------------------------------|-------------------------------|-------------------------------|---------------------------------|--------|------------------|
| 1956 | 4                                | 4                                | 1                             | 1                             | 1                               |        | 9                |
| 1957 | 2                                | 2                                | 7                             | 3                             | 6                               | 1      | 2                |
| 1958 | 7                                | 10                               | 1                             | 6                             | 2                               | 5      | 4                |
| 1959 | 5                                | 4                                | 7                             | 3                             | 3                               | 3      | 4                |
| 1960 | 3                                | 2                                | 2                             | 2                             | 3                               | 4      | 2                |
| 1961 | 1                                | 1                                | 1                             | 1                             | 1                               | 4      | 1                |
| 1962 | 2                                | 1                                | 3                             | 1                             | 1                               | 4      | 1                |
| 1963 | 4                                | 3                                | 2                             | 3                             | 3                               | 4      | 1                |
| 1964 | 6                                | 4                                | 3                             | 2                             | 1                               | 2      | 1                |
| 1965 | 4                                | 3                                | 1                             | 1                             | 1                               | 2      | 1                |

53 Interview with Professor Yao Zhiquan from the Shanghai Institute of Technical Physics, Chinese Academy of Sciences, May 27, 2019.
54 The six senior researchers include Wang Ganchang, Hu Ning, He Zenglu 何增禄 (1898–1979), Li Yi 力一, Zhu Hongyuan, and Zhang Wenyu. Except for Li Yi, the other five Chinese physicists all had studied and worked in Europe and the United States and achieved influential experimental results.
55 In 1951, the People's Republic of China began to send students to the Soviet Union. By 1959, the number of students reached a total of 14,798. After the Sino-Soviet split, the number of students sent to the Soviet Union decreased on a yearly basis, going from about three hundred in 1960 to only seventy-one in 1961 and thirty-five in 1962. See Cao (2010).
56 Sources: The authors compiled this table based on the personal records of Chinese scientists from JINR archives. For more details of the specific personnel, see the appendix list.
Before 1962, as a matter of fact, the working relationship between the Chinese and Soviet scientists at the JINR was harmonious. The extraordinary activities of Chinese scientists “left a deep impression” on the Soviet counterparts (Wang 2017, 177). In 1958, the heads of the laboratories unanimously agreed that “all the Chinese comrades have shown themselves to be very conscientious and thoughtful workers, have achieved good results in their work, and, according to all the data, can continue to work independently in the future.” Soviet supervisors or colleagues played an active role in guiding young Chinese scientists to tackle difficult problems and gave them the priority to utilizing experiment equipment. Even during the Sino-Soviet split, most Chinese scientists maintained friendly connections with their Soviet colleagues. After returning to China, in February 1962, Wang Ganchang wrote to ask for Director Blokhintsev’s help in purchasing the experiment equipment he needed. Blokhintsev resolved to spare no effort to assist Wang. During holidays, scientists from China and the Soviet Union would organize an abundance of recreation activities (Figure 17). Chinese scientists were often invited to visit their Soviet colleagues. Xu Honggui 徐鸿贵, who worked at the JINR from 1960 to 1962, later recalled: “under the soft light, in a small room covered with tapestries on the walls, when the accordion sounded, different voices merged into beautiful melodies. The Chinese and Russian folk songs flew outside the room, echoing in the night sky of this small city” (Xu 1994).

After returning home, Chinese scientists committed themselves to developing nuclear weapons, particle physics theories, and accelerator technology. In the development of nuclear weapons, Wang Ganchang was responsible for the experimental research and played a leadership role; Zhou Guangzhao employed the “principle of maximum work” to resolve the “issue of nine calculations” of the theoretical pre-research of atomic bomb; Tang Xiaowei designed the neutron initiation experiment for the atomic bomb, and propounded the principle and method for the measurement of neutrons; Lü Min engaged in the real-time physical measurement of nuclear weapons tests; Wang Shiji carried out the measurement and research of the microscopic nuclear parameters of hydrogen bomb; Qian Shaojun 钱绍钧 (1934–) and Wang Naiyan were responsible for the radiochemical diagnosis of nuclear tests and the moderate-distance and close-in measurements of nuclear weapon tests, respectively. Their activities were of paramount importance to China’s successful tests of atomic and hydrogen bombs. Wang Shufen made crucial developments in the early development

57 Letter No. 380/23 of June 21, 1958 from D. I. Blokhintsev to Qian Sanqiang. JINR Archives: fond 3, opis 1, delo 79, list 36–38. For the original Russian text, see Appendix 1.
58 Letter on February 1, 1962 from Wang Ganchang to Director Blokhintsev of the Joint Institute for Nuclear Research. JINR Archives: fond 3, opis 1, delo 243, list 44.
59 “柔和的灯光下,在那墙壁贴满挂毯的小屋里,当手风琴响起的时候,不同的嗓音汇成一首首优美的歌曲,中国的和俄罗斯的民歌歌声飘扬出屋外,回荡在这座小城的夜空。”
of Institute of Modern Physics, CAS, and focused on the study of the application of nuclear technology. Zhu Hongyuan, He Zuoxiu, Wang Rong 汪容 (1923–2007), Xian Dingchang, and others vigorously drove forward the development of particle physics theory and proposed the hadron-structure model—the straton model (Liu 2018). In the late 1980s, Li Yi 力一, Zhang Wenyu, Xian Dingchang, Fang Shouxian, and others participated in the construction of the Beijing Electron Positron Collider (2.2 GeV) and accurately measured the mass of the tau lepton ($\tau$). Yang Fuqing worked on the development of computer software systems. Yao Zhiquan pursued experimental research on nuclear power plant reactors and was involved in the first nuclear power plant project in China. In addition, Wang Fujun 王福钧 made contributions to agricultural isotopes, and Gu Guangben 顾广本 to medical accelerators.

On May 15, 1989, M. Gorbachev (1931–), chairman of the Presidium of the Supreme Soviet of the Soviet Union, visited China, marking the normalization of Sino-Soviet relations. The scientific bond between China and the JINR, which had been disconnected for nearly two decades, was resumed. Wang Ganchang, honorary director of the China Institute of Atomic Energy, and Zhou Guangzhao, president of the China Association for Science and Technology, led delegations to revisit the JINR in 1989 and 1990 respectively. During the same period, Wang Naiyan visited Dubna as well. When he saw the senior fellow scientist of the same laboratory, the two “embraced each other with tears in their eyes” (Wang 2017, 177). In 1991, Professor Xu Honggui 许洪贵, secretary-general of the Chinese Nuclear Society, signed a cooperation agreement with the JINR. This led to the subsequent collaborations of the two sides in such fields as...
particle physics, heavy ion physics, neutron physics, and accelerator technology. Chinese scientists and their colleagues from JINR now work together on experiments in China at the Beijing Spectrometer III (BES III) and Jiangmen Underground Neutrino Observatory (JUNO) and in research projects at the Nuclotron-based Ion Collider fAclity (NICA) collider, which is being constructed in Dubna.

4 Conclusion

The Joint Institute for Nuclear Research in Dubna is the epitome of cooperative scientific research by socialist countries led by the Soviet Union in the context of the Cold War. By the means of this cooperation platform, member states of the JINR and their scientists contributed to the development of physics in the world while benefiting from this cooperation to varying degrees. With the aid of advanced equipment and the international cooperation mechanism of the JINR, Chinese physicists (some of whom had studied in Western Europe or the United States) made significant results, such as the discovery of the first antiparticle of a charged hyperon and the proof of the law of PCAC, and mastered the technologies of experimental instruments and equipment involved in that research. Young Chinese scientists also excelled in scientific practices and thrived in the context of international exchange and cooperation, going on to become a nascent force in China’s nuclear industry, and profoundly contributing to the development of China’s science and technology after returning home.

As a research institution characteristic of international cooperation, the establishment and development of the JINR in Dubna was oriented towards the Soviet Union, and was impacted by the relations between the Soviet Union and other countries, even by the rivalry between socialist and capitalist countries. At the peak of the cooperation, China contributed 20% of the funds for Dubna, to which leading scientists such as Wang Ganchang, Hu Ning, Zhu Hongyuan, and Zhou Guangzhao were sent, creating the opportunity to cooperate with Soviet and Eastern European scientists. Some physicists returning to China dedicated themselves in developing nuclear weapons and produced new scientific or technological results. When China announced its withdrawal from the JINR in 1965, the institute lost a considerable source of funding and human resources. Meanwhile, Chinese scientists were, for about a decade, deprived of access to advanced instruments such as accelerators and other equipment and to the arena for international exchanges and cooperation, but these returnees continued to propel forward China’s science and technology.

