

UNIVERSITY CENTRE

2005 marks the completion of the first 15 years of the JINR University Centre (the UC) existence, which may well be a reason for reviewing some of its achievements.

During its existence, the UC has become a JINR subdivision that actively cooperates with higher education institutions of JINR Member States and carries a mission of turning out young scientists and engineers. This activity resulted in a decrease in the average age of research staff at the JINR Laboratories, especially the Bogoliubov Laboratory of Theoretical Physics and Dzhelpev Laboratory of Nuclear Problems, where great importance is attached to the support of young specialists.

The UC's activity aimed at students and postgraduates, which is partly carried out at the expense of the means provided by the Plenipotentiaries of JINR Member States, has raised the interest in research performed at JINR of students and postgraduates of the following JINR Member States: Bulgaria, the Czech Republic, Poland, Romania, and Slovakia; and increased the number of young researchers in the national teams of these countries. Noted should be the role of the above Member State teams in this activity.

The rightness of the UC's strategic development has been confirmed by an increase in the number of grants to the UC from JINR Member State plenipotentiaries over the years. Thus the UC received grants from the plenipotentiaries of the following countries:

- 2000: Poland;
- 2002: the Czech Republic and Poland;
- 2005: Bulgaria, the Czech Republic, Poland, Romania, and Slovakia.

During the reported year, the UC postgraduates made more than ten reports to major international conferences. The UC postgraduates and alumni are among the JINR prize winner teams.

The UC readily responds to the proposals of new projects in education and itself offers new agreements on cooperation with higher education institutions of the

JINR Member States, and promotes their conclusion. In 2005, the following agreements and protocols were signed:

- a protocol of intentions with the Institute of Nuclear Physics at the National Nuclear Research Centre, the Republic of Kazakhstan;
- a protocol with Uppsala University, Sweden (under preparation);
- a protocol on academic exchanges between the UC and the Institute of Theoretical Physics, Chinese Academy of Sciences;
- a protocol on academic exchanges between the UC and Beijing University of Technology.

An announcement that a special programme of preparing young physicists for work on the CMS project (an initiative by Prof. I. Golutvin, Head of RDMS CMS) met a lively response among students and young scientists. A first group of students have been selected on a competitive basis; they have already started attending a special curriculum.

The development of the JINR postgraduate studies is an important component of training highly skilled specialists. Over the past five years, 66 completed the JINR postgraduate programmes; 43 of them were taken on the JINR staff.

The UC carries out its regular activities according to the goals set by the JINR Plan for Research and Cooperation (Topic 1026-98/2008 headed by A. Sissakian and S. Ivanova) and resolutions of the Sessions of the JINR Scientific Council and Programme Advisory Committees for Nuclear and Condensed Matter Physics.

The UC Council headed by Prof. A. Sissakian plays an important role in coordinating the JINR-based educational programmes.

Graduate students of Moscow Engineering Physics Institute (MEPI), Moscow Institute of Physics and Technology (MIPT), and a number of higher education institutions of Russia and JINR Member States attend at the UC full-time programmes during the final

two years of their studies. Their curricula are prepared jointly with their home departments and expanded to reflect the fields of research carried out at the JINR Laboratories.

Table 1 shows the distribution of the UC students over their home institutions as of 2005.

Table 1

Higher education institution	Number of its students at the UC in 2005
Moscow State University (MSU)	17
Moscow Engineering Physics Institute (MEPI)	13
Moscow Institute of Physics and Technology (MIPT)	24
Institutions of JINR Member States (Armenia, Belarus, Russia, Ukraine)	46
Total	100

Also on the basis of the UC, 192 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 UC's equipment has been improved. In 2005, a local computer infrastructure was established on the basis of the UC's resources to teach Grid technologies. The UC cluster includes a P4 computer (2.4 GHz, 512 MB RAM, and a disk of 80 GB) and five P4 computers (3 GHz, 1 GB RAM, and a disk space of 2×80 GB). The computers of the cluster are run under Linux Red Hat 9.0. The operating system was extended to solve, in particular, the following tasks:

- teaching users to work in a Grid environment;
- teaching Grid technologies to system administrators;
- debugging Grid services in various Grid environments.

Within the framework of the LCG and EGEE projects, the UC cluster hosted Grid technology classes for students and courses for Grid users and Grid system administrators.

In 2005, the equipment of one of the UC's four computer classrooms was upgraded: installed were eight Celeron computers (2.8 GHz, 512 MB RAM).

