UNIVERSITY CENTRE

In 2004, the JINR University Centre (the UC) continued to work within the framework of the first-priority topic «Organization, Maintenance and Development of the University-Type Educational Process at JINR». The main aims of the topic in 2004 were the following:

- Support and development of the study process at the UC;
- Organization and conduction of international schools for students and postgraduates;
- Organization and conduction of specialized practice for students from higher education institutions of JINR Member States;
- Development of cooperation with international Funds (DAAD, EMSPS, etc.) for organizing student and postgraduate exchanges between the UC and research centres regulated by special agreements;
- Development of the specialized training of highly skilled specialists for JINR Member States;
- Organization of bilateral supervision of postgraduates by scientists of JINR and its Member States;
- Establishment of a modern PC-farm for studying Grid technologies.

JINR's educational activities are coordinated by the UC Council under the chairmanship of JINR Vice-Director Professor A. Sissakian.

The Programme of JINR's Educational Activity Development for 2003–2009, which was worked out in 2002, got further elaboration. It is based upon the concept of continuous education. The education system aimed at turning out highly skilled young specialists begins with attracting secondary school students to the studies on the basis of a special laboratory practicum.

Graduate students of Moscow Engineering Physics Institute (MEPhI), Moscow Institute of Physics and Technology (MIPT), and a number of higher education institutions in Russia and JINR Member States attend at the UC full-time programmes during the final two or three years of their studies. Their curricula are prepared jointly with their home departments and expanded to reflect the following fields of research carried out at JINR Laboratories: nuclear physics, elementary particle physics, condensed matter physics, theoretical physics, technical physics, and radiobiology.

Table 1 shows the distribution of the UC students over their home institutions as of 2004.

Table 1

Higher education institution	Number of its students at the UC in 2004
Moscow State University (MSU)	27
Moscow Engineering Physics Institute (MEPhI)	9
Moscow Institute of Physics and Technology (MIPT)	24
Institutions of other JINR Member States (Armenia, Belarus, Russia, Ukraine)	29
Total	89

Also on the basis of the UC, 155 students of Moscow Institute of Radiotechnology, Electronics, and Automation (MIREA) attend full-time programmes at the Department of the Electronics of Physics Installations and Department of Information Technologies for Computation Systems.

The courses offered at the UC include Elementary Particle Physics, Relativistic Nuclear Physics, Theory of Fundamental Interactions, Theory of Nuclear Reactions, Atomic Nucleus Structure, Introduction to the Theory of Accelerators, Experimental Nuclear Physics, Standard Model, Modern Methods of Detecting Nuclear Reactions and Nuclear Radiation, Programmable Logical Units, Digital Units and Their Applications, Electronic Methods of Detecting Ionizing Radiation, Radiation Safety and Environment Protection, Mathematical Statistics, Object-Oriented Programming in C++, Computing in High Energy Physics, Internet Technolo-

gies, Database Management Systems, Telecommunication Systems and World Information Resources, English for Students, and English for Postgraduates.

Within semesters, the UC offers additional short lecture courses on modern achievements in physics and related areas to its students and postgraduates. These courses form the lecture cycle «Modern Problems of Natural Sciences». In 2004, the following lectures were given within this cycle:

• F. Dydak (CERN), «Neutrino Oscillations: Status and Prospects»;

• D. Blaschke (Rostock University and Bogoliubov Laboratory of Theoretical Physics, JINR), «Contemporary Problems in the Quantum Field Theory of Dense Nuclear/ Quark Matter».

The list of the UC's publications for its students and postgraduates extended to include the following textbook:

• *Kazakov D. I.* Supersymmetric Generalization of the Standard Model of Fundamental Interactions. Dubna: JINR, 2004.

Noted should be the active participation of JINR's scientists in the educational process. In 2004, the UC's faculty numbered more than 40.

