KABARDINO-BALKARIAN STATE UNIVERSITY
ON THE WAY TO DYNAMIC DEVELOPMENT


КАБАРДИНО-БАЛКАРСКИЙ ГОСУДАРСТВЕННЫЙ
УНИВЕРСИТЕТ им.Х.М.БЕРБЕКОВА

KABARDINO-BALKARIAN STATE UNIVERSITY TODAY

Rector of KBSU
B.S. Karamurzov

The Kabardino-Balkarian State University (KBSU) was founded in Nalchik on the basis of teacher-training college, opened in 1932. For the services in training of highly qualified specialists and the development of research works the Kabardino-Balkarian State University was awarded the Order of Peoples' Friendship in 1982, in connection with its 50-th anniversary. On the 30-th of December 1996 the university was appropriated the name of its first Principal H.M. Berbekov, by the decree of the president of the Kabardino-Balkarian Republic (KBR), Kokov V.

The KBSU mission allows to position it as a Federal and regional educational, scientific and cultural center.

Nowadays, the Kabardino-Balkarian State University is one of the leading institutions oh higher education, which is testified by the fact that the KBSU takes the 11-12 places in popularity rating of universities in Russia for 2002, 11-13 places in popularity rating for 2003 and 10 places in popularity rating for 2004-2010.

Annually, the university turns out up to two thousand specialists and it takes the leading positions among other classical universities of the Southern Federal Region in the degree of equipping. Structurally the KBSU consists of 2 Institutes, 14 faculties, 6 colleges and lycee for gifted children, which permit to provide continuity of the content and organization of educational and scientific processes. Altogether, in all forms of education

The new building of KBSU

near 14500 people study at the university complex. For the last 14 years, a continuous system of education has been formed in the university: comprehensive programs are implemented in preschool establishment, in primary school, in the lycee for gifted children; the program of secondary professional education – in colleges; higher professional education – in faculties and institutes.

Classes at the Lyceum of KBSU

The KBSU implements the multi-stage and multi – step system of professional education: carries out training of the staff with secondary professional education on the basic and advanced levels in 37 specialties, training on programs of higher professional education in 43 specialties and 60 directions. The resolution of the Parliament of the Russian Federation dated the 10-th of September 1997 «On the reformation of the professional education system in the Kabardino-Balkarian Republic» became the legal basis of the introduction of the multi-stage system in the KBSU, in accordance with which 6 colleges and the Institute of Further Education (on the organizational legal basis of one body corporate) were included in the university.

Interns and attending physi cians are examining the patient

The more advanced way of formation of university complexes (on the basis of one body corporate) has been implemented in the KBSU. At the present time the problems of structural and organizational character have been solved: the administration of secondary professional education, the scientific- methodic center on secondary professional education at the Principal's office, Faculty office, organizing the work of 6 chairs and cyclical committee on humanitarian and socio-economic subjects of secondary professional education have been formed. Graduate students

of some colleges get higher education in shortened terms. The educational process in the KBSU is realized by 934 permanent workers, including 188 Doctors of Sciences, professors, and 618 associate professors. More than 500 teachers work at colleges and at the lycee. The university has postgraduate studies in 80 specialties, doctorate studies in 14 specialties, post graduate medical courses in 24 specialties and intern courses in 15 specialties.

Ballroom
Dance Ensemble «Callisto»

Educational and scientific base
of KBSU

The additional educational programs are implemented in the Institute of further education of teachers and retraining of teaching staff, in the regional center of further education and professional retraining of the staff, the faculty of further education of teachers of secondary and higher educational institutions, Educational methodological center of training and further education of professional accountants.

Students at the Internet Center

On the hillside Cheget

The participants of physics of extremum conditions international conference on the rock of Elbrus

Teachers, workers and students in the KBSU have various ways of access to the sources of information via one of the largest university centers of Internet in Russia; the resource center of providing of the unified educational informational area in the Kabardino-Balkarian Republic; the Kabardino-Balkarian center of the Internet Education Federation; the service computer center and specialized center of telemedicine.

In the laboratories of the x-ray diagnostics of materials

Professor Kh.B. Khokonov at apparatus «X-ray image amplifier»

In the library fund of the KBSU there are more than 1,5 million of units, including 2000 unique publications. The work on for mation of the unified informational library computer network of the university complex and on organization of the informational library complex of the university on the basis of new computer technologies has been carried out.

Nowadays the university complex comprises about 2.3. thousand computers. In high school the activities on development on the basis KBSU of a cluster of high-performance calculuss are completed, which one is be largest in the Southern Federal District (SFD) and enters number of 50 largest clusters of Russia.

The University was the participant of 6-th frame program of scientific researches and technological development of the European Union (FP6) (executed with the Parisian university), project PANDA, realizes the projects supported by the funds CRDF and DAAD.

The interuniversity regional center of international cooperation and academic mobility, registered in the list of the Ministry Education and Science Russian Federation (MES RF) is founded at the University.

Botanical garden of KBSU

At present time more than 500 foreign students from more than 20 countries are trained at the University. Geography of countries, which representatives are trained at the University, has extended lately. Students from Turkmenia, Netherlands, Finland, Romania, Great Britain have joined the multinational community of foreign students; the quantity of students from Southern Korea, Israel and Palestine has increased.

Contract signing in Ammansk university

Foreign students in computer class

One of the main political and strategic directions of the University is the increase of living- areas. In 2008 the construction of the second 68-apartment apartment house for the employees of the university was completed. KBSU is the only high school in Russia, which is possible to realize such program for its employees.

In 2011 the University open the construction of a sport complex of KBSU with a universal gym and swimming-pool of 25×10 m and renovation of a stadium attracting federal budget and extra-budget means of the University. The building of the information centre – library by the common area of 5200м^2 is being constructed, besides it is planned to achieve financing of the building of an educational-laboratory block of medical faculty of KBSU, which will include student's polyclinics, clinic of an odontology and plastic surgery and sanatorium-profilactory.

Recreation department
of KBSU in Abkhaziya

The Kabardino-Balkarian state university has a developed social infrastructure. The administration of KBSU supports the social field, having on balance two bases of recreation department and sanatorium-preventorium, where the students and workers and guests of the university have a possibility to rest and improve their health. A strategic line of a management of the university is the purposeful support of the ecological programs and unique natural objects.

Visit of KBSU in 2001
of Russian President V.V. Putin

SCIENTIFIC AND RESEARCH ACTIVITIES OF KABARDINO-BALKARIAN STATE UNIVERSITY

KBSU states its' mission as a federal centre of education, science, culture and information.

The main object for the leading research university is integration of science and education and the main problems to be focused on are: production of knowledge (science) and transmission of knowledge (teaching\ learning process).

Scientific activities of KBSU are aimed not only at acquisition of data about major trends of nature and society development, but also at implementation of new technologies and solution of social problems.

Scientific research and economics, provided that economic activity is reasonable, taken together, result in their mutual enrichment and thus support leading universities which still possess solid scientific potential.

Major trends of scientific and research work and KBSU innotation activities are outlined with the view of economic and resource capacities of the Federation, the South of Russia and the university and are adjusted to the profile of specialists' training at the Higher Educational Institution.

Scientific and research work at the university is carried out in 5 priority areas (8 are listed below) and in the field of 27 critical technologies, identified by the President of the Russian Federation.

KBSU most urgent scientific programmes:

- Nanophysics, nanochemistry, nanotechnology and nanomaterials;
- Geogonamics and Geophysics;
- Cosmology and Astrophysics;
- Energetics, including hydrogen energetics;
- Higher Molecular Compounds;
- Medical and Biological Research;
- History of the South of Russia and Culture of the peoples of the Northern Caucasus;
- Philology, including the native languages of KBR.