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“Zhang Wenyu tongzhi shengping” 张文裕同志生平 [The Life Story of Comrade Zhang
Appendix 1

The following list provides the original Russian texts for the translated English quotes in the mentioned footnotes.

Footnote 29: “Случай рождения и распада антисигма-минус-гиперона был найден после просмотра 40 тысяч стереофотографий, на которых были зарегистрированы десятки тысяч других взаимодействий отрицательных пионов с атомами водорода и углерода пропана. Мне сейчас трудно припомнить точно, в каком месяце это произошло. То ли это было в конце января, то ли в начале февраля 1960 года. . . . Помню только, что еще стояла зима: на улице было морозно и много снега.”

Footnote 37: “Тов. Чжоу Гуан-чжао в период работы в ЛГФ ОИЯИ выполнил ряд работ. . . . Он является чрезвычайно способным и перспективным научным работником и вне всяких сомнений соответствует занимаемой должности.”

Footnote 38: “Из группы физиков-теоретиков академик Боголюбов Н. Н., особо выделяет молодого учёного Чжоу Гуан-чжао, который уже сделал много самостоятельных теоретических исследований.” “По мнению проф. Боголюбов Н. Н., оставление Чжоу Гуан-чжао ещё, по крайней мере, на один год значительно обогатило бы его знания и было бы полезно Институту.”

Footnote 40: “Нам стало известно, что проф. Ван Ган-Чан уже не вернется на работу в Объединенный институт.

Мы вполне понимаем, что интересы развития науки в Китае требуют того, чтобы проф. Ван Ган-Чан работал у себя на родине, и пользуясь случаем я хотел бы отметить, что интересы развития науки в Китае нам также близки и дороги, но мы все же не можем не сожалеть, что проф. Ван Ган-Чан не будет больше участвовать в работе нашего Международного социалистического Института.

В связи с уходом из Института проф. Ван Ган-Чан мы испытываем сейчас большие трудности в подсказании руководителя группы пропановой камеры Лаборатории высоких энергий. Мы были бы рады, если бы Вы могли рекомендовать кого-либо из китайских учёных вместо проф. Ван Ган-Чан как руководителя группы.”

Footnote 44: “В целях совместного развития научно-исследовательской работы социалистических стран мы, в соответствии с Вашим приглашением, направили нашего
высококвалифицированного научного работника профессора Чжан Вэнь-юя для работы в Объединённом институте ядерных исследований. Как нам стало известно, в институте в настоящее время профессору Чжан Вэнь-юю чинится различного рода ограничения и трудности: тема исследования, над которой он работает, была без какого-либо основания снята; время работы руководимой им исследовательской группы на электронной счётной машине неоднократно сокращалось; несколько раз имели место попытки перевода лаборантов из его исследовательской группы в другие группы. Профессор Чжан Вэнь-юй как учёный не встречает в институте должного к себе отношения: он является членом учёного совета института, но его не приглашают на некоторые заседания Совета. Вместе с тем, вплоть до настоящего времени профессор Чжан Вэнь-юй ещё не имеет своего соответствующего кабинета. В связи со всем вышеизложенным, профессор Чжан Вэнь-юй не имеет возможности нормально вести исследовательскую работу.”

Footnote 45: “На протяжении всего времени пребывания в Институте проф. Чжан Вэнь-юй приглашался на все заседания научно-технического совета и Учёного Совета Лаборатории высоких энергий и принимал непосредственное участие в составлении и изменении планов научных работ как Лаборатории в целом, так и отдельных групп. Дирекцией Лаборатории проф. Чжан Вэнь-юй неоднократно предупреждался о недопустимости многотемности в работе его группы (5 тем), но он упорно игнорировал все предложения сократить тематику и сосредоточить внимание на двух-трёх наиболее актуальных темах. Несмотря на это дирекция Лаборатории высоких энергий, именно в целях укрепления социалистического лагеря и руководствуясь добрыми намерениями, пошла на то, что в течение года наращивала количество лаборантов в группе проф. Чжан Вэнь-юй. Так, на 9 членов группы к середине этого года у него было 20 лаборантов, что является беспрецедентным в истории Института.

Более того, группе проф. Чжан Вэнь-юй было предоставлено 20% времени, выделенного всей Лаборатории, для обсчёта на электронно-счётных машинах. . . . Ни одна научная группа ни в одной из лабораторий никогда не работала в таких благоприятных условиях, как группа проф. Чжан Вэнь-юй.

Когда за некоторое время до конференции по физике высоких энергий с очевидностью было выяснено, что сам проф. Чжан Вэнь-юй и его группа с работой не справляется, ему было сокращено количество тем с 5 до 2-х с тем, чтобы эти последние были окончены и представлены на конференцию и, естественно, что некоторое количество лаборантов было передано другим группам, успешно готовившим работы к конференции, но при этом в распоряжение проф. Чжан Вэнь-юй было оставлено 10 лаборантов, которые вполне могли обеспечить успешное окончание двух оставшихся тем. Однако, перед самой конференцией выяснилось, что проф. Чжан Вэнь-юй единственный руководитель группы, который не представил ни одной работы.

Таким образом, дело, видимо, не в том, что у проф. Чжан Вэнь-юй действительно не было отдельного кабинета (кстати, большинство не менее крупных учёных не имеют своих кабинетов), а в том, что он не сумел, или точнее не хотел использовать предоставленные ему преимущественные возможности для успешного ведения научной работы.
К изложенном выше я хотел бы добавить, что дирекция Института и дирекция Лабораторий вправе регулировать расстановку научных и подсобных кадров в зависимости от изменения научных планов и развития отдельных направлений экспериментальных и теоретических работ. Таким образом, Вы видите, что у Вас нет никаких оснований перелагать ответственность за неуспешную работу профессора Чжан Вэнь-юя на Институт.

**Footnote 51:** "Любое государство-член Объединенного института ядерных исследований может выйти из Института. Письменные извещения о выходе из Института направляются полномочными представителями правительства государства-члена, пожелавшего выйти из Института, на имя директора Института, но не позднее, чем за 3 месяца до окончания текущего финансового года."

**Footnote 57:** "Все китайские товарищи показали себя очень добростовестными и вдумчивыми работниками, достигли хороших результатов в своей работе и по всем данным могут в дальнейшем вести самостоятельную работу."
### Appendix 2: List of Chinese scientists working at the Joint Institute for Nuclear Research (1956–1965)