The JINR Educational Programme is realized and developed in close cooperation with Russia's leading higher education institutions. The UC has agreements on cooperation in education with a number of higher education institutions of Russia and JINR Member States, including MEPhI; MIPT; Moscow Power Engineering Institute; MIREA; A. Sakharov State Ecological University in Minsk (Belarus); Belgorod State University; Lipetsk State Technical University; Tula State University; P. Sukhoi State Technical University in Gomel (Belarus); Belarus State University; T. Shevchenko National University in Kiev (Ukraine); Yerevan State University (Armenia); Sofia University (Bulgaria); N. Rilsky State South-Western University (Blagoyevgrad, Bulgaria); International Postgraduate Studies at the Institute of Nuclear Physics (Krakow, Poland); and the Czech Technical University in Prague (the Czech Republic).

On the basis of the UC, JINR offers postgraduate programmes in the following ten specialties:

01.04.16 — Nuclear and Elementary Particle Physics;

01.04.02 — Theoretical Physics;

01.01.20 — Charged Particle Beam Physics and Accelerator Techniques;

01.04.23 — High Energy Physics;

01.04.07 — Solid State Physics;

01.01.07 — Computational Mathematics;

01.04.01 — Physics Experiment Techniques, Instrument Physics, and Physics Research Automation;

05.13.11 — Mathematical and Software Support of Computers, Computational Complexes, and Networks;

05.13.18 — Mathematical Modelling, Numerical Methods, and Software Complexes;

03.00.01 — Radiobiology.

In 2004, JINR's total postgraduate enrolment was 69. Table 2 shows the distribution of the postgraduates over the JINR Laboratories.

The distribution of the postgraduates over the specialties is shown in Table 3.

Table 2

JINR Laboratory	Number of postgraduates, 2004
Bogoliubov Laboratory of Theoretical Physics	19
Dzhelepov Laboratory of Nuclear Problems	13
Flerov Laboratory of Nuclear Reactions	6
Veksler and Baldin Laboratory of High Energies	11
Frank Laboratory of Neutron Physics	6
Laboratory of Particle Physics	4
University Centre	2
Laboratory of Information Technologies	7
Division of Radiation and Radiobiological Research	1
Total	69

Table 3

Specialty	Number of postgraduates, 2004
Nuclear and Elementary Particle Physics	29
Theoretical Physics	10
Charged Particle Beam Physics and Accelerator Techniques	1
Solid State Physics	3
Physics Experiment Techniques, Instrument Physics, and Physics Research Automation	10
Mathematical and Software Support of Computers, Computational Complexes, and Networks	2
Mathematical Modelling, Numerical Methods, and Software Complexes	5
High Energy Physics	1
Radiobiology	1

Up to now, 150 people have completed the JINR postgraduate programmes. The UC postgraduates are

active in scientific research and report their work to seminars and conferences at JINR and other research institutes in Russia and JINR Member States. Twenty-one of those who completed UC postgraduate programmes defended their Candidate's theses.

On 7 June, the UC hosted the seminar «Modern Physics Paradigm: Relation between Physics, Metaphysics, and Mathematics». It was held to continue and extend a course of the history of philosophy given to the UC postgraduates, but also attracted JINR's scientists. As lecturers, invited were Professors and Associate Professors of MSU. Summing up the seminar, all the speakers, especially those of MSU, stressed the importance and necessity of holding such seminars.

Keeping in line with JINR's international character, the UC actively develops its international cooperation. Especially busy are the UC's relations with universities of Belarus, Bulgaria, the Czech Republic, Poland, Romania, Russia, Slovakia, and Ukraine. On the basis of the UC, institutes and universities of JINR Member Sates unite their efforts in education activities. In 2004, the UC was visited by 72 students from Poland, 14 students from the Czech Republic, 9 secondary school students from Germany, 12 secondary school students from Poland, 5 students from Slovakia, 10 students from Romania, and 6 students from Bulgaria. Besides coming for acquaintance visits to the JINR Laboratories, the students attended the physics practicum and participated in research carried out at JINR.

One of the UC's missions is the organization and conduction of international scientific schools and training courses. For students and postgraduates from both the UC and JINR Member States, schools, which have now become regular, proved to be very useful. Those are the School in Memory of B. Pontecorvo and International Student School on Nuclear Physics Methods and Accelerators in Biology and Medicine.