Traditionally KBSU has a high level of research in the field of physics of the surface and physics of inter-phase phenomena, electri-

cal chemistry, physical chemistry and biology. Various activities are carried out in the field of facio-mandibular surgery.

The following fields are also intensively investigated: biological variety of the Central Caucasus, mountain ecosystem and human health, aspects of individual development in the educational environment, scientific foundations of management of interrelations between a human being and environment. Social sciences are also developed.

International department of UNESCO at the university «Education and Upbringing in the spirit of Culture, Peace and Human Rights», Centre of Aesthetic Upbringing and Artistic Activities, Museum of History of KBSU, Publishing House, General Health Care and Dental Polyclinics, Botanical Garden, Ecological Station, Educational-Scientific Laboratory «Herbarium», Zoological Museum, Educational-Scientific complex in Prielbrusye with medical and biological centres are functioning at the university.

Scientific and Research work is carried out at all the departments; also, there are 4 Scientific and Research Institutions, Centre of Applied Anthropology, Centre of X-Ray Diagnostics of Materials. There are 52 laboratories. 8 of them are founded jointly with the Russian Academy of Science, 1 is a joint project with the National Ukraine Academy of Science.

The list of laboratories:

- Laboratory of Geodynamics (joint project with the Institute of Geomagnetic Studies of the Russian Academy of Science);
- Laboratory of Applied Geophysics (joint project with the Institute of Physics of the Russian Academy of Science);
- Laboratory of astrophysics and physics of cosmic rays (joint project with RAS);
- Laboratory of X-Ray difractometric methods of heterostructures;
- Laboratory of physics of extreme conditions (joint project with RAS);
- Laboratory of wave processes in heterogenic mediums (joint project with RAS);
- Laboratory of seismic monitoring;
- Laboratory of glaciology monitoring.

KBSU activities are aimed at integration of the university with the state institutions of academies of science and scientific organizations of the ministries and federal bodies of executive power.

This kind of joint scientific work results in scientific production of high level which is traditionally in demand directly or through scientific organizations which are university partners.

In the framework of agreements on cooperation KBSU has intensive connections with neutrino observatory in Baksan of the Institute of nuclear research of RAS, Joint Institute of Higher Temperatures of RAS, Institute of Chemical Physics of RAS, Botanical Institute in St. Petersburg named after V.L.Komarov.

Besides the institutions and affiliations of RAS, KBSU also cooperates with:

- Institute of Geochemistry and analytical Chemistry named after V.I. Vernadsky, RAS;
- Institute of element-organic compounds named after A.N. Nesmeyanov, RAS;
- Institute of Electrochemistry named after A.N. Frumkin, RAS;
- Institute of biophysical chemistry named after N.M. Emanuel, RAS;
- Institute of oil and chemical synthesis named after A.V. Topchiev, RAS;
- Institute of chemical physics named after N.N. Semionov, RAS and others.

Besides Russian Academy of Science, KBSU started research activities in the field of X-ray optics and synchrotron radiation with the National Academy of Ukraine. In the laboratory they carry out fundamental research in the field of Solid State Physics. It results in practical recommendations for the enterprises of electronic industry of Russia and Ukraine manufacture of semiconductor microelectronic devices.

Direct methods of research of semiconductor materials are employed, those the most perspective from the point of view of non-destruction analyses of hetero-structures and express ways of obtaining experimental data.

In 46 scientific areas qualified research personnel is employed: 3 academicians, 3 correspondent-members of RAS, 1 academician of RAO, 5 Merited Scientists of RF, 188 doctors of Science and 618 Candidates of Science, 18 Post-doctoral and 263 graduate students.

Permanent growth of financing of scientific research project is observed in KBSU.

In 2002 it was 30 mln. rbls, in 2011 it increased to 235 mln. rbls.

During the last 3 years fundamental research constituted 61 %, applied research equaled 25 % and 14 % – experimental work.

Unique scientific equipment is used at the University on a shared basis: the centre of X-ray Diagnostics of Materials (headed by Prof. Kh.B. Kushkhov) is urgent problems in areas of:

- Physics of condensed condition;
- Phase equilibrium;
- Chemistry of solids, melts and solutions;
- Processes of higher temperatures in chemistry and study of materials;
- Electrochemical synthesis of magnet solids on the basis of rare metals, non-platinum electrical catalysts for chemical sources of current and hydrogen energetics;
- Obtaining new Nan crystal metallic, ceramic, metal-ceramic and extra-hard materials.

The main objectives of the Centre of Shared Resources (CSR) are:

- Concentration of intellectual potential and material-technical basis;
- More effective usage of equipment;
- Participation of CSR in the projects of priority importance, fundamental and applied science, critical technologies of the federal level, expert work;
- Training of younger personnel and highly qualified staff;
- Professional development courses in the trend of work of CSR;
- Development of research methods and methods of educational process;
- Further development of equipment basis of CSR;

- Seminars, conferences and exhibitions reflecting major trends of work of CSR;
- Centre of Shared Resources incorporates;
- Laboratory X-Ray structural and X-Ray Phase analyses (research of crystal structure and phase composition);
- Laboratory of Spectroscopic methods (elementary analyses of substances and matter, special composition of non-organic, bio-organic, polymer and laboratory of electrical- chemical synthesis of nano – size powders and nano-crystal films of metal-like hard melting compounds and carbon nano- structures;
- Laboratory of electrical- chemical synthesis of magnet solids on the basis of rare metals.

Essential part of equipment of the Centre of Shared Resources was bought by university or acquired as awards: X-Ray difractometre, multifunctional electrical- chemical complex Autolab PGSTAT 30, impulse potentiostat P-50- I , potentiostat EF453, X-Ray fluorescent elementary analyst MAX –GV.

Centre of Shared Resources is open for collaboration with the university researchers and those of the Southern Federal District of Russia. It's equipment is used in Masters', Candidate and Doctoral Dissertations research and for students' laboratory practice for the courses: «Physical Methods of Research in chemistry», «Modern Methods of analysis», «Methods of research of electrochemical reaction», etc.

Ministry of Education of Russia included 10 departments of KBSU in the leading top-list:

- Physics of Inter-phase phenomena in multi-componential systems;
- History and culture of Northern Caucasus;
- Geodynamics and Geotectonic of Northern Caucasus area;
- Meteorology and Climatology;
- Applied geophysics and volcano studies;
- Physics of Surface Phenomena in Condensed media;
- Astrophysics and quantum theory of the field;
- Cosmology and Gravitation;

- Wave processes and resonance phenomena in multilayer non- homogeneous media.

Research of the Departments of physics of Inter-phase Phenomena in Multi-componential systems and History and culture of Northern Caucasus is financed from the federal Budget as winners of the Research support contest.

One of the priority trends of research development in KBSU is «Industry of nano-systems and materials» and critical technology of the federal level «Nanotechnology and Nanomaterials».

Namely, in 2006-2011 the research trends were:

1. Nanomaterials and nanostructures;
2. Inter-phase Phenomena in multi-componential systems, including nanosystems .
3. Morphology, structure and nano- size non- homogeneity of micro channel plates.
4. Mechanisms of electrochemical synthesis of carbon nanotubes, nano-size powders and nano-crystal films of functional and construction materials on the basis of hard- melting and rare metals in ionic melts.
5. Low temperature electrochemical synthesis of nano-size powders of carbides of molybdenum and tungsten under excessive pressure of carbon dioxide in halogenated melts.
6. Influence of nonstructural morphology on macroscopic characteristics of polymer-polymer compositions.
7. Nanostructures in polymers and nanocomposites.
8. Nanocompositional polymer materials on the basis of polycondensational polymers and organically modified clays.
9. Nono- size structural and morphological heterogeneity of working glass plates.