| Year (Number of people) | Name                   | Year of birth | Dispatching date | Returning date | Duration | Qualifications upon dispatch                                                                 | Laboratories/positions at the JINR                                      |
|-------------------------|------------------------|---------------|------------------|----------------|----------|------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| 1956 (9)                | Wang Shufen (female)   | 1923          | 1956.06.18       | 1960.01.03     | 3 yrs. 7 mos. | Assistant professor, Institute of Physics (IOP), Chinese Academy of Sciences (CAS)             | Laboratory of High Energy Physics (nuclear emulsion) (groups 3 and 1)/Researcher |
|                         | Hu Ning               | 1916          | 1956.10.08       | 1958.10.10     | 2 yrs.    | Professor, IOP, CAS, and Laboratory of Theoretical Physics, Department of Physics, Peking University (PKU) | Laboratory of Theoretical Physics/Senior researcher, head of group 4        |
|                         | Wang Ganchang         | 1907          | 1956.10.08       | 1961.01.26     | 4 yrs. 4 mos. | Doctor, professor, academician, Division of Mathematics and Physics, CAS                        | Laboratory of High Energy Physics/Senior researcher, head of groups 3 and 12, vke director of JINR |
|                         | Huang Nianning        | 1933          | 1956.11.01       | 1958.11.01     | 2 yrs.    | Graduate student, Department of Physics, PKU                                                    | Laboratory of Theoretical Physics (group 4)/Research assistant             |
|                         | Xuang Nian-ning       | 1931          | 1956.11.01       | 1960.04.08     | 3 yrs. 5 mos. | CAS Experimental Group                                                                          | Laboratory of Nuclear Problems (groups 12 and 7). Department of Nuclear Physics Experiment/Research assistant |
|                         | Targ Xiaowei          | 1932          | 1956.11.01       | 1960.01.25     | 3 yrs. 3 mos. | Graduate student, Department of Physics, PKU                                                    | Laboratory of Theoretical Physics (group 4)/Research assistant             |
|                         | Tan Ciao-Vei          | 1927          | 1956.11.12       | 1957.08.26     | 10 mos.   | Graduate student, Moscow State University                                                       | Laboratory of Theoretical Physics (group 4)/Researcher (quit for his mistake) |
|                         | Wang Fei              | 1927          | 1956.11.12       | 1960.09.01     | 2 yrs. 9 mos. | Intern researcher, Cosmic-Ray Group, IOP, CAS                                                  | Laboratory of High Energy Physics (groups 8 and 12)/Research assistant (won an award for discovering the antismuon-minus hyperon) |
| Year (Number of people) | Name                  | Year of Birth | Dispatching date | Returning date | Duration | Qualifications upon dispatch                                                                 | Laboratories/positions at the JINR                                      |
|-------------------------|-----------------------|---------------|------------------|---------------|----------|------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| 1956 (9)                | Wang Zhuxiang 王祝翔  | 1932          | 1956.12.20       | 1960.08.09    | 3 yrs. 8 mos. | Intern researcher, IOP, CAS                                                                    | Laboratory of High Energy Physics (groups 8 and 12)/Research assistant   |
|                        | Guan Xian (female)    |               |                  |               |          | Associate professor, Department of Mathematics and Mechanical Engineering, PKU                | Laboratory of Theoretical Physics/Senior laboratory assistant            |
| 1957 (2)                | Zhou Guangzhao 周光召  | 1929          | 1957.01.24       | 1961.02.20    | 4 yrs. 1 mo. | Associate professor, PKU                                                                      | Laboratory of Theoretical Physics (groups 4 and 1), Department of Nuclear Theoretical Physics/Researcher |
|                        | Чжоу Гуан- Чжоу       |               |                  |               |          |                                                                                                 |                                                                              |
| 1958 (6)                | He Zenglu 何增禄      | 1899          | 1958.03.05       | 1959.07.28    | 1 yr. 5 mos. | Professor of the Department of Engineering Physics, Tsinghua University (THU), member of the China Association for Science and Technology, the Chinese Physical Society, and the Academic Committee of the Institute of Optics | Laboratory of High Energy Physics (group 15)/Senior researcher (high-vacuum technology) |
|                        | Xu Daoyu 虞道友        |               |                  |               |          | Teacher, Department of Engineering Physics, THU                                                | Laboratory of Neutron Physics (group 2)/Research assistant (sent to intern at the nuclear power station for China’s need) |
|                        | Ly Naifan 刘乃范       | 1932          | 1958.03.05       | 1960.07.05    | 2 yrs. 4 mos. | Assistant in Accelerator Major, Department of Engineering Physics, THU                        | Laboratory of Nuclear Problems (group 13), Accelerator Department/Research assistant, researcher |
|                        | Zheng Puying (female) | 1931          | 1958.03.05       | 1960.04.11    | 2 yrs. 1 mo. | Researched emulsion at the IOP, CAS, member of the National Association for Science Popularization | Laboratory of High Energy Physics (groups 11 and 2)/Research assistant (emulsion group) |
| Year (Number of people) | Name                  | Year of birth | Dispatching date | Returning date | Duration | Qualifications upon dispatch                                                                 | Laboratories/positions at the J.NR |
|------------------------|-----------------------|---------------|------------------|---------------|----------|----------------------------------------------------------------------------------------------|----------------------------------|
| 1958 (6)               | Luo Wenzong           | 1926          | 1958.03.09       | 1959.10.13    | 1 yr. 7 mos. | Assistant professor, Beijing Institute of Physics                                                | Laboratory of Nuclear Problems (group 6)/Research assistant |
|                        | Luo Вэнь-Чжуан       |               |                  |               |          |                                                                                               |                                  |
|                        | Wang Yunyu (female)   | 1933          | 1958.06.14       | 1960.07.07    | 2 yrs. 1 mo. | Researched the diffusion of neutrons in solutions in Moscow, and conducted ultramicroanalysis at the Lebedev Physical Institute. | Laboratory of Nuclear Problems (group 6), Radiochemistry Department/Research assistant |
|                        | Ван Юн-Юй             |               |                  |               |          |                                                                                               |                                  |
|                        | He Zhaoxiu            | 1927          | 1959.03.17       | 1960.11.28    | 1 yr. 8 mos. | Institute of Atomic Energy (IAE), CAS                                                            | Laboratory of Theoretical Physics (group 5)/Research assistant (recalled by the Chinese government) |
|                        | 何兆庥                |               |                  |               |          |                                                                                               |                                  |
|                        | Xie Zuo-Cuo           | 1935          | 1959.03.17       | 1964.02.18    | 4 yrs. 11 mos. | Assistant professor, IAE, CAS                                                                     | Laboratory of Theoretical Physics (group 1)/Research assistant |
|                        | 沈鼎昌                |               |                  |               |          |                                                                                               |                                  |
|                        | Xian Dingchang        |               |                  |               |          |                                                                                               | Laboratory of High Energy Physics (group 8)/Research assistant |
|                        |                        |               |                  |               |          |                                                                                               |                                  |
|                        | Li Min                | 1931          | 1959.05.09       | 1962.07.21    | 3 yrs. 2 mos. | Graduate student (in cosmic ray research), IAE, CAS                                              | Laboratory of Nuclear Problems/Research assistant |
|                        | 吕敏                   |               |                  |               |          |                                                                                               |                                  |
|                        | Люй Мин               |               |                  |               |          |                                                                                               |                                  |
| 1959 (49)              | Zhu Hengyan           | 1917          | 1959.07.10       | 1961.09.08    | 2 yrs. 2 mos. | Senior professor, vice director of the Theory Laboratory, IAE, CAS                              | Laboratory of Theoretical Physics (group 3)/Senior researcher |
|                        | 朱洪元                |               |                  |               |          |                                                                                               |                                  |
|                        | Chen Da-peng          | 1933          | 1959.10.05       | 1960.01.03    | 3 mos.   | Assistant professor, IAE, CAS                                                                     | Laboratory of Nuclear Problems (group 13)/Engineer (recalled by the Chinese government for work) |