In 2005, the following lectures were given within the cycle «Modern Problems of Natural Science»:

- Prof. G. Stratan (Romania). Einstein: a Person, a Thinker, a Public Figure.
- Prof. V. Pervushin (BLTP, JINR) and Prof. A. Zakharov (ITEP). Frames of Reference in the General Theory of Relativity and the Tomography of the Universe.
- Prof. V. Naumov (BLTP, JINR). Cosmic Rays and Neutrino.

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

Ivanov I. N. and Trubnikov G. V. Introduction to the Theory of Accelerators (YHLI-2005-28, in Russian).

The traditional ties between the UC and the following higher education institutions have been actively developing on the grounds of the agreements on co-operation: MEPI, MIPT, Moscow Institute of Power Engineering, MIREA, Sakharov State Ecological University in Minsk (Belarus), Belgorod State University, Lipetsk State Technical University, Tula State University, Sukhoi State Technical University in Gomel (Belarus), Belarus State University, Shevchenko National University in Kiev (Ukraine), Yerevan State University (Armenia), Sofia University (Bulgaria), Rilsky State South-Western University (Blagoyevgrad, Bulgaria), Plovdiv State University (Bulgaria), the International Postgraduate Studies at the Institute of Nuclear Physics (Krakow, Poland), and the Czech Technical University in Prague (the Czech Republic).

In 2005, the UC-based Department of High Energy Particle Interaction Physics at the Faculty of General and Applied Physics, Moscow Institute of Physics and Technology (Head of Research: Prof. A. Sissakian, JINR Vice-Director; Head of the Department: Prof. G. Shelkov, Chief of the Division of Counter-Beams at the Laboratory of Nuclear Problems), turned out 13 Masters of Science. During 13 years of its existence, 46 of its graduates took a job at JINR.

The Regulations on Students' Practical Work, which were accepted in 2005, will allow students to be immediately involved in the realization of the most important parts of the Institute's research programme. Due to the change of generations, required is a detailed analysis of the Laboratories' needs of specialists in the most topical fields of research. Additional opportunities of attracting students to this research must be looked for. In particular, the International Summer Student Practice in JINR Fields of Research is designed to play this role. In 2005, a second Practice was held.

The Second International Summer Student Practice in JINR Fields of Research (12 July – 4 August) marked the end of the summer practice period. Thirty-eight students selected on a competitive basis attended the Practice. They came from the Czech Republic (13), Poland (8), Romania (7), Slovakia (6), Belarus (2), Bulgaria, and Russia.

The Practice programme included lectures and work at the following JINR Laboratories and subdivisions: DLNP, LIT, FLNP, FLNR, SCAR, and the UC.

An excursion was organized to the NEVOD research facility at MEPI. During the second half of the Practice, its participants also attended the International Summer School on Nuclear Theory and Astrophysical Applications.

At the end of the Practice, all its participants prepared the reports that were presented in the Czech Re-

public and Poland at the autumn seminars on the Practice.

In 2005, the JINR postgraduate programmes continued to function in ten specialties of physics and mathematics. The 2005 JINR total postgraduate enrolment was 66. Table 2 shows the distribution of the UC postgraduates over the JINR Laboratories.

Table 2

JINR Laboratory	Number of postgraduates
Bogoliubov Laboratory of Theoretical Physics	18
Dzhelepov Laboratory of Nuclear Problems	18
Flerov Laboratory of Nuclear Reactions	4
Veksler and Baldin Laboratory of High Energies	9
Frank Laboratory of Neutron Physics	4
Laboratory of Particle Physics	3
University Centre	1
Laboratory of Information Technologies	8
Laboratory of Radiation Biology	1
Total	66

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

Table 3

Specialty	Number of postgraduates
Nuclear and Elementary Particle Physics	26
Theoretical Physics	17
Charged Particle Beam Physics and Accelerator Techniques	1
Solid State Physics	3
Physics Experiment Techniques, Instrument Physics, and Physics Research Automation	9
Mathematical Support of Computers, Computing Complexes, and Networks	1
Mathematical Modelling, Numerical Methods, and Software Complexes	7
High Energy Physics	1
Radiobiology	1

Up to now, 163 people have completed the JINR postgraduate programmes. In 2005, there were 15 postgraduates at the UC from JINR Member States (seven from Armenia, four from Belarus, three from Ukraine, and one from Uzbekistan). Twenty-one have defended their Candidate's theses.

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 States unite their efforts in education activities. In 2005, JINR was visited by 68 students from Poland, 30 from the Czech Republic, nine from Romania, nine from Slovakia, seven from Belarus, six from Ukraine, four from Bulgaria, one from Italy, one from Uzbekistan, and eight secondary school students from Poland. Besides coming on acquaintance visits to the JINR Laboratories, the students took 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.