Department of physics is involved in research of federal level in the sphere of Precision and Nanometric Technologies of processing, assembling and control.

Above mentioned research resulted in creation of original multi-purpose experimental device which makes it possible to:

- to make real-time observations of nanoobjects;

- to precisely position nanoobjects, to monitor nano-probe contacts with the fixed point on the surface of nanoobject (particles, threads, areas, etc.) with 0,1-0,3 nm precision;
- to visualize kinetics of origin and growth of carbon nanostructures;
- to amalgate thin films and replicas of micro and nanoobjects.
- to make visual selection of nanostructures and investigate their mechanical, heat, emission properties under high vacuum conditions (10~ Pa) and temperature to 3000 K.
- to perform treatment of nano-size objects with clusters of charged particles (1-2 nm precision) under direct visual control (nano-lathe).

Nano-lathe applications are sharpening of the standard cantilever edge to 1-2 nm, manufacture of new cantilevers with the point of defined size and material; manufacture of metal needles with 10-15 times exceeding analogous parameters (for microbiological an microsurgery needs); nanosurgery and genetic engineering.

Carbon nanotubes in the form of cores and spirals with diameter 1, 2-1, 5 nm were produced with the help of nano-lathe. The length of cores is 100 nm, spirals to 1000 nm and more.

Dimensional dependence of soaking of metal threads with diameter 100-500 nm by small metal drop was studied. It was found out that the angle of threads soaking in these dimensions is reduced by 20-25 % as compared to soaking angle in macro system. It was also observed that electron emissions with current density to 10`-10` A/m` appear between the of metal nanodimensional threads with distances less than 15 nm and voltage 5-7 v current experiences significant oscillations in the case of continuous change of the distance.

This is a unique devise on a world wide scale. KBSU can suggest itself as a producer and supplier of this kind of devices to the interested customers.

In the framework of critical technologies of the federal level «Materials for Micro and Nanoelectronics» sustainable results were ob-

tained in the field of the project «Nanoelectrochemistry of intermetallic and hard-melting compounds of rare metals and carbon nanotubes».

Scientists of the Department of Chemistry of KBSU were the first in Russia to obtain nano-dimentional powders and nano-crystal films of carbides, borides, silicates of tungsten, molybdenum, chrome, titanium on the basis of rare metals and carbon nanotube.

They developed a way of control of the powder particles and nanotubes sizes, and also a process of filling of nanotubes with various metals. It enabled them to come to the forefront of creation of metal conductors – nanowires which belong to the new generation of resistors. New electrode materials on the basis of nano-size particles of tungsten carbide were developed which are more cost-effective as compared to previously employed platinum.

New more efficient parameters of compact magnets can be achieved on the basis of the research of nano-size powders and nano-crystal films of rare metals compounds.

At the department of Non –organic and Physical chemistry of KBSU samples of ceramic alloy compared in hardness to melted tungsten carbide were obtained from high disperse nano-size powders of tungsten carbide by method of electrical discharge agglomeration, for the first time in the world practice.

Electrochemical one-stage process of filling of carbon nanotubes with various metals with the aim of obtaining metal conductors – nanowires covered with carbon shell was developed.

This is a joint research conducted by KBSU and the University of Mishkoltz (Hungary). From 2006 KBSU is involved in the Russian – Hungarian program of science and research «Creation of Clusters of nanotechnologies» with the project «Electrochemical synthesis of nano-size powders of tungsten carbide in ionic melts».

Sustainable results were obtained within the framework of critical technologies development of the federal level «Elementary basis of microelectronics, nanoelectronics and quantum computers» at the department of Microelectronics and computer technologies of KBSU with the project «Development of Technology of obtaining nano-size structures with semicomductor quantum points in semicomductor and dielectric matrices for quantum and optical electronic devices».

As a result of this research structures with silicon quantum points (20-20 nm) were obtained, their distribution through the matrices not exceeding 5-10 %. Technology of highly homogeneous nanostructures (to 1 %) are being developed.

New theory of friction in nanocontact solids (based on the notions of fractal dimensions and fractal Integral-differentiation) and nanocrystal solids thermal capacity theory were developed at the Department of Microelectronics and Computer Technologies. The theory demonstrated that characteristic temperature and temperature of melting may critically depend on fractal structure of nanocrystal substance.

Thermodynamic approach enabled to express temperature of melting of isolated nanoparticle in a principally new way.

Nanotechnological research is also carried out at the Centre of Shared Resources «X-Ray Diagnostics of materials», where new technologies of obtaining new nanocrystal metallic, ceramic, metal ceramic and super hard materials are under development.

KBSU participated in the contest among of Higher Professional Institutions in the framework of the project «Supply and maintenance of educational laboratories of nanotechnology for specialized classrooms of physics, chemistry and biology at educational institutions of the university profile » for the years of 2006-2010. As a result of the contest, the university was included in the list of 35 winners among Russian universities. In November 2008 the university got new equipment, scanning probe microscope NanoEducator with teaching instructions and manuals. Total cost of equipment is 3 mln. rbls. Equipment was installed and tests were successfully accomplished in December, 2008. From 2009 this new lab is open for studies and research.

Department of Microelectronics and Computer Technologies of KBSU offers Bachelor and Master programmes in Nanotechnology:

554501 – Physics of Nanosystems;

554502 – Chemistry of Nanosystems;

554503 – Nanosystem Material Studies;

554505 – Methods of Nanodiagnostics.

First bachelor degrees in Nanotechnology were obtained in academic year of 2006-2007.

Department offers a graduate course in «Solid – state electronics, radioelectronic components, micro- and nanoelectronics, quantum effects devices».

Joint Dissertation Board for awarding Scientific Doctorate and Candidate Degrees in Solid State Electronics, radio electronic components, micro- and nanoelectronics, quantum effect devices (05.27.01); vacuum and plasma electronics (05.27.02) (founded jointly with Northern Caucasian Institute of Mountains and Metals, Dagestan State Technical University).

Scientific and Research work of the university has glorious traditions. Famous scientist, professor F.I. Frankle was among the faculty – members of Physics and Mathematics Department. His work in the field of hydro-air dynamics and methods of mathematical physics was a significant contribution to Soviet and world science. His enthusiasm is still tangible in the work of modern physicists and mathematicians of the university.

Leading scientific schools founded at the university by professors S.Z. Zadumkin, P.A. Savintsev, A.K. Mikitayev, Kh.B. Kushkhov and academician of RAS M.Ch. Zalikhanov continue their fruitful research.

In 1960 th at the Department of Physics of KBSU there was founded Nalchik school of physicists (a school headed by the Merited Scientist of Russia prof. S.N. Zadumkin) which was recognized as a leader in the field of physics of interphase phenomena and particle streams interaction with solids. Theories of thermodynamics and electron – statistic theories of surface energy and tension, adhesion and absorptions in metal solution were advanced. General conditions of phase equilibrium and interphase boundaries in multicomponential heterogeneous systems containing anisotropic phases and surface curving were investigated. Scientists of this school headed by prof. Kh.B.Khokonov discovered and investigated new physical phenomena: acoustic effect of crystal formation of melting and dissolving, electromagnetic-capillary effect of soaking and spreading, dispersion of plastic materials under instant relaxation of tensions of all round compressions. More than 30 original methods of research of compo-

sitions, structure and processes on the surface and interphase boundaries were developed at the level of inventions.

Merited Scientist of KBR, Doctor of Physics and Mathematics prof. P.A. Savintsev discovered as early as 1940-th new phasal transformation of the first kind with its distinctive characteristics-contact melting. Contact melting in condensed media is a perspective trend of development in the field of creation and obtaining new materials with programmable physical, mechanical and chemical properties.