|                        | 陈大鹏                |               |                  |               |          |                                                                                               |                                  |
|                        | Chang Shouxian         | 1932          | 1959.10.05       | 1960.10.19    | 1 yr.    | IAЕ, CAS                                                                                       | Laboratory of Nuclear Problems (group 13), Accelerator Department/Researcher |
|                        | 方守贤                |               |                  |               |          |                                                                                               |                                  |
|                        | Fang Shouxian          |               |                  |               |          |                                                                                               |                                  |
|                        | Zhang Ji Li           | 1930          | 1959.10.05       | 1960.01.01    | 3 mos.   | Institute of Electrical Engineering, CAS                                                        | Laboratory of Nuclear Problems (group 13), Accelerator Department/Engineer |
|                        | 张继良                |               |                  |               |          |                                                                                               |                                  |
|                        | Чжуан Дин-Линь        |               |                  |               |          |                                                                                               |                                  |
|                        | Zhu Хун-Юань           |               |                  |               |          |                                                                                               |                                  |
| Year (Number of people) | Name                  | Year of birth | Year of dispatching date | Returning date | Duration | Qualifications upon dispatch | Laboratories/positions at the JNR |
|------------------------|-----------------------|---------------|--------------------------|---------------|----------|-------------------------------|----------------------------------|
| 1959 (49)              | Chen Zhongmo 陈中谟   | 1932          | 1959.10.15               | 1963.12.17    | 4 yrs. 2 mos. | Assistant professor, IOP, CAS | Laboratory of Theoretical Physics (group 1)/Research assistant |
|                        | Yang Huaxi? 杨华溪?   | 1928          | 1959.12.05               | 1960.01.01    | 1 mo.     | Operator, technician, IAE, CAS | Laboratory of Nuclear Problems (group 13), Accelerator Department/Research assistant |
|                        | Chen Lingyan (female) | 1935          | 1959.12.07               | 1962.10.09    | 2 yrs. 10 mos. | Assistant, Department of Engineering Physics, THU | Laboratory of High Energy Physics (group 12)/Laboratory assistant, research assistant |
|                        | Chen Tieyong 陈铁镛   | 1931          | 1959.12.07               | 1960.12.26    | 1 yr. 1 mo. | Head of duty for Physical Reactor, IAE, CAS | Laboratory of Neutron Physics, Department of Neutron Measurement/Research assistant |
|                        | Chu Lianyuan 趙连元   | 1931          | 1959.12.07               | 1961.10.16    | 1 yr. 10 mos. | Assistant professor, IAE, CAS | Laboratory of Theoretical Physics (group 3)/Research assistant, researcher |
|                        | Cui Huachuan 崔化传   | 1932          | 1959.12.07               | 1963.12.17    | 4 yrs.    | Assistant professor, IAE, CAS | Laboratory of Nuclear Problems (group 5), Department of Nuclear Applications/Research assistant, laboratory assistant |
|                        | Du Xueren  杜学仁     | 1936          | 1959.12.07               | 1964.12.28    | 5 yrs. 1 mo. | Laboratory assistant, IAE, CAS | Laboratory of Nuclear Problems (group 13), Accelerator Department/Research assistant |
|                        | Du Suo-Jian 杜素坚    | 1935          | 1959.12.07               | 1965.06.14    | 5 yrs. 6 mos. | Assistant professor, IAE, CAS | Laboratory of High Energy Physics/Research assistant |
|                        | Du Yuancai 杜运才     | 1932          | 1959.12.07               | 1963.12.17    | 4 yrs.    | Assistant professor, IAE, CAS | Laboratory of Nuclear Problems (group 1), Department of Nuclear Applications/Engineer |
| Year (Number of people) | Name | Year of birth | Dispatching date | Returning date | Duration | Qualifications upon dispatch | Laboratories/positions at the JINR |
|-------------------------|------|---------------|------------------|---------------|----------|----------------------------|----------------------------------|
| 1933                    | Han Shulong | 1933 | 1959.12.07 | 1965.03.02 | 5 yrs. 3 mos. | Assistant professor, IAE, CAS | Laboratory of Nuclear Problems (group 11), Department of Nuclear Chemistry/Research assistant, laboratory assistant |
| 汉树荣 | 1933 | 1959.12.07 | 1965.03.02 | 5 yrs. 3 mos. | Assistant professor, IAE, CAS | Laboratory of Nuclear Problems (group 11), Department of Nuclear Chemistry/Research assistant, laboratory assistant |
| He Degeng                | 1933 | 1959.12.07 | 1961.01.15 | 1 yr. 1 mo | IAE, CAS | Laboratory of Neutron Physics, Department of Radio Electronics/Engineer |
| He Deyian                | 1933 | 1959.12.07 | 1961.01.15 | 1 yr. 1 mo | IAE, CAS | Laboratory of Neutron Physics, Department of Radio Electronics/Engineer |
| Hu Jiawei                | 1936 | 1959.12.07 | 1964.12.29 | 5 yrs. 1 mos. | IAE, CAS | Laboratory of Nuclear Problems (group 7)/Research assistant |
| 胡家伟 | 1936 | 1959.12.07 | 1964.12.29 | 5 yrs. 1 mos. | IAE, CAS | Laboratory of Nuclear Problems (group 7)/Research assistant |
| Hu Chao                      | 1933 | 1959.12.07 | 1962.07.02 | 2 yrs. 7 mos. | Assistant professor, IAE, CAS | Laboratory of Nuclear Problems (group 7)/Research assistant |
| 胡超                     | 1933 | 1959.12.07 | 1962.07.02 | 2 yrs. 7 mos. | Assistant professor, IAE, CAS | Laboratory of Nuclear Problems (group 7)/Research assistant |
| Hu Lifeng                 | 1933 | 1959.12.07 | 1962.07.02 | 2 yrs. 7 mos. | Assistant professor, IAE, CAS | Laboratory of Nuclear Problems (group 7)/Research assistant |
| 胡力丰                 | 1933 | 1959.12.07 | 1962.07.02 | 2 yrs. 7 mos. | Assistant professor, IAE, CAS | Laboratory of Nuclear Problems (group 7)/Research assistant |
| Jiang Shusen              | 1935 | 1959.12.07 | 1960.04.11 | 4 mos. | Assistant professor, IAE, CAS | Laboratory of Nuclear Problems (group 7)/Research assistant |
| 蒋树森                | 1935 | 1959.12.07 | 1960.04.11 | 4 mos. | Assistant professor, IAE, CAS | Laboratory of Nuclear Problems (group 7)/Research assistant |
| Li Maosan                | 1930 | 1959.12.07 | 1960.05.14 | 5 mos. | Laboratory assistant, IAE, CAS | Laboratory of Nuclear Problems (group 13), Accelerator Department/Research assistant (returned to China for health reasons) |
| 刘茂三                | 1930 | 1959.12.07 | 1960.05.14 | 5 mos. | Laboratory assistant, IAE, CAS | Laboratory of Nuclear Problems (group 13), Accelerator Department/Research assistant (returned to China for health reasons) |
| Liu Qingfan              | 1932 | 1959.12.07 | 1960.07.05 | 7 mos. | Technician, IAE, CAS | Laboratory of Nuclear Problems (group 13), Accelerator Department/Engineer |
| 刘清藩                | 1932 | 1959.12.07 | 1960.07.05 | 7 mos. | Technician, IAE, CAS | Laboratory of Nuclear Problems (group 13), Accelerator Department/Engineer |
| Liu Yichen               | 1930 | 1959.12.07 | 1964.06.04 | 4 yrs. 6 mos. | Assistant professor, Institute of Mathematics, CAS | Laboratory of Theoretical Physics (group 3)/Research assistant |
| 刘易成                | 1930 | 1959.12.07 | 1964.06.04 | 4 yrs. 6 mos. | Assistant professor, Institute of Mathematics, CAS | Laboratory of Theoretical Physics (group 3)/Research assistant |
| Liu Yuan                 | 1935 | 1959.12.07 | 1963.12.17 | 4 yrs. | Assistant professor, IAE, CAS | Laboratory of Theoretical Physics (group 3)/Research assistant |
| 刘渊                | 1935 | 1959.12.07 | 1963.12.17 | 4 yrs. | Assistant professor, IAE, CAS | Laboratory of Theoretical Physics (group 3)/Research assistant |
| 刘渊                | 1935 | 1959.12.07 | 1963.12.17 | 4 yrs. | Assistant professor, IAE, CAS | Laboratory of Theoretical Physics (group 3)/Research assistant |
| Year (Number of people) | Name                  | Year of birth | Dispatching date | Returning date | Duration | Qualifications upon dispatch                      | Laboratories/positions at the JNR                                      |
|-------------------------|-----------------------|---------------|------------------|----------------|----------|---------------------------------------------------|------------------------------------------------------------------------|
|                         | Ping Chunqing         | 1934          | 1959.12.07       | 1965.06.14     | 4 yrs. 6 mos. | Assistant professor, IAE, CAS                     | Laboratory of High Energy Physics (group 10)/Engineer                  |
|                         | Цинь-Цин Quan Jinguan | 1931          | 1959.12.07       | 1960.07.05     | 7 mos.    | Head of duty, IAE, CAS                            | Laboratory of Nuclear Problems/Engineer                               |
|                         | Цинь-Цин-чунь Wang Daji| 1932          | 1959.12.07       | 1960.06.30     | 7 mos.    | Engineer, IAE, CAS                                | Laboratory of Nuclear Problems (group 13)/Accelerator Department/Engineer |
|                         | Ван Да-Ди Wang Naiyan | 1935          | 1959.12.07       | 1965.06.14     | 5 yrs. 6 mos. | Assistant professor, IAE, CAS                      | Laboratory of Neutron Physics, Department of Neutron Measurement/Research assistant |
|                         | Ван Нан-Янь            |               |                  |                |          | Editor of the Department of Information Technology, the CAS General Office, and member of the Chinese Physical Society, and the Association for Science and Technology Communication | Laboratory of Theoretical Physics (group 4)/Researcher                |
| 1959 (49)               | Wang Rong Wang Zhenzhu| 1923          | 1959.12.07       | 1962.01.08     | 2 yrs. 1 mo. | Assistant professor, IAE, CAS                     | Laboratory of Neutron Physics, Department of Reactor Applications/Research assistant, engineer |