In 2004, for the first time in its history, the UC hosted a Summer Student Practice in JINR Fields of Research, which was organized jointly with the Czech Technical University in Prague, Adam Mickiewicz University (Poznan, Poland), and MEPhI. The Practice was attended by 36 students, who came from Bulgaria (4), Czech Republic (9), Poland (11), Romania (4), Russia (2), Slovakia (4), and Ukraine (2). They were selected on a competitive basis.

The main aim that the International Practice organizers set before themselves was active involvement of students in the work of experimental and theoretical research teams at JINR's facilities. Therefore, the Practice was arranged in such a way that in the morning the students attended lectures, and in the afternoon they worked with research teams at JINR's Laboratories.

During the last ten days of the Practice, its participants, as envisaged by the Practice programme, attended the International Student School on Selected Issues of Theoretical Nuclear Physics, which was held on July 20–29 at the Bogoluibov Laboratory of Theoretical Physics and dealt with the results of the latest research into nuclear structure and nuclear reactions, theoretical methods, and their use in astrophysics and mesoscopic systems. As lecturers, besides the JINR's leading specialists, invited were well-known scientists of the Czech Republic, Germany, Russia, and Ukraine. The School programme included the following topics: nuclear excitations at different energies, nuclear structure and nuclear reactions at the stability border, astrophysical aspects of nuclear structure, double beta-decay and the neutrino mass problem, and hypernuclei. Much attention was also paid to the study of the properties of radioactive nuclei and the reaction mechanisms through which they are produced, including the fusion reactions leading to the formation of massive nuclear systems. On 20 July — the day of the School opening — Academician Yu. Oganessian gave a lecture on superheavy elements.

All the Practice participants submitted written reports on their work under supervisors at the Laboratories and received certificates from the Organizing Committee.

During their stay in Dubna, all the students were acquainted with JINR's Laboratories: they saw the Central Computing and Information Complex at the Laboratory of Information Technologies, medical beams at the Dzhelepov Laboratory of Nuclear Problems, and experimental facilities at the Frank Laboratory of Neutron Physics and Dzhelepov Laboratory of Nuclear Problems. They also visited MEPhI, where they were shown the NEVOD facility.

One would be right to say that the Summer Student Practice in JINR Fields of Research has become another step towards the development of the system of student schools and conferences and offered its participants a unique opportunity not only to attend a lecture course but also to be immediately involved in actual research performed at JINR's Laboratories.

Specially noted should be the development of the UC's contacts with Polish universities. The Bogoliubov–Infeld Programme was established to support Polish universities' and JINR's initiatives in working out and realizing educational projects. The UC's and Polish students and postgraduates exchange visits and participate in schools and conferences held both in Dubna and in Poland. The results of these activities were evaluated at a seminar in Poznan on 23 October 2004. The Polish students who attended the UC-based Summer Student Practice in JINR Fields of Research reported their research work to the seminar. They also appraised another practice of 2004 — the one that was hosted by the Frank Laboratory of Neutron Physics and received organizational support from the UC. It was attended by students of the Adam Mickiewicz University (Poznan, Poland), Ural Polytechnic Institute (Yekaterinburg, Russia), and Bucharest University (Romania).

In September 2004, a three-week practice was organized for Romanian students and a week's prac-

tice for Czech students, which went off very successfully.

This activity of the UC was supported by the Autumn Sessions of the JINR Programme Advisory Committee (PAC). Marked was the great success of these courses organized on the UC's initiative in cooperation with JINR Laboratories. The efforts by the laboratory staff who contributed to the education and training were much appreciated. PAC recommends continuation of these courses and considers this activity to be important for promoting contacts with Member States and for attracting young people to JINR.

It should be noted that these activities were financially supported by the Plenipotentiaries of the concerned JINR Member States.

On 23 November, a meeting took place at the UC between the authorities of the Bogoliubov–Infeld Programme and members of JINR's Polish staff. Opinions were exchanged on expanding the UC's collaboration with higher education institutions of Poland and other JINR Member States and broadening their involvement in JINR's educational and research activities.