28 scientific papers by P.A.Savintsev on the subject were registered as inventions and discoveries by the State Committee. Scientific school of prof. P.A. Savintsev continues active fundamental and applied research in the field of contact melting in KBSU and other universities implementing advanced technologies. 4 Doctoral thesis were defended for the research in this field, and prof. A.A. Akhubekov is one of them.

At the Department of Physics of KBSU new class of indicators monitored by electric current, namely device «SVEROS-TV» was developed. Thin films of electrochrome material tungsten … bronze which is coloured or monochromed depending on the sign of applied voltage is in the basis of this device.

Several trends of X-Ray defractional optics are developed in collaboration with the Nobel Prize winner academician of RAS G.I. Alferov. In particular, dispersion of X-Ray radiation in crystals with various lattice deviations. It is exactly deformation field in certain cases can serve as a transformer of X-Ray radiation applied and its' characteristics are improved.

Many developments in X-ray-diffraction crystal optics have been introduced thus yielding a considerable economic effect.

The staff of the same laboratory has worked out experimentally tested production technology of nano-sized multidiodes for SHF (superhigh frequency) 30-300 Gigahertz range generators, which can be applied to satellite communications, high-speed wireless Internet, radiolocation, radiometry, radio, medical electronics etc.

The worked out products are competitive in comparison with the alternative products on the market of millimeter range SHF com-

ponents. All the products have RF patents with the whole technological process being concentrated exceptionally at KBSU.

The Academic and Research School of the RAS Academician M.Ch. Zalikhanov, founded at KBSU and High-mountain Geophysical Institute, carries out different researches, which have been put into practice to create the means of struggling with dangerous snow-avalanche and mud processes, to protect agricultural holdings from hail and to work out recommendations for ecological services.

The Microelectronics and Computer Technologies Department together with the physicists is of highly scientific potential in the field of complex methods of researching solid surface. There are graduate studies at Physical Detartment in such specialities as «Condensed state Physics», «Thermophysics and Theoretical Thermotechnics», «Physics of atomic nucleus and elementary particles» and doctoral studies in the following specialities: «Physics of condensed state», «Thermophysics and Theoretical Thermotechnics». There is also Dissertation Council on obtaining candidate and doctoral degrees in Physico-Mathematical sciences. In 2009 physicists of KBSU and other Russian Universities have an opportunity to submit their works to 2 Dissertation Councils of the University for obtaining academic degrees of doctor and candidate of sciences. The first Council is in specialties: 01.04.07 – Physics of Condensed State, 01.04.14 – Thermophysics and Theoretical Thermotechnics in physico-mathematical sciences, and the second one is in specialties: 05.13.18 – Mathematic modeling, numerical methods and complexes of programmes in technical sciences, 01.01.03 – Mathematical physics in physico-mathematical sciences.

Actually new methods of obtaining of micro- and nanodisperse powders of oxide tungsten bronze of alkaline metals are being worked out at the laboratory «Physical chemistry of ion melts and physicochemical basis of the molybdenum and compounds synthesis in condensed mediums».

More than 150 scientific works have been published, 10 author's certificates and RF patents have been obtained, 2 Doctoral and 4 Candidate theses have been defended.

The technology of obtaining micro and nanodisperse pigment – powders of the so called oxide tungsten bronze, which depending on the solution have metallic, semiconductor, electrode and electrochrome qualities and are resistant to the influence of acids and alkaloids, has been worked out and protected by patents. Different bronze solutions correspond to golden-yellow, yellow, orange, red, violet, blue and other colors.

Unique physical and chemical qualities of tungsten oxide bronzes and also the possibility of their obtaining in the form of high-disperse powders gave grounds to use them as day fluorescent pigments for production of high-quality paints. Usage of such «tungsten paints» for banknote printing and other securities will raise their quality and degree of reliability of protection against forgery, which is connected with the necessity of knowledge of the solution of the given pigment, the technology of its obtaining and the color corresponding to the given solution. All this creates «high technological shield» from securities forgery.

Manufactured product of Nalchik Hydrometallurgic Plant – tungstic oxide (VI) is the main component of the initial blend for pigment-bronze synthesis.

The project «Production technology of new paints on the basis of the pigment -powders of oxide tungsten bronzes for banknotes and other securities printing» is supported by FGUP «GOZNAK» of the Russian Federation and transnational organization SICPA – a global leader in the production of protective paints for banknotes and securities (Switzerland, Lozano). It is planned to carry out specialized fundamental researches on the use of pigment qualities of oxide tungsten bronze powders with the leading firms «Huber» (Germany) and SICPA banknotes on production of printer's ink for printing. There is an agreement with SICPA on the testing of the pigment-powders of oxide tungsten bronzes quality.

The Physical Chemistry Chair of KBSU worked out a number of new technologies, in particular:

- Technology of application of wear-resistant, heat-resistant, corrosion-resistant coating of carbides, borides, silicides of refractory metals in ion melts, which allows to get absolutely non porous, well

linked surfaces on graphite, nickel, copper, different steels, solid melts. The surfaces can be used for corrosion protection of containers made of steel-45 in natrium- sulphuric sources of current, and also raised heat-, wear-, corrosion- and abrasive resistant products made of structural steel in different medium.

- Technology of diamonds and diamond-like extra-hard material metallization in ion melts, which doesn't have any counterparts in Russian and world wide practice and which allows to increase wear-resistance of the instrument 1,5-2 times more (introduced at Russian plants- in Rostov, Jaroslav Region and town Terek KBR and abroad – at Lvov diamond instruments plant). The technology is created on the basis of discovered by KBSU scientists new phenomenon of surface conductivity generation on the border of diamond division (diamond-like structures)-ion melt, that allowed to realize electrochemical processes on diamond surface.
- Technology of used and non-acceptable diamond instrument recuperation, which doesn't have counterparts in the country and abroad is protected by Russian Federation patent. The technology is based on a fundamentally new way of destroying high-alloy matrix of diamond instrument by means of anodic oxidation in alkaline melt. It allows to extract the diamonds and metals composing the hard-alloy matrix with their second usage in production of a new diamond instrument.

There is a graduate school at Chemical Department in the following specialities: «Inorganic Chemistry», «Physical Chemistry», «Electrochemistry».

In 2011 the chemists of KBSU and other Russian universities have an opportunity to submit their works to the Dissertation Council of the University for obtaining the academic degrees of doctor and candidate of sciences in speciality 02.00.04 – Physical chemistry on chemical sciences.

The Technical and Engineering Department of KBSY mastered high-effective technology of extra-hard instrumental materials coating.

The technology is intended for metal plating on powders of natural and synthetic diamonds, cubic boron nitride and other extra-hard materials, used in cutting, correcting, stone-working and rock-destroying instruments.

Coatings are applied by ion-plasma metal diffusion in vacuum. Low temperature, excluding diamond damage is the distinguishing peculiarity of the process.

The main technology characteristics are optimized according to the criterion of maximum working capacity of a diamond instrument taking into consideration the mode of deformation of the instrument under the influence of power and temperature factors of the operation process.

The technology and equipment for its realization can be also used for coating of other thin materials, used in powder metallurgy.

Several generations of technological equipments for powder metallization have been worked out at KBSU. The distinguishing peculiarities of the latest developments are:

– Productivity up to 4000 carats in a shift;

– Diamond cut range of the worked powders is from 100/80 to 2500/2000;

– Wide choice of materials and high uniformity of coated surfaces;

– Possibility for coating of up to 4 layers of different materials in one cycle;

– Compact execution and convenient technical service.

The main technical and technological solutions are protected by the author's certificates and patents. The results of SRW (Scientific and Research Work) are published in the leading Russian and foreign scientific-technical editions and are certified at International, All-Russian scientific conferences.