|                         | 王世缉 Ван Чунь        |               |                  |                |          | Assistant professor, IAE, CAS                      | Laboratory of High Energy Physics (group 5), Department of Science Experiment/Research assistant |
|                         | Ван Ши-Ди              |               |                  |                |          | Assistant professor, IAE, CAS                      | Laboratory of Nuclear Problems, Department of Nuclear Applications/Research assistant |
|                         | Wang Zhenghua Wang Цзин-Ба | 1934   | 1959.12.07       | 1965.03.02     | 5 yrs. 3 mos. | Assistant professor, IAE, CAS                     | Laboratory of Nuclear Problems (group 13), Accelerator Department/Technician |
|                         | 席承安 Ван Чэнь        |               |                  | 1960.01.01     | 1 mo.     | Intern researcher, IAE, CAS                       | Laboratory of Nuclear Problems (group 13), Accelerator Department/Technician |
| Year (Number of people) | Name                      | Year of birth | Dispatching date | Returning date | Duration | Qualifications upon dispatch               | Laboratories/positions at the J.NR                        |
|------------------------|---------------------------|---------------|------------------|---------------|----------|------------------------------------------|----------------------------------------------------------|
| 1933                   | Xu Yongchang              | 1959.12.07    | 1964.12.29       | 5 yrs. 1 mo.  | Assistant professor, IAE, CAS             | Laboratory of High Energy Physics (group 6)/Research assistant |
|                        | Сюй Ю-Чан (female)        |               |                  |               |          |                                          | Laboratory of Nuclear Problems (group 2), Department of Nuclear Physics/Research assistant |
|                        | Yuan Rongfang             | 1959.12.07    | 1964.12.29       | 5 yrs. 1 mo.  | Assistant professor, IAE, CAS             | Laboratory of Neutron Physics, Department of Reactor Applications/Technician |
|                        | 姚春芳（女）               |               |                  |               |          |                                          | Laboratory of Neutron Physics, Department of Neutron Measurement/Research assistant |
|                        | Юйнь Жун-Фан              |               |                  |               |          |                                          | Laboratory of Nuclear Problems (group 10), Department of Nuclear Physics Application/Laboratory assistant, research assistant |
|                        | Zeng Naigong              | 1959.12.07    | 1964.12.28       | 5 yrs. 1 mo.  | Assistant professor, IAE, CAS             | Laboratory of Nuclear Problems (group 11), Department of Nuclear Spectroscopy/Research assistant |
|                        | 曾乃工                    |               |                  |               |          |                                          | Laboratory of Nuclear Problems (group 13)/Head              |
|                        | Чжэнь Най-Гун              |               |                  |               |          |                                          | Laboratory of Nuclear Problems (group 13), Accelerator Department/Laboratory assistant |
| 1934                   | Zhang Runhua              | 1959.12.07    | 1963.12.17       | 4 yrs.       | Assistant professor, IAE, CAS             | Laboratory of Nuclear Problems (group 11), Department of Nuclear Spectroscopy/Research assistant |
|                        | 张润华                    |               |                  |               |          |                                          | Laboratory of Nuclear Problems (group 13)/Head              |
|                        | Чжэнь Заунь-Вэ              |               |                  |               |          |                                          | Laboratory of Nuclear Problems (group 13), Accelerator Department/Laboratory assistant |
|                        | Zhou Yuelhua              | 1959.12.07    | 1960.01.01       | 1 mo.        | Assistant professor, IAE, CAS             | Laboratory of Nuclear Problems (group 11), Department of Nuclear Spectroscopy/Research assistant |
|                        | 周月华（女）               |               |                  |               |          |                                          | Laboratory of Nuclear Problems (group 13)/Head              |
|                        | Чжоу Юэ-Бэ                 |               |                  |               |          |                                          | Laboratory of Nuclear Problems (group 13), Accelerator Department/Laboratory assistant |
|                        | Li Yi                     | 1913          | 1960.07.05       | 7 mos.       | Vice director, IAE, CAS                  | Laboratory of Nuclear Problems (group 13)/Head              |
|                        | 力一                       |               |                  |               |          |                                          | Laboratory of Nuclear Problems (group 13), Accelerator Department/Laboratory assistant |
|                        | Zhou Shu                  | 1930          | 1960.01.01       | 1 mo.        | Assistant professor, IAE, CAS             | Laboratory of Nuclear Problems (group 11), Department of Nuclear Spectroscopy/Research assistant |
|                        | 周述                      |               |                  |               |          |                                          | Laboratory of Nuclear Problems (group 13)/Head              |
|                        | Чжоу Шю                    |               |                  |               |          |                                          | Laboratory of Nuclear Problems (group 13), Accelerator Department/Laboratory assistant |
| 1933                   | Cao Guozhen               | 1959.12.20    | 1965.03.02       | 5 yrs. 2 mo. | Assistant Teaching and Research Office of Nuclear Physics, Department of Atomic Energy, Northeast Institute of Technology | Laboratory of Nuclear Problems (group 2), Department of Nuclear Physics/Engineer |
| Year (Number of people) | Name | Year of birth | Dispatching date | Returning date | Duration | Qualifications upon dispatch | Laboratories/positions at the JINR |
|-------------------------|------|---------------|------------------|---------------|----------|-----------------------------|----------------------------------|
| 1959 (45)               | Feng Qin (female) | 1937 | 1959.12.20 | 1965.06.14 | 5 yrs. 6 mos. | Research intern, IAE, CAS | Laboratory of Theoretical Physics/Laboratory assistant, engineer |
|                         | Han Meihua | 1935 | 1959.12.20 | 1961.02.16 | 1 yr. 2 mos. | Assitant, Department of Chemistry, Guangxi: Normal University | Laboratory of Nuclear Problems, Accelerator Department/Research assistant |
|                         | Gu Benuang | 1939 | 1959.12.20 | 1961.02.16 | 1 yr. 2 mos. | Assistant, Teaching and Research Office of Accelerator, Department of Engineering Physics, Beijing Vocational and Technical College | Laboratory of Nuclear Reactions/Research assistant |
|                         | He Chengxin | 1929 | 1959.12.20 | 1961.12.20 | 2 yrs. | Senior designer, Harbin Electric Machinery Factory | Laboratory of Nuclear Reactions, Cyclotron Department/Engineer |
|                         | He Zhen-Sun | 1935 | 1959.12.20 | 1960.04.28 | 5 mos. | Assistant, Department of Physics, Guangxi University | Laboratory of Theoretical Physics Theory Department/Laboratory assistant (recalled due to academic qualifications) |
|                         | He Shuwen | 1939 | 1959.12.20 | 1960.04.28 | 5 mos. | Assistant, Department of Physics, Guangxi University | Laboratory of Theoretical Physics/Researcher |
|                         | Hu Shike | 1930 | 1959.12.20 | 1962.03.30 | 2 yrs. 3 mos. | Teacher in nuclear physics, Sichuan University, member of the Chinese Physics Society, and the All-China Association for Science Popularization | Laboratory of Theoretical Physics/Laboratory assistant |
|                         | Xu Shu-En | 1935 | 1959.12.20 | 1964.02.18 | 4 yrs. 2 mos. | Assistant, Department of Chemical Technology, Hefei Vocational and Technical School | Laboratory of Nuclear Problems, Accelerator Department/Research assistant |
|                         | Wang Chuangpeng | 1935 | 1959.12.20 | 1964.02.18 | 4 yrs. 2 mos. | Assistant, Department of Chemical Technology, Hefei Vocational and Technical School | Laboratory of Nuclear Problems, Accelerator Department/Research assistant |
|                         | Xu Zuhua | 1934 | 1959.12.20 | 1961.12.20 | 2 yrs. | Technician, Institute of Nuclear Research, CAS-Heilongjiang Branch | Laboratory of Nuclear Problems, Cyclotron Department/Engineer |
| Year (Number of people) | Name | Year of birth | Dispatching date | Returning date | Duration | Qualifications upon dispatch | Laboratories/positions at the J.NR |
|------------------------|------|---------------|------------------|---------------|----------|-----------------------------|----------------------------------|
| 1960 (24)              | Liu Lu? | 1928 | 1960.02.04 | 1965.06.14 | 5 yrs. 4 mos. | Vice director, Department of Radiochemistry, Tianjin University | Laboratory of Nuclear Reactions, Department of Science Experiment/Research assistant, researcher |
|                        | Wang | 1935 | 1960.02.13 | 1964.02.18 | 4 yrs. | Assistant, Department of Physics, Hebei Normal College | Laboratory of Nuclear Problems/Group leader |
|                        | Cao Jing | 1935 | 1960.02.13 | 1961.01.17 | 11 mos. | Assistant, Department of Physics, Guangdong Normal University; studied at Beijing Institute of Posts and Telecommunications | Laboratory of High Energy Physics, Department of Science Experiment/Research assistant, laboratory assistant |
|                        | Huang Lixuan? | 1933 | 1960.02.13 | 1961.06.16 | 1 yr. 4 mos. | Assistant, Department of Atomic Energy, PKU | Laboratory of Nuclear Problems, Department of Nuclear Physics Application/Laboratory assistant |
|                        | Li Xuanning | 1937 | 1960.02.13 | 1962.02.22 | 2 yrs. | Assistant, Department of Physics, Xi’an Agricultural Normal College | Laboratory of Nuclear Problems, Accelerator Department/Laboratory assistant (commended for excellent work) |