In 2004, efforts were continued to involve postgraduates and students in the UC's international scientific and educational projects. The UC, together with Lund University (Sweden), St. Petersburg University, the National Institute of Chemical Physics and Biophysics (Estonia) and Tartu University (Estonia), got a grant from the joint Visby Research Programme «Collaboration in Internet-Based Technologies for Education and Science between Estonian, Russian and Swedish Institutions» (Swedish Institute, contract No. 01657/2004). Within the framework of this grant, a UC postgraduate worked for two months at Lund University and studied there Grid technologies. This experience will allow him to begin preparing a practical course for the UC students and postgraduates, which will be based on the UC's special PC-farm intended for training specialists in Grid technologies.

In 2004, prolonged was a joint project by the UC and the Institute of Theoretical Physics of Giessen University (Germany), which is supported within the Leonard Euler Scholarship Programme of the German Academic Exchange Service (DAAD). Three students of the UC specializing in theoretical heavy ion physics had additional scholarship during an academic year.

Two students of the UC-based Department of High Energy Particle Interaction, MIPT, attended the CERN Summer School, which was held on 1 July — 1 September 2004.

A student of the University of Applied Sciences in Ravensburg–Weingarten, Germany, had a practice at the Flerov Laboratory of Nuclear Reactions from 15 March to 31 August 2004.

In 2004, the UC continued the training, retraining, and improvement of the qualifications of working staff and specialists (more than 300 peoples were trained).

The UC-based courses training entrants to MEPhI continued to function in 2004. In Academic Year 2004–2005, their enrolment was 12 students of the city's secondary schools. Eleven of those who completed the courses held throughout Academic Year 2003–2004 entered MSU, MEPhI, Moscow Aviation Institute, and Dubna University.

The UC has a special laboratory for demonstrating experiments in physics to secondary school students.

On 18–30 January 2004, twelve Polish graduation-class students of secondary schools and their teachers were on a visit to the UC. They came from the cities of Leszno, Lublin, Poznan, and Swinoujscie. The visit was organized within the Bogoliubov–Infeld Programme for winners and prizemen of different school contests in physics. A special educational programme had been prepared for them, which included both lectures on physics and performance of laboratory exercises of the UC's specialized physics practicum for secondary school students.

From January 2005 on, a new exercise of the UC physics practicum will be offered, «Correlation Gamma Spectroscopy in Nuclear Physics Research Using Scintillation Detectors Based on NaI(Tl) Crystals».

On 30 June — 11 July 2005, the Third International Student School on Nuclear Physics Methods and Accelerators in Biology and Medicine will be held in Dubna. It is planned as another school within the cycle of the UC-based summer student schools. By an already formed tradition, it will be attended by students and postgraduates of Belarus, Bulgaria, the Czech Republic, Germany, Poland, Romania, Russia, Slovakia, and Ukraine.

The participants will be selected on the basis of the reports on their research work, which will be presented at special student sessions.

As lecturers, invited are specialists in applied medical physics of Russia, Poland, the Czech Republic, Slovakia, and Switzerland.

Information on the previous International Student Schools on Nuclear Methods and Accelerators in Biology and Medicine is available at the UC's Internet site, http://uc.jinr.ru/SummerSchool/, and http://uc.jinr.ru/2SummerSchool/.

In 2004, published were the Proceedings of the Second International Student School «Nuclear Physics Methods and Accelerators in Biology and Medicine» (Poznan, Poland, 19–30 July 2003) — JINR, E18-2004-63.

On 12 July — 4 August 2005, according to the Topical Plan for JINR Research and International Cooperation, the UC, Adam Mickiewicz University (Poznan, Poland), Czech Technical University in Prague, Bratislava Technical University, MEPhI, MIPT, and MSU will jointly hold in Dubna a Summer Student Practice in JINR Fields of Research.

Scientists and postgraduates of the UC, jointly with scientists of the Bogoliubov Laboratory of Theoretical Physics (a Sector headed by R. Jolos) and Giessen University (Germany) have been studying for many years

the interactions between heavy ions and nuclei. This activity has been supported by DAAD grants. The results were reported to the International Conference NUCLEUS-2004.

In 2004, reports on the JINR Educational Programme were presented at the —

• international conference EXON-2004, Peterhof, Russia, 5–12 July 2004;

• workshops at Krakow, Opole, and Kielce, Poland, October 2004.

The UC's Internet site (http://uc.jinr.ru) has been regularly updated.