Numerous laboratory and industrial testings of diamond instruments showed that the usage of the offered technology of plating provides a considerable raise of working capacity of the instrument due to the increasing of cut solidity, reliability of crystal retaining in the matrix. Testing, carried out in 5 different geological regions of the country, showed that the usage of the presented technology allows to raise the main characteristics of instruments working capacity, and also: to increase the instrument resource up to 50-80 % and decrease the discharge intensity of diamonds to 30-60 %.

According to the Engineering and design information science Institute of the Russian Academy of Sciences analysis the development of information and also multimedia technologies in education leave behind the equipment necessary for study of modern production technologies. Many universities don't have modern kinds of manufacturing equipment (machines, presses and others), production tools (including modern cutters), and new manufacturing technologies are not available.

That's why the leading producers of equipments in the sphere of mechanical engineering, engineering tools, motor-car construction supply vocational education institutions not with single machines but with training-methodical complexes, which include high-capacity equipment with programmed numerical control (PNC), computer control system, equipped with modern software support which allows to realize the whole complex of tasks of process design (CAD/CAM/CAE), training automated workplaces.

EDISI RAS, KBSU has been cooperating with for the last 15 years, worked out the structure of the training-manufacturing complex for training of workers and technicians (engineers), broad specialists. This scheme is realized on the basis of the training-manufacturing firm in cooperation with «IMID» firm (Russia). The firm is completely equipped with modern industrial equipment of different specialization and training of specialist and retraining of the teaching stuff is being carried out.

According to the agreement with EDISI RAS and «IMID» firm a training-manufacturing complex of the same type will be opened at KBSU in the nearest future. High-capacity equipment with programmed numerical control (PNC) has already been bought and soon will be delivered to the university. The realization of the project will allow to:

– carry out training and retraining of the specialists (including students) meeting modern requirements, for KBR and Southern Federal District (SFD);

– carry out training and retraining of the teaching staff for institutions of primary, secondary and higher professional education for KBR and SFD;

– work out fundamentally new educational programmes;

– master the output (designing, production and maintenance) of science intensive production, also ordered by outside organizations.

There are graduate studies at Technical and Engineering Department in the following specialities: «Engineering, system of driving gear and machine components», «Engineering techniques», «Technology and equipment of mechanical and physico-technical processing», «Technologies and pressure machining», «Atomic nuclear reactor industry, machines, aggregations and technology of materials of atomic industry», «Mathematical modeling, numerical methods and programme complexes», «Technology and management of construction», «Structural mechanics».

In 2011 the faculty and scientists of other universities of Russia have an opportunity to defend their works at the Dissertation Councils of the University for obtaining of the academic degrees of doctor and candidate of sciences in specialities 05.13.18 – Mathematical modeling, numerical methods and programme complexes in technical sciences.

Five laboratories, founded at KBSU in cooperation with RAS, study questions of geophysics, geodynamics and wave processes in layered mediums, carry out the monitoring of natural phenomena in the foothills of Elbrus. There is an agreement between KBSU, IJI RAS, OIFZ RAS, IDG RAS и GAISH MSU on carrying out of joint experimental work in the region of Elbrus volcanic center.

In 2003-2011 the University under support of Ministry of Education and MES RF carried out the development of the Complex geophysical information-measuring system RUAIIS KBSU) «GALS», equipped with unique scientific equipping.

With the framework of this work complex geophysics observatory with distant pickup of data was put into operation for continuous geophysical monitoring of Kabardino-Balkarian territory and adjacent regions with the aim to forecast the conditions of appearing and development of big natural catastrophes.

The observatory contains:

1. Stations of seismic monitoring of the territories of Kabardino-Balkaria.

2. Stations of dynamic processes study in the region (tilt-metric and deformation-metric stations).

3. Seismic-gravity information-measuring systems.

4. The complex magneto-variation stations.

5. Stations of heat monitoring of geophysical medium.

Observatory stations are on different heights in different regions of North Caucasus.

In 2005-2007 in Nalchik the second stage of geophysical observatory was developed. It consists of: seismic-gravity, tilt-metric, magneto-variation and seismic stations. All the equipment of the observatory (three-component broadband seismic station, microbarograph, precision quartz tilt indicator) is provided with systems of remote access (control) through Internet and work in the continuous monitoring mode of operation. In 2003-2011 under Inderchi Mountain in the main drift of Baksan neutrino observatory (BNO) IJI RAS KBSU scientists in cooperation with IFZ RAS и IZMI RAS equipped measuring posts of the first and third stages of the geophysical observatory. Tilt-metric, three-component magneto-variation and four-component seismic station; autonomous registrator of seismic processes; system of collecting and transmission of geophysical information were placed in specially prepared mountain slashes in embeddings of 1500 and 4200 meters.

«GALS» system is intended for carrying out complex geophysical (volcanology, seismology) researches to work out information-technological and mathematical methods of effective forecasting of natural (including catastrophic) processes.

In 2004-2011 with the use of «GALS» system information about the movement of tectonic plates, inner structure of the Elbrus volcanic center, the results of environmental observations of the thin structure of the induced geophysical fields, registration of physical fields of strong avalanches, and also data about the variation of magnetic fields in Elbrus region (including during the full solar eclipse on March 29, 2006) was obtained.

There are graduate studies at the University in the following specialities «Geophysics, geophysical methods of minerals search»,

«Economical, social and political geography», «Meteorology, climatology, agrometeorology».

In BNO IJI of RAS the University carries out scientific researches using joint laboratory of astrophysics and physics of cosmic rays, where they realize the working out of the plants to register slowly interacting particles on the basis of emission, scintillation, proportional and ionized detectors; they carry out the work on creating new detectors of neutrino and particles of the candidates on «dark substance»; they study new methods and systems of liquids, noble gases and ultimate hydrocarbons refinement.

In 2011 the University staff set neutron supermonitor for studying cosmic rays, and it will transmit data to the world net.

It is planned to organize the scientific-educational center of cosmic rays and subatomic physics (SEC KLSF KBSU) on the basis of laboratory of astrophysics and physics of cosmic rays, ZKP and KBSU chairs (physics of condensed state, physics of nanosystems, theoretical physics, emergency situations). The following public institutions will take part in the work of the center: Institute of earth magnetism and radio wave spreading of RAS, Institute of nuclear researches of RAS, Moscow engineering-physical institute, High-mountian geophysical institute, ZAO «High-level ecological observatory» – which cooperate with KBSU on terms of agreement.

The aim of the scientific-educational center is to carry out scientific researches and specialists training in the sphere of applied nuclear physics, nuclear medical physics, geophysics and ecology, computer technologies, who have skills of work with modern nuclear-physical equipment, software and are able to take part in modern scientific and technological projects.

Since 1981 in Baksan ravine of Kabradino-Balkaria International scientific Baksan schools «Particles and cosmology» have been carried out. In 2007 the 14-th Baksan School like the previous one was organized together by KBSU, Institute of nuclear researches of RAS, Joint Institute of nuclear researches RAS and Los Alamos National Laboratory (Los Alamos, USA). It attracted the attention of many leading scientists of Russia, Europe, USA, Japan and gave an opportunity to discuss

the questions of introducing of scientific results of the organizers and participants of the School in the filed of high technology.

Laboratory of extreme states physics, founded at KBSU in cooperation with OIVT RAS carries out active scientific work within the framework of RAS Presidium programme «Thermophysics and mechanics of intensive impulse effect», complex programme of researches of RAS Presidium «Thermophysics and mechanics of extreme power effect «, OEMMPU programmes and RAS Presidium programmes «Physics and mechanics of strongly condensed substance and problems of internal structure of the Earth and planets», programmes of fundamental researches of RAS Presidium «Study of substances in extreme conditions» (subprogramme «Thermophysics of extreme state of substance»).