|                        | Liu Fuxiang? | 1934 | 1960.02.13 | 1963.03.04 | 3 yrs. 1 mo. | Assistant, Department of Radiochemistry, Northwest University | Laboratory of Nuclear Problems/Laboratory assistant, research assistant |
|                        | Ren Dehou | 1931 | 1960.02.13 | 1960.12.25 | 10 mos. | Assistant professor, IAE, CAS | Laboratory of High Energy Physics, Synchrotron Department/Returning home due to health deterioration |
| Year (Number of people) | Name (Transcription) | Year of birth | Dispatching date | Returning date | Duration | Qualifications upon dispatch | Laboratories/positions at the JNR |
|---------------------------|----------------------|---------------|------------------|----------------|----------|-------------------------------|---------------------------------|
| 1931                      | Shen Qionghua (沈琼华) | 1960.02.13    | 1964.02.18       | 4 yrs.         |          | Assistant, Department of Mathematics, Hefei University of Technology | Laboratory of Theoretical Physics, Department of Computational Mathematics and Computer/Research assistant |
| 1932                      | Shu Yaode (舒耀德)    | 1960.02.13    | 1964.12.28       | 4 yrs. 11 mos. |          | Laboratory assistant, IAE, CAS | Laboratory of Nuclear Problems, Accelerator Department/Laboratory assistant |
|                           | Wu Ye-Da (吳亞達)     |               |                  |                |          |                                | Laboratory of High Energy Physics/Laboratory assistant, engineer |
| 1935                      | Wang Xiaoliang (王孝良) | 1960.02.13    | 1965.03.02       | 5 yrs. 1 mo.   |          | Institute of Computing Technology, CAS | Laboratory of Theoretical Physics, Department of Computational Mathematics and Computer/Laboratory assistant, engineer |
| 1931                      | Zhongmu (張仲木)       | 1960.02.13    | 1964.12.16       | 4 yrs. 10 mos. |          | Assistant professor, IAE, CAS | Laboratory of High Energy Physics, Synchrofazotron Department/Engineer |
|                           | Чжан Чжу-Му            |               |                  |                |          |                                |                                   |
| 1960 (24)                 | Yan Wuguang (严武光)   | 1934          | 1965.03.02       | 5 yrs.         |          | Graduated from the Department of Physics, Leningrad State University (USSR) in 1959; received the Candidate of Sciences degree from the Moscow State University in 1962 | Laboratory of Neutron Physics, Department of Neutron Measurement/Laboratory assistant, research assistant |
|                           | Янь Е-Гуан              |               |                  |                |          |                                | Laboratory of High Energy Physics/Research assistant |
| 1933                      | Hu Honggui (徐鸿桂 (贵)) | 1960.04.14    | 1962.06.25       | 2 yrs. 2 mos. |          | Intern, Institute of Geochemistry and Analytical Chemistry, the USSR Academy of Sciences (Moscow) | Laboratory of Nuclear Reactions, Department of Science Experiment/Research assistant |
|                           | Су Хун-Гун              |               |                  |                |          |                                |                                   |
| 1931                      | Bai Fuwei (白福威)     | 1931          | 1964.12.28       | 4 yrs. 8 mos. |          | Technician, IAE, CAS          | Laboratory of Nuclear Reactions, Cyclotron Department/Laboratory assistant, research assistant |
|                           | Бай Фу-Вэй             |               |                  |                |          |                                |                                   |
| 1931                      | Gao Qiqian (高旗千)    | 1960.04.18    | 1965.03.02       | 4 yrs. 11 mos. |          | Engineer, IAE, CAS            | Laboratory of Nuclear Reactions, Department of Science Experiment/Senior laboratory assistant, research assistant |
|                           | Го Цин-Цзень            |               |                  |                |          |                                |                                   |
| Year (Number of people) | Name                  | Year of birth | Dispatching date | Returning date | Duration | Qualifications upon dispatch                                                                 | Laboratories/positions at the JINR                                                                 |
|------------------------|-----------------------|---------------|------------------|---------------|----------|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| 1960 (24)              | Huang Zuzhan          | 1931          | 1960.07.11       | 1965.06.14    | 4 yrs. 11 mos. | Engineer, IAE, CAS                                                                            | Laboratory of Theoretical Physics, Department of Theoretical Physics/Research assistant            |
|                        | Xu Yan               |               |                  |               |          |                                                                                               |                                                                                                   |
|                        | Wang Yongchang       | 1926          | 1960.07.11       | 1965.06.14    | 4 yrs. 11 mos. | Assistant professor, IAE, CAS                                                                  | Laboratory of High Energy Physics/Research assistant                                                  |
|                        |                       |               |                  |               |          |                                                                                               | Laboratory of Neutron Physics/Research assistant                                                  |
|                        | Wan Yen-Chan         | 1934          | 1960.07.11       | 1963.07.04    | 3 yrs.   | Engineer, IAE, CAS                                                                            | Laboratory of High Energy Physics, Department of New Science and Technology/Engineer               |
|                        | Zhang Yi             |               |                  |               |          |                                                                                               |                                                                                                   |
|                        | Zhuan Ji             |               |                  |               |          |                                                                                               |                                                                                                   |
| 1961 (10)              | Wang Fujun           | 1931          | 1960.07.18       | 1962.08.09    | 2 yrs. 1 mo. | Engineer, IAE, CAS                                                                            | Laboratory of Nuclear Problems, Department of Radiochemistry and Spectroscopy/Research assistant  |
|                        |                      |               |                  |               |          |                                                                                               |                                                                                                   |
|                        | Yan Yi               | 1960.08.06    | 1963.07.01       |               | 2 yrs. 11 mos. | The Second Ministry of Machine Building Industry                                                | Laboratory of Nuclear Problems, Department of Electrical Engineering/Group leader                   |
|                        | Xu Yi                |               |                  |               |          |                                                                                               |                                                                                                   |
|                        | Eg I                 |               |                  |               |          |                                                                                               |                                                                                                   |
|                        | Zou Zhitian          | 1927          | 1960.08.11       | 1962.09.12    | 2 yrs. 1 mo. | Assistant professor, IAE, CAS                                                                  | Laboratory of Nuclear Problems, Department of Nuclear Applications/Research assistant (recalled by the Chinese government for family reasons) |
|                        |                      |               |                  |               |          |                                                                                               |                                                                                                   |
|                        | Zhou Enhou           | 1930          | 1960.09.16       | 1960.12.16    | 3 mos.   | Engineer, Institute of Modern Physics, CAS (Lanzhou)                                          | Laboratory of Nuclear Reactions/Engineer                                                             |
|                        |                      |               |                  |               |          |                                                                                               |                                                                                                   |
|                        | Zhao Taonan          | 1932          | 1961.02.11       | 1965.06.14    | 4 yrs. 4 mos. | Assistant, Department of Chemistry, Jiangsu Normal College                                    | Laboratory of Nuclear Problems, Department of Nuclear Chemistry and Spectroscopy/Research assistant |
|                        |                      |               |                  |               |          |                                                                                               |                                                                                                   |
|                        | Zhao Tao-Han         | 1934          | 1961.02.11       | 1965.03.02    | 4 yrs. 1 mo. | Assistant, Department of Chemistry, Nankai Vocational and Technical College                  | Laboratory of Nuclear Problems, Department of Spectroscopy/Research assistant                      |