In 2005, a joint project was prolonged 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). In April–May, the UC Director, S. Ivanova, gave a course of theoretical atomic physics at Giessen University (Germany) in the capacity of an invited lecturer. At the 98th session of the JINR Scientific Council (2–3 June 2005), this cooperation was presented by Prof. W. Scheid and S. Ivanova at the Round Table «JINR's Cooperation with German Research Centres, Universities, Organizations, and Foundations in Science and Education» in the report «Giessen–BLTP–UC Collaboration in Nuclear Physics: Research and Education».

Of special note is the development of the UC's contacts with Polish universities. Thanks to the Bogoliubov–Infeld programme, JINR continues its active cooperation with Polish education institutions.

On 30 June – 11 July, the Third International Summer Student School on Nuclear Physics Methods and Accelerators in Biology and Medicine was held in Rattmino near Dubna. The School's traditional organizers are the UC, Adam Mickiewicz University (Poznan, Poland), the Czech Technical University in Prague, and MSU. The School's students came from Belarus, Bulgaria, the Czech Republic, Poland, Romania, Russia (MSU, MEPI, and Novosibirsk Institute of Nuclear Physics), Slovakia, and the UC. The first two schools were held in 2001 and 2003; they were highly appraised by students and postgraduates; so there was an influx of applications for attending the Third School. The most numerous delegations came from Poland, the Czech Republic, and MSU. For the first time, there were School participants from Bulgaria and Slovakia. The audience numbered 75 in all; there were 21 lecturers.

For the School participants' further work at their home institutions, most of the lectures, with the lecturers' kind permission, have been put up at the School's Internet site,

<http://uc.jinr.ru/3SummerSchool/lecture.html> .

Following the School tradition, students presented their research to the Student Sessions. This School had the greatest number of student reports. At the first School (2001), 12 reports were made; at the second (2003), 31; this time, the School audience members made 42 reports within the School subjects. By tradition, the best reports were selected by the audience themselves. The best three students were Kinga Maria Brzozowska (Institute of Nuclear Chemistry and Technology, Warszawa), Ewa Karolina Szykowna (AGH University of Science and Technology, Krakow), and Mariusz Pietrzyk (Jagiellonian University, Krakow).

The student reports will be published in the Proceedings of the School.

In the School participants' opinion, its programme was elaborated quite good. They found most of the lectures absorbing and useful. In their own words, they got a more generalized idea of the world and began to understand what, and for whom, is being done in this area of knowledge. To the organizers of the School, its most important result is its participants' intention to attend further schools and, which is yet more important, to come to JINR for practice and performing their diploma and dissertation theses.

In conclusion, the School organizers expressed their deep gratitude to the Plenipotentiaries of Belarus, Bulgaria, the Czech Republic, Poland, Romania, and Slovakia to JINR, who allotted special grants for the organization of the School. The School was also supported by a grant from the Russian Foundation for Basic Research.

The UC has a special laboratory for demonstrating experiments in physics to secondary school students. Two groups of the 10th- and 11th-year students of Dubna's secondary schools attend classes at the UC three times a week. They perform exercises of the laboratory practicum «Experimental Methods in a School Course of Physics».

In 2005, the UC continued the training, retraining, and improvement of the qualifications of working staff and specialists. JINR's five new staff were trained in allied professions; nine JINR's staff were trained in a second profession. At the JINR courses training personnel for facilities that are within the jurisdiction of the Federal Technical Inspection, 90 JINR's staff and 15 staff of Dubna's organizations were trained and certified. In 2005, 28 JINR's staff were trained and certified to operate and maintain machines, mechanisms, and pressurized vessels. Sixteen JINR's staff improved their qualifications at special seminars organized by education institutions in Moscow, St. Petersburg, Obninsk, and Ivanovo.

In 2005, 35 students of State Professional Lyceums No. 67 and 95 had practice in their specialties at JINR.

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

Reports on the JINR Educational Programme were presented to the —

- Fifth International Conference on Nuclear and Radiation Physics (Almaty, Kazakhstan, 26–29 September);
- Second Eurasian Congress on Medical Physics and Engineering «Medical Physics — 2005» (Moscow, 21–24 June);
- China Workshop on Heavy Ion Physics (7–9 December);
- seminars at Beijing University, Beijing University of Technology, Lanzhou University, and Heavy Ion Research Facility in Lanzhou (China, November–December).

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