KBSU scientists carried out theoretical calculations of surface energy and phase transfers under high pressures, they experimentally defined threshold of radiodestruction of alkaline-halide crystals and glass by nano- and femtosecond laser impulses.

The researches, carried out in the laboratory on the programmes of Department of power engineering, mechanical engineering, mechanics and processes of management of RAS, are supported by the scientific council of RAS in thermophysics, by the scientific council of RAS in physics of plasma and by the scientific council of RAS in complex problem «Physics of low-temperature plasma».

Since 1978 KBSU and RAS have been holding traditional international scientific conferences on physics of extreme states of substances on the basis of the University. Regularly, conferences gather more than 100 active scientists from Russia, USA, France, Germany, Brazil and other countries in Elbrus region to study extreme states of substances.

In March, 2011 the University in cooperation with OIVT RAS and Institute of chemical physics problems of RAS carried out the XXVI-th International scientific conference on physics of extreme states of substances.

During the XIX-th and XXV-th «Constitutive equation of substance» International scientific conference KBSU scientists got Diploma of honor for the series of work on physics of extreme states

of substance, they were awarded 4 medals at the XX-th International scientific conference «Intensive energy flow effect on substance».

Since 2003 the mentioned above RAS institutes and RAS scientific council on complex problem of «Physics of low-temperature plasma» in cooperation with KBSU have carried out another annual scientific arrangement – All-Russia symposium «Problems of physics of ultra-short processes in high-nonequilibrium mediums». In July 2011 the 9-th symposium was successfully carried out on the basis of KBSU in New Aphon.

Researches on power engineering within the framework of the Programme of search of thermal and other alternative renewable energy sources on the territory of Kabardino-Balkarian Republic are carried out at KBSU.

The following forms of energy like geothermal, solar, wind and hydroenergy can be applied on the territory of KBR, which is characterized by complex topography and presence of active geological formations (magma focuses and chambers).

Successful mastering of the mentioned forms of energy demands carrying out of the first stage of the complex of scientific and research work for the period of 2-3 years, costing 18-20 million rubles. The researches are extremely important for the Republic because there are not enough power resources in KBR.

Geophysical observatory founded by KBSU in cooperation with RAS is the supporting center which allows to get the initial information about the internal structure of geothermal zones.

Speaking about the search of renewable sources of energy on the territory of Kabardino-Balkaria, one should first of all point out the supply of hydrothermal energy which is prior for the Republic. It can be easily explained if to take into consideration that the supplies of thermal energy are connected with volcano centers and first of all with caldera of Elbrus and the nearest adjacent territories.

In resent years university scientists in cooperation with RAS and other organizations collected scientific materials, testifying excessive volcano activity within Elbrus caldera. The carried out complex geological-geophysical observations allowed to fix the presence of under-surface magma chambers in the central part of Elbrus volcano caldera in the depth of 2 km. below sea level.

Received unique data are justified by the results, obtained in the process of interpretation of thermal cosmic survey, which revealed there thermal anomaly. Besides the revealed thermal anomalies and calderas along the periphery could be possibly caused by the formation of peripheral magma chambers, and in this case they can be potentially long-term for receiving of the hydrothermal heat.

Elbrus region has a number of thermal springs: for example, weak fumarole activity occasionally renews in the regions of the eastern Elbrus top and Irikchat pass, the temperature in the well in the region of Tyrnyauz tungsten-molybdenum field is 223.5C in the depth of 4000 m. (that considerably exceeds the standard geothermal gradient – 5.59C).

Organization of wide-scale work on study of thermal fields in the region of Elbrus volcano center and on the adjacent territories using high cosmic technologies of probing of the Earth surface is necessary for the realization of the following researches in this sphere.

Special attention should be paid to tectonic zones and magma brining deep breaks, which tectonic activity can be characterized by strengthening of processes of vertical heat-mass transfer along the breaks and breaking violations.

Carrying out the work on search and mastering of alternative renewable sources of energy on the territory of KBR, KBSU scientists aim at fulfilling the requirements, defined by Kyoto protocol for the Russian Federation on working and realization of policy and measures, directed to reducing of discharge of hothouse gases and providing of steady development.

Within the framework of energy programmes, successfully realized at the University, KBSU chair of physical chemistry joined the researches on hydrogen power engineering, as a participant of the international scientific programme FP6 (EUROPEAN COMISSION 6^{th} Framework Programme on Research, Technological Development and Demonstration) and realized the project «Non platinum electro catalyst for chemical sources of current» («Development and research of non platinum electrocatalysts for eclectro- chemical processes»). The task of developing a reversible solid-polymeric element-electrolyzer has been set.

At KBSU the scientific school in high-molecular compounds headed by professor A.K.Mikitaev has been successfully carrying out research work for more than 20 years. The school deals with studies of synthesis, formation laws of high-molecular compounds structure, their physicochemical properties and the technology of obtaining and conversion of polymeric materials of different class.

The University is one of the leading North Caucasian organizations in the field of complex research of synthesis, polymers physical-chemistry and in the field of training highly qualified scientific manpower.

On the basis of a number of fundamentally new scientific results in this research area more than 100 inventors certificates have been received, more than 700 articles have been published and more than 40 Candidate theses and 4 theses for a Doctoral degree have been defended.

In 2005 a young scientist of this scientific school received a grant of CRDF supporting three-year probation period in SEC in Rostov-on-Don.

At the chair of high-molecular compounds of KBSU a number of technological chains on producing new market demanded polymeric compositions has been worked out, including:

1) technologies of PVA adhesive small tonnage production;

2) technologies of new class sorbent small tonnage production.

A group of young researchers has worked out the technology of obtaining and production of new polymeric nano - composites on the basis of laminated silicates and polyelectrolytes with sorption and biocyde properties and prepared it for implementation (project supervisor is Candidate of Chemistry, senior lecturer of KBSU S.Yu. Khashirova). For sorbent demand of the Russian water industry amounts to 140 000 tons per year, new surfactant composites must get wide application.

The collection of innovational projects of students, postgraduate students and young researchers, directed to the solution of problems in the Republic is carried out on the basis of the University Business-Incubator «Start».

In the end of 2008 a similar project «Sorbents for water purification and disinfection» was presented at the international economic

forum «Russian South Entrepreneurship: Innovations and Development» and at the first Southern venture trade fair in Rostov-on-Don. The project won «Original Business-Idea» and «The Best Presentation» nominations and was awarded the prize «Business of Don».

Moreover, the Fund of assistance to development of small business enterprises in the scientific research field awarded a grant for completing the scientific-research work on this project. On estimating the results of this work it is planned to finance and organize the developed sorbents production.

On December 2008 and 2010 the perspective developments of the Chair of high-molecular compounds of KBSU were presented at the international forum on nano-technologies, which was organized by «The Russian Corporation of Nano-technologies».

At the forum the chair presented the technology of obtaining nano-composite polymeric materials on the basis of polycondensation polymers and organic-modified clay (professor A.K. Mikitaev) and the technology of obtaining organic-modified montmorillonite on the basis of bentonite clay mined form Gerpegezh deposite in KBR and polymeric clay sorbents for water purification (senior lecturer S.Yu. Khashirova). The exposition of the chair aroused much interest and it was marked by the International Forum Diploma.

At the Chemistry Department there are graduate studies in «Organic Chemistry» and «High-molecular compounds» specialities and doctoral studies in «High-molecular compounds» speciality.

In 2011 scientists working in the field of high-molecular compounds have the possibility to submit their theses to the Dissertation Council of the University for obtaining the academic degrees of Candidate of Sciences and Doctor of Sciences in speciality 02.00.06. – high-molecular compounds in chemical, technical and physical-mathematical sciences.