|                        | Zhou MaoLun          |               |                  |               |          |                                                                                               |                                                                                                   |
|                        |                      |               |                  |               |          |                                                                                               |                                                                                                   |
| Year (Number of people) | Name               | Year of birth | Dispatching date | Returning date | Duration | Qualifications upon dispatch                        | Laboratories/positions at the JINR                                      |
|-------------------------|--------------------|---------------|------------------|---------------|----------|------------------------------------------------------|------------------------------------------------------------------------|
| 1961 (10)               | Zhang Wenyu        | 1910          | 1961.11.16       | 1964.12.09    | 3 yrs. 1 mo. | Director of the Cosmic-Ray Laboratory, IAE, CAS     | Laboratory of High Energy Physics/Senior researcher                   |
|                         | Чжан Вэй-Юй        |               |                  |               |          |                                                      |                                                                        |
|                         | Chu Shijie         | 1936          | 1961.12.23       | 1963.12.16    | 2 yrs.   | Research intern, IAE, CAS                           | Laboratory of Nuclear Problems, Department of Nuclear Physics Application/Research assistant |
|                         | Чу Ши-Цэ           |               |                  |               |          |                                                      |                                                                        |
|                         | Kong Xiangjing     | 1933          | 1961.12.23       | 1965.06.14    | 3 yrs. 6 mos. | Intern, IAE, CAS                                  | Laboratory of Nuclear Problems/Research assistant                      |
|                         | 孔祥敏             |               |                  |               |          |                                                      |                                                                        |
|                         | Кун Сан-Цин         |               |                  |               |          |                                                      |                                                                        |
|                         | Liang Guozhao      | 1936          | 1961.12.23       | 1965.06.14    | 3 yrs. 6 mos. | Research intern, IAE, CAS                         | Laboratory of Nuclear Reactions, Department of Science Experiment/Research assistant |
|                         | 梁国照             |               |                  |               |          |                                                      |                                                                        |
|                         | Lin Go-Chao        | 1934          | 1961.12.23       | 1965.06.14    | 3 yrs. 6 mos. | Research intern, IAE, CAS                         | Laboratory of Nuclear Reactions, Department of Science Experiment/Research assistant |
|                         | Ma Jun             |               |                  |               |          |                                                      |                                                                        |
|                         | Wu Zhongxin        | 1931          | 1961.12.23       | 1962.12.11    | 1 yr.    | Research intern, IAE, CAS                         | Laboratory of Nuclear Problems, Department of Nuclear Physics Application/Research assistant |
|                         | 孙克忠             |               |                  |               |          |                                                      |                                                                        |
|                         | Sun Kezhong        | 1931          | 1961.12.23       | 1962.12.11    | 1 yr.    | Research intern, IAE, CAS                         | Laboratory of Nuclear Problems, Department of Nuclear Physics Application/Research assistant |
|                         | Wu Zongfan         | 1935          | 1961.12.23       | 1965.06.14    | 3 yrs. 6 mos. | Research intern, IAE, CAS                         | Laboratory of Nuclear Problems/Research assistant                      |
|                         | 吴宗藩             |               |                  |               |          |                                                      |                                                                        |
|                         | Yu Чжун-Фань       | 1936          | 1961.12.23       | 1965.06.14    | 3 yrs. 6 mos. | Intern, IAE, CAS                                  | Laboratory of High Energy Physics, Department of Science Experiment/Research assistant |
|                         | Ye Weiwen          |               |                  |               |          |                                                      |                                                                        |
|                         | Е Вэй-Вэнь         | 1936          | 1961.12.23       | 1965.06.14    | 3 yrs. 6 mos. | Intern, IAE, CAS                                  | Laboratory of Nuclear Reactions/Research assistant                      |
|                         | Li Changyong       | 1918          | 1962.04.27       | 1964.04.09    | 1 yr. 11 mos. | Professor, IAE, CAS                               | Laboratory of Neutron Physics, Department of Neutron Measurement/Researcher |
|                         | 李昌永             |               |                  |               |          |                                                      |                                                                        |
|                         | Ли Чан-Юн          |               |                  |               |          |                                                      |                                                                        |
| Year (Number of people) | Name                  | Year of birth | Dispatching date | Returning date | Duration | Qualifications upon dispatch                                                                 | Laboratories/positions at the JINR |
|-------------------------|-----------------------|---------------|------------------|---------------|----------|------------------------------------------------------------------------------------------------|-----------------------------------|
|                         | Li Mingwen           | 1936          | 1962.04.27       | 1964.05.07    | 2 yrs.   | Research intern, IAE, CAS                                                                     | Laboratory of High Energy Physics/Research assistant |
|                         | Li Мин-Вэн           |               |                  |               |          |                                                                                               | Laboratory of Neutron Physics, Department of Radio Electronics/Research assistant |
|                         | Yao Zhiquan          | 1936          | 1962.04.27       | 1965.06.14    | 3 yrs. 2 mos. | Shanghai Institute of Nuclear Research, CAS                                                   | Laboratory of Neutron Physics, Department of Neutron Measurement/Research assistant |
|                         | Yao Чи-Чвань         |               |                  |               |          |                                                                                               |                                                                                  |
|                         | Chen Huitang         | 1933          | 1962.11.21       | 1964.12.29    | 2 yrs. 1 mo. | Assistant professor, IAE, CAS                                                                  | Laboratory of Neutron Physics, Department of Reactor Applications/Researcher |
| 1962 (12)               | Chen Хуи-Тан         |               |                  |               |          |                                                                                               | Laboratory of Theoretical Physics, Department of Computing Technology/Engineer |
|                         | Hu Zhengjia          | 1930          | 1962.11.21       | 1965.06.14    | 2 yrs. 7 mos. | IAE, CAS                                                                                      | Laboratory of Neutron Physics, Department of Neutron Measurement/Research assistant |
|                         | Li Jianping          | 1936          | 1962.11.21       | 1965.06.14    | 2 yrs. 7 mos. | Assistant professor, IAE, CAS                                                                  | Laboratory of Nuclear Reactions, Department of Science Experiment/Research assistant |
|                         | Li Цян-Пин           |               |                  |               |          |                                                                                               | Laboratory of Nuclear Problems, Department of Nuclear Chemistry and Spectroscopy/Research assistant |
|                         | Lu Xiting            | 1931          | 1962.11.21       | 1965.06.14    | 2 yrs. 7 mos. | IAE, CAS                                                                                      | Laboratory of Nuclear Problems, Department of Nuclear Chemistry and Spectroscopy/Research assistant |
|                         | Lu Си-Тин            |               |                  |               |          |                                                                                               |                                                                                  |
|                         | Mu Junbao            | 1934          | 1962.11.21       | 1963.09.22    | 10 mos.  | Assistant professor, IAE, CAS                                                                  | Laboratory of Nuclear Problems, Department of Nuclear Chemistry and Spectroscopy/Research assistant |
|                         | Mu Цюн-Пао           |               |                  |               |          |                                                                                               |                                                                                  |