In 2008 the work on opening of the KBSU Medical-Biological Center began. This Center will include a laboratory of human, animal and plant genomes and it will possess a unique equipment, which has no analogues in the SFD.

The researches carried out in this laboratory will give an opportunity to raise the quality level of works in the field of biology and medicine.

In the laboratory of human, animal and plant genomes it is planned to carry out researches in the following directions:

– diagnostics of human, animal and plant infections;

– diagnostics of hereditary diseases;

– genotyping;

– detection of polymorphism and study of genetic variety and taxonomy of plants;

– genome analysis in the research of genetics of quantitative attributes of plants and animals;

– molecular-biological bases of diseases development;

– oncohematology;

– mutation analysis –atherosclerosis prevention programme;

– cancer prevention programme;

– pancreatic diabetes prevention programme;

– monitoring and estimation of therapy effectiveness in case of virus diseases. The determination of «virus load», i.e. the quantity of virus particles in blood allows to realize an individual adjustment of anti-virus drug dosage;

– determination of microorganisms drug resistance. With the help of APC it is possible to detect definite subtypes and strains of drug resistant viruses and bacteria;

– DNA-diagnostic methods in perinatal diagnostics of hereditary diseases (mucoviscidosis, phenylketonuria, hemophilia etc.);

– diagnostics of monogenic diseases;

– DNA-diagnostics of predisposition to multifactorial diseases (polymorphisms, associated with arterial hypertension, impaired coagulation etc.).

The experimental work in the field of molecular genetics is absolutely necessary for qualified training of doctors and biologists. It will give an opportunity to introduce a course of clinical genetics and courses of specialization on genotherapy and genodiagnostics at the Medical Department of the University. It will also be of utmost

importance in teaching the bases of clinical genetics at the faculty of advanced training of doctors and increase the level of medical training in the Republic as well.

Data acquisition on the peculiarities of genetic structures of populations in Kabardino-Balkaria is a very important contribution to the total knowledge about the gene pool of humanity, which can be applied in human evolution problems solution and in studying the historical processes, connected with the formation of definite ethnic groups. The given scientific school aims at studying the population and genetic peculiarities of the ethnic population of KBR as a part of the North Caucasian peoples on the basis of analysis of genetic markers and their comparison with the corresponding markers of other peoples of North Caucasus to reconstruct the origins and historical relationships of North Caucasian peoples.

Genetic differentiation, genetic and phylogenetic relationships of modern North Caucasian peoples will be determined on the basis of the obtained data on polymorphism. It is planned to create a DNA-bank which will be used for studying the genetic nature of a number of multifactorial diseases - mucoviscidosis, phenylketonuria, myodystrophy, Wilson's syndrome etc.

The study of ethno-genomics of the native population of Kabardino-Balkaria as a part of North Caucasian peoples, reconstruction of their origins and historical relationships will give an opportunity to analyze the genetic risk factors of multifactorial diseases connected with the phenomenon of DNA polymorphism without which early prevention and individual drug therapy are impossible.

The University has accumulated significant experience in the research area of gerontology and the work on opening of a new gerontological center of KBSU, which will serve the Republic and other regions of Russia, has already begun.

The Telemedicine Center which is a segment of insurance telemedicine network with round-the-clock possibility of consulting highly experienced doctors has been functioning at KBSU for many years. The Center deals with organization, preparation and holding videoconferences and consultations with participation of specialists who are at telemedical stations of patient care institutions within the

network. It also provides information support for videoconference session with the help of data transmission equipment.

The following types of telemedicine consultations are carried out in the network of insurance telemedicine:

– consultations in real-time operation mode for supervising complex pathologies, operations; remote prophylactic medical examination, lectures, consultations or conferences;

– delayed consultations, which do not demand the patient's presence and for which interchange of files by e-mail and other facsimile massages is quite enough (preliminary analysis of diagnostics results etc.);

– preliminary consultations of patients to determine the indications for hospitalization in the leading medical centers of the region or Moscow;

– dynamic supervision of patients in the remote period after complex operations, for instance brain or heart surgery;

– urgent teleconsultation when life is at risk. In this case urgent teleconference is one of the most effective means of rendering immediate qualified consultative aid;

– delivering lectures to KBSU students by the leading doctors in videoconference mode.

The Telemedicine Center of KBSU gave an opportunity to hold a number of teleconferences with the participation of many telemedicine centers of Russia, including: telemedicine centers of «The State Medical Center of Health Ministry of Russia», MRI of pediatrics and pediatric surgery, Research Institute of Urology, «Medincenter» of Ministry of Foreign Affairs, Insurance Telemedicine Center «Cane Assistance» etc.

The scientific school on mountain ecology, which developed in the last four decades, became famous both in our country and abroad owing to the development of the scientific direction «The ecological bases of evolution and wildlife protection in Caucasus». The long term studies resulted in substantiation of the scientific conception on ecological – evolutional and biogeographical effect of interrelation of high-altitude zone in mountains and latitude zones in plains. This conception provides a new level of study of the Caucasian fauna, develops the theoretical basis of protecting the unique gene pool of the region.

Two ecological stations located on the foothills and mountains of the Central Caucasus have become scientific and educational training grounds of KBSU, other higher educational and research institutions including foreign ones.

In 1953 botanical gardens were founded in the University campus in the western part of Nalchik. At present they are included in the register of botanical gardens of Russia. Besides the University campus in Nalchik botanical gardens have a plot in the unique region of North Caucasus in the foothills of Elbrus 2000 m. above sea level.

Nowadays seven laboratories function at the botanical gardens: dendrology; floriculture; tropical and subtropical plants; medicinal, rare and endangered plants; breeding and seed growing; taxonomy of higher and lower plants with the help of «Herabarium»; implementation.

There are about 40 000 herbarium specimens in the laboratory «Taxonomy of higher and lower plants» and educational – scientific laboratory «Herabarium». All endemic, rare and endangered plants of KBR and typical specimens are presented here. The Red Book of KBR was prepared on the basis of these laboratories.

The laboratory «Implementation» deals with breeding exotic and cultivated plants which successfully passed acclimatization in the region.

Students of different departments of KBSU are engaged in the work in botanical gardens from May to November. Botanical gardens are the main bases of the educational process at the Biology Department of KBSU. On the basis of botanical gardens several candidate theses were prepared and defended, 8-10 degree works are fulfilled annually; educational, specialized and pre-diploma practices are carried out.

Since 2002 Botanical gardens of KBSU have been financed by the scientific programmes of Education Ministry of Russia and MON RF aimed at supporting unique scientific establishments. By the result of the carried out work Botanical gardens of KBSU were included in the Analytical review of Education Ministry of Russia «Unique scientific and educational establishments of higher institutes of education», published by Tver Innocenter.

At the university there are graduate studies in the following specialities: «Obstetrics and Gynaecology», «Human Anatomy», «Endo-

crinology», «Internal Diseases», «Cardiology», «Ocular Diseases», «Dermatovenerologic Diseases», «Diseases of Nervous System», «Psychiatry», «Dentistry», «Surgery», «Neurosurgery», «Epidemiology», «Social Health and Health Care Service», «Allergology and Immunology», «Urology», «Botany», «Microbiology», «Zoology», «Physiology and Biochemistry of Plants», «Physiology», «Genetics», «Ecology», «Biological Resources», «Biomechanics», «The Theory and Methods of Physical Training, Sport Training, Health-improving and Adaptive Physical Training»; and doctoral studies in specialities: «Pediatrics», «Infectious Diseases», «Surgery», «Microbiology», «Biomechanics», «The Theory and Methods of Physical Training, Sport Training, Health-improving and Adaptive Physical Training».

In 2011 148 clinical interns passed primary specialization in 24 specialities, and 125 residents passed advanced training in 24 specialities. Training of interns is realized both at specialized chairs and health protection institutions. The work of chairs of the University with interns and residents is organized in accordance with the curricula of chairs of KBSU which meet the requirements of the State Educational Standards by their contents and level.

Reformation of the Dissertation Council in medical sciences and opening of the Dissertation Council in biological sciences are on the agenda.

At KBSU much attention is paid to social studies because definite effective recommendations of struggling against terrorism, overcoming crisis phenomena and destructive tendencies in the North Caucasian region, stabilization of situation in trouble spots, establishing relationships on the basis of tolerance, give an opportunity to improve the economic situation in the South of Russia and in the country on the whole.

The University considers appropriate knowledge of the situation in the region to be a significant condition of realizing effective policy and state government in the North Caucasus. Here the determination of trends of social-economic, political and cultural modernization of local societies under the conditions of social and political stability and democratic consolidation of the Russian society is a matter of utmost importance.

KBSU adheres to the position that bridging over crisis phenomena and destructive tendencies in the North Caucasian region of modern Russia can be realized only basing on state policy of complex regional modernization.

Only deep consideration of the course and results of social and political transformations of the Russian reforms period «within» local societies and from the point of view of local cultures, the analysis of these transformations from the position of the North Caucasian subjects of 'transition to democracy' own social and political experience can give more or less definite indications of possible scenarios of further development.

At KBSU the research works carried out on the basis of Social – Humanitarian Institute resulted in fulfilling the following tasks:

– to determine the comparative chances of rooting the structures of civil society, democratic institutions, cultural openness and civil self-identification in the social and cultural ground of the region;

– to reveal the conditions and ways of transforming the North Caucasus from 'the window of geopolitical vulnerability' into the factor of strengthening the positions of Russia in the Caucasian region on the whole.

A group of scientists of KBSU received State Prize of KBR in the field of science and technology for their achievements in social sciences.

In 2008 basing on the resolution of the University Academic Council the Institute of Problems in Caucasus and the Center of Social Studies were opened at KBSU. These organizations are aimed at activating a number of fundamental and applied researches in the field of social sciences.

At the university there are graduate studies in the following specialities: «History of Russia», «General History (Modern)», «Ethnography, Ethnology and Anthropology», «Ontology and Cognition Theory», «Aesthetics», «Social Philosophy», «Theory and History of Culture» and doctorate in speciality «History of Russia».

In 2011 the scientists working in the field of humanitarian studies have the possibility to submit their theses to the Dissertation Council of the University for obtaining the academic degrees of Candidate of Sciences and Doctor of Sciences in specialities

07.00.07 – «Ethnology, Ethnography and Anthropology» and 07.00.02 – «History of Russia» in historical sciences.

In April 2008 Circassian Culture Center and Balkarian Culture Center were opened at the Philology Institute of KBSU and by the end of the year Multifield Linguistic Center «Polyglot» and Jurislinguistic Laboratory were opened at the chair of the Russian Language and General Linguistics of the same institute. Besides it is scheduled to open a scientific-research and educational center of Russian culture and linguistics.

Scientific-research work at the Philology Institute is realized in the following directions:

– Structural-systematical and semantic paradigm of cross-cultural communication;

– Comparative and historical study of mythoepic traditions of the North Caucasian peoples.

– Russian Literature. Literature of the North Caucasian peoples. Folklore studies.

– Semantics and pragmatics of a text and linguistic units.

– Functioning of the Russian Language under the conditions of polyethnic region.

The last two directions are worked out at the chair of the Russian Language and General Linguistics. Within the framework of the first direction the chair studies a wide range of problems of semantics and pragmatics of different level linguistic units, particularly semantic, grammatical, pragmatic and cognitive aspects of the language, the peculiarities of their interaction on different levels, linguistic units functions in the process of communication; study and description of the meaning structure and types of their components, the specificity of functioning of semantic units and semantic relations. Within the framework of the second direction the chair has accumulated much experience in studying the peculiarities of language situation in the republic and formulated a scope of urgent problems. Nowadays the conception of studying and description of linguistic processes under the conditions of the new language policy in KBR is being worked out.

The chair of the Russian Language and General Linguistics carries out research work on the project «The Phraseological Picture of the Universe», financed by ME RF from the federal budget.

In 2004-2008 the scientists of Philology Institute of KBSU:

– defended 7 doctoral and 22 candidate theses;

– published 27 monographs and 795 articles;

– worked out the conception of teaching Balkarian at a secondary school, standards and typical curricula of Balkarian (5-9, 11 forms), which were approbated and approved by the pedagogical community of KBR;

– in 2010-2011 the last two issues of the annual «Russian Germanistics» were published in cooperation with the Russian Union of Germanists.

At KBSU there are graduate studies in the following specialities: «Literature of the RF Peoples (literature of the North Caucasian peoples)», «Literature of Foreign Countries (Europe, America and Australia)», «Folklore Studies», «The Russian Language», «Languages of the RF Peoples (Turkish languages)», «Language Theory», «Comparative-Historical, Typological and Contrastive Linguistics», «Theory and Methods of Teaching and Upbringing (Russian)»; and doctoral studies in specialities: «Literature of the RF Peoples», «The Russian Language», «Languages of the RF Peoples (Turkish languages)», «Languages of the RF Peoples (Caucasian languages)», «Language Theory».

In 2011 the scientists working in the field of philology had the possibility to submit their theses to two Dissertation Councils of the University for obtaining the academic degrees of Candidate of Sciences and Doctor of Sciences. The first Council was in specialities 10.01.02 – «Literature of the RF Peoples», 10.01.09 – «Folklore Studies» in philological sciences and the second one was in specialities 10.02.02. - «Languages of the RF Peoples» and 10.02.19 - «Language Theory» in philological sciences.

Since 2001 102 theses have been defended at the second Dissertation Council including 33 theses defended by candidates of higher educational and scientific-research institutions of the South of Russia and this fact proves its significance in the region. In 2004-2010 doctorates

and post-graduate students of the Chair of the Russian Language and General Linguistics defended 4 doctoral and 16 candidate theses.

The Kabardino-Balkarian State University has established close scientific contacts with universities in Austria, Germany and Spain.

Thus, in 2006 KBSU concluded a contract of cooperation with the Institute of study and support of regional and transnational cultural processes (Austria), providing for large-scale cooperation in the field of organization of scientific conferences, students exchange with correspondent diploming, carrying out a number of new projects in the scope of the European Union budget for 2007-2013 period.

Constant work on organization of probations and advanced training of teachers, carrying out language courses, teachers exchange is realized in cooperation with Goethe – Institute and Friedrich Schiller University of Jena.

The University pays much attention to establishing the International Center of studying national minority languages in different parts of the world (including Caucasian languages) in cooperation with the University of Granada. The supervisor of this programme is professor Rafael Guzman Tirado who successfully defended his doctoral thesis in «Language Theory» speciality at KBSU in September 2006.

The Center will give an opportunity to publish a number of research works on national minority languages, to compile multilingual dictionaries, to establish a real sociolinguistic and political status of minority languages, to organize expeditions etc.

Annually the University holds a number of prestigious International and All-Russian scientific events. So, in 2011 KBSU organized 20 research, research-applied and research-methodic conferences, symposiums and seminars including 9 International and 3 All-Russian ones.

Thus, the University can be considered as an institution with a significant number of research, scientific and technical, experimental and design works of high quality in a wide range of specialized directions. The level of scientific and research activity of the University gives grounds to speak of its deserving place among other leading research universities of RF.

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