Continued
| Year (Number of people) | Name                  | Year of birth | Dispatching date | Returning date | Duration | Qualifications upon dispatch                  | Laboratories/positions at the JINR                                                                 |
|------------------------|-----------------------|---------------|------------------|---------------|----------|-----------------------------------------------|--------------------------------------------------------------------------------------------------|
| 1962 (12)              | Qian Shaojun          | 1934          | 1962.11.21       | 1965.06.14    | 2 yrs. 7 mos. | Assistant professor, IAE, CAS              | Laboratory of High Energy Physics, Department of Science Experiment/Research assistant             |
|                        | Wu Baishi             | 1930          | 1962.11.21       | 1964.12.29    | 2 yrs. 1 mo.  | IAE, CAS                                     | Laboratory of Neutron Physics, Department of Neutron Measurement/Researcher                         |
|                        | Yang Fuqing (female)  | 1932          | 1962.11.21       | 1964.12.29    | 2 yrs. 1 mo.  | Assistant professor, IAE, CAS              | Laboratory of Theoretical Physics, Department of Computational Mathematics and Computer/Research assistant |
|                        | Zhao Weijiang         | 1938          | 1962.11.21       | 1965.06.14    | 2 yrs. 7 mos. | Assistant professor, IAE, CAS              | Laboratory of Nuclear Problems, New Accelerator Department/Research assistant                     |
|                        | Shi Shuanghui         | 1935          | 1963.02.04       | 1965.06.14    | 2 yrs. 4 mos. | Graduate student, Department of Physics, Moscow State University | Laboratory of Nuclear Reactions/Laboratory assistant, research assistant                           |
|                        | Ling Guizhong         | 1936          | 1963.05.15       | 1965.06.14    | 2 yrs. 1 mo.  | Assistant professor, IAE, CAS              | Laboratory of High Energy Physics, Department of New Science and Technology/Research assistant     |
| 1963 (7)               | Lu Songlin            | 1938          | 1963.05.15       | 1965.06.14    | 2 yrs. 1 mo.  | Assistant professor, IAE, CAS              | Laboratory of Neutron Physics, Department of Neutron Measurement/Research assistant               |
|                        | Zhang Peishu          | 1935          | 1963.05.15       | 1965.06.14    | 2 yrs. 1 mo.  | Assistant professor, IAE, CAS              | Laboratory of High Energy Physics, Synchrotron Department/Research assistant                     |
|                        | Zhang Peishu          | 1933          | 1963.05.15       | 1965.06.14    | 2 yrs. 1 mo.  | Assistant professor, IAE, CAS              | Laboratory of Neutron Physics, Department of Neutron Measurement/Research assistant               |
| Year (Number of people) | Name              | Year of birth | Dispatching date | Returning date | Duration   | Qualifications upon dispatch | Laboratories/positions at the JINR                      |
|-------------------------|-------------------|---------------|------------------|----------------|------------|------------------------------|--------------------------------------------------------|
|                         | Li Datu           | 1934          | 1963.09.25       | 1965.06.14     | 1 yr. 9 mos.| Assistant professor, IAE, CAS | Laboratory of Theoretical Physics, Department of Computer/Research assistant |
|                         | Li Da-Ty Wang     | 1936          | 1963.09.25       | 1965.06.14     | 1 yr. 9 mos.| Assistant professor, IAE, CAS | Laboratory of Neutron Physics, Department of Neutron Measurement/Research assistant |
|                         | Nengming Wang     | 1925          | 1964.01.03       | 1964.12.28     | 1 yr.      | Deputy chief engineer, Nanjing Electric Power Transmission | Laboratory of Neutron Physics, Department of Neutron Measurement/Engineer |
|                         | 韦国敏            | 1927          | 1964.01.03       | 1964.12.28     | 1 yr.      | Technician and engineer, IAE, CAS | Laboratory of Neutron Physics, Department of Neutron Measurement/Engineer |
|                         | 周启章            | 1920          | 1964.01.03       | 1964.06.23     | 6 mos.     | Deputy chief engineer, IAE, CAS | Laboratory of Neutron Physics, Department of Neutron Measurement/Engineer |
|                         | Zhang Peizhu      | 1932          | 1964.03.12       | 1965.06.14     | 1 yr. 3 mos.| Assistant professor, IAE, CAS | Laboratory of High Energy Physics, Department of New Science and Technology/Research assistant |
|                         | 朱芝仙            | 1935          | 1964.03.12       | 1965.06.14     | 1 yr. 3 mos.| IAE, CAS                     | Laboratory of Nuclear Problems, Department of Nuclear Spectroscopy/Research assistant |
|                         | Чжу Цзин-Сянь     | 1930          | 1964.09.11       | 1965.06.14     | 9 mos.     | IAE, CAS                     | Laboratory of Theoretical Physics, Department of Computational Mathematics and Computer/Researcher |
|                         | Li Chi            | 1926          | 1964.09.11       | 1965.06.14     | 9 mos.     | IAE, CAS                     | Laboratory of High Energy Physics/Researcher          |
| Year (Number of people) | Name                  | Year of birth | Dispatching date | Returning date | Duration | Qualifications upon dispatch | Laboratories/positions at the JNR                          |
|-------------------------|-----------------------|---------------|------------------|--------------|----------|-------------------------------|-----------------------------------------------------------|
| 1964 (13)               | Liu Guangyu?          | 1934          | 1964.09.11       | 1965.06.14   | 9 mos.   | Engineer, IAE, CAS             | Laboratory of High Energy Physics, Department of Electric Power Technology/Engineer |
|                         | Лю Гуан-Ю            |               |                  |              |          |                               |                                                           |
|                         | Liu Qingqian          |               |                  |              |          |                               |                                                           |
|                         | 刘清前               |               |                  |              |          |                               |                                                           |
|                         | Лю Цин-Цин            | 1935          | 1964.09.11       | 1965.06.14   | 9 mos.   | Assistant professor, IAE, CAS  | Laboratory of Theoretical Physics/Research assistant     |
|                         | Ren Gengwei           | 1934          | 1964.09.11       | 1965.06.14   | 9 mos.   | Assistant professor, IAE, CAS  | Laboratory of Theoretical Physics/Research assistant     |
|                         | 任庚未               |               |                  |              |          |                               |                                                           |
|                         | Жэнь Гэнь-Вэй         | 1934          | 1964.09.11       | 1965.06.14   | 9 mos.   | Assistant professor, IAE, CAS  | Laboratory of Theoretical Physics/Research assistant     |
|                         | Yang Shande           |               |                  |              |          |                               |                                                           |
|                         | 杨善德               |               |                  |              |          |                               |                                                           |
|                         | Ян Шань-Дэ            | 1935          | 1964.09.11       | 1965.06.14   | 9 mos.   | Assistant professor, IAE, CAS  | Laboratory of Theoretical Physics/Research assistant     |
|                         | Yao Hanbin?           | 1935          | 1964.09.11       | 1965.06.14   | 9 mos.   | Assistant professor, IAE, CAS  | Laboratory of Theoretical Physics/Research assistant     |
|                         | 雅汉斌               |               |                  |              |          |                               |                                                           |
|                         | Яо Хэнь-Пин           | 1936          | 1964.09.14       | 1965.06.14   | 9 mos.   | Assistant professor, IAE, CAS  | Laboratory of Nuclear Problems/Research assistant        |
|                         | Zhang Daomin          | 1936          | 1964.09.14       | 1965.06.14   | 9 mos.   | Assistant professor, IAE, CAS  | Laboratory of Nuclear Problems/Research assistant        |
|                         | 张道民               |               |                  |              |          |                               |                                                           |
|                         | Чжан Дао-Мин          | 1935          | 1964.09.14       | 1965.06.14   | 9 mos.   | Assistant professor, IAE, CAS  | Laboratory of Nuclear Problems/Research assistant        |
|                         | Chen Maobai           | 1935          | 1964.09.14       | 1965.06.14   | 9 mos.   | Assistant professor, IAE, CAS  | Laboratory of Nuclear Problems/Research assistant        |
|                         | 陈茂柏               |               |                  |              |          |                               |                                                           |
|                         | Чэнь Мао-По           | 1939          | 1965.01.20       | 1965.06.14   | 5 mos.   | Assistant professor, IAE, CAS  | Laboratory of Nuclear Reactions, Accelerator Department/Research assistant |
|                         | Hu Jianzhong          | 1933          | 1965.01.20       | 1965.06.14   | 5 mos.   | Assistant professor, IAE, CAS  | Laboratory of Nuclear Reactions, Accelerator Department/Research assistant |
|                         | 胡建忠               |               |                  |              |          |                               |                                                           |
|                         | Ху Цин-Чжун           | 1933          | 1965.01.20       | 1965.06.14   | 5 mos.   | Assistant professor, IAE, CAS  | Laboratory of Nuclear Reactions, Accelerator Department/Research assistant |
|                         | Liu Zhiying           | 1933          | 1965.01.20       | 1965.06.14   | 5 mos.   | Engineer, IAE, CAS             | Laboratory of Neutron Physics/Research assistant         |
|                         | 刘志英               |               |                  |              |          |                               |                                                           |
|                         | Лю Чжин-Ин           | 1937          | 1965.01.20       | 1965.06.14   | 5 mos.   | Assistant professor, IAE, CAS  | Laboratory of Neutron Physics, Department of Radio Electronics/Research assistant |
|                         | Lu Songlin            |               |                  |              |          |                               |                                                           |
|                         | 卢松林               |               |                  |              |          |                               |                                                           |
|                         | Lu Sun-Lin            |               |                  |              |          |                               |                                                           |
| Year (Number of people) | Name                      | Year of birth | Dispatching date | Returning date | Duration | Qualifications upon dispatch | Laboratories/positions at the JINR |
|------------------------|---------------------------|---------------|------------------|---------------|----------|-------------------------------|-----------------------------------|
| 1965 (11)              | Ma Zhongqian             | 1933          | 1965.01.20       | 1965.06.14    | 5 mos.   | Assistart professor, IAE, CAS | Laboratory of Nuclear Reactions, Department of Science Experiment/Research assistant |
|                        | Ma Цун-Чен               |               |                  |               |          |                               | Laboratory of Nuclear Reactions, Accelerator Department/Engineer |
|                        | Qiao Qingwen             |               |                  |               |          |                               |                                   |
|                        | Цяо Цин-Вэн               | 1935          | 1965.01.20       | 1965.06.14    | 5 mos.   | Engineer, IAE, CAS            | Laboratory of Nuclear: Problems/Research assistant |
|                        | Shang Zhenkui            |               |                  |               |          |                               |                                   |
|                        | Шан Цин-Куй               | 1937          | 1965.01.20       | 1965.06.14    | 5 mos.   | Assistart professor, IAE, CAS | Laboratory of Nuclear: Problems/Research assistant |
|                        | Wang Changru             |               |                  |               |          |                               |                                   |
|                        | 王长儒                   | 1934          | 1965.01.20       | 1965.06.14    | 5 mos.   | Assistart professor, IAE, CAS | Laboratory of Nuclear: Problems/Research assistant |
|                        | Ван Чэн-Жу               |               |                  |               |          |                               |                                   |
|                        | Yae Zewu                 | 1936          | 1965.01.20       | 1965.06.14    | 5 mos.   | Assistart professor, IAE, CAS | Laboratory of Neutron Physics, Department of Neutron Measurement/Research assistant |
|                        | Яо Цзэ-У                 |               |                  |               |          |                               |                                   |
|                        | Zhang Guangyang          | 1937          | 1965.01.20       | 1965.06.14    | 5 mos.   | Assistart professor, IAE, CAS | Laboratory of Neutron Physics, Department of Neutron Measurement/Senior researcher |
|                        | 郑光阳                   |               |                  |               |          |                               |                                   |
|                        | Чжан Гуан-Ян              | 1931          | 1965.01.20       | 1965.06.14    | 5 mos.   | Assistart professor, IAE, CAS | Research assistant (perhaps engaged in experimental neutron physics in the Laboratory of Neutron Physics) |
|                        | Zheng Zhihao             |               |                  |               |          |                               |                                   |
|                        | 郑志豪                   |               |                  |               |          |                               |                                   |

Note: The numbers of Chinese scientists in different laboratories: Laboratory of Theoretical Physics: 27; Laboratory of High Energy Physics: 32; Laboratory of Neutron Physics: 30; Laboratory of Nuclear Problems: 5; Laboratory of Nuclear Reactions: 19; others: 1. Total: 143.
(Some of the scientists were assigned to multiple laboratories during different periods of time. The statistics are based on actual conditions. For the calculation of months, decimal fractions smaller than 0.5 are omitted and all others are counted as 1.)
This list was compiled based on the JINR archives.