Programs of Joint Funds

The joint funds set up by NSFC and other relevant government departments, local governments and industrial sectors aim to play a better guiding role of the National Science Fund to attract resources from different sectors to support basic research in specific areas and directions. The joint funds focus on national interests and key directions of scientific developments, attract nationwide researchers to conduct basic research in relevant areas, so as to solve key scientific problems, promote cooperation among industrial sectors, universities and research institutes, foster scientific and technological talents, and enhance Chinese indigenous innovation capabilities in relevant areas, industries or regions.

In 2010, the joint funds in the Guide include NSAF Joint Fund, Joint Fund of Astronomy, Joint Fund of Research on Major Science Facilities, NSFC-Guangdong Joint Fund and NSFC-Yunnan Joint Fund. In addition, some projects are designed to be co-funded by NSFC with local authorities in charge of regional science and technology development.

The joint funds form a part of the national natural science fund system, and NSFC announces guidelines for application. The joint funds are open to applicants all over the country and are managed according to NSFC's regulations and project selection procedure. Any result generated from the joint funds, such as papers, books, reports, software, patents and awards, should all bear the words Joint Funds of NSFC and the project number or relevant statement. Applications for the joint funds should be prepared according to relevant project type (such as General Program or Key Program) outlines.

NSAF Joint Fund

Jointly set up by NSFC and the Chinese Academy of Engineering Physics (CAEP), the Fund is to encourage scientists in related fields to carry out basic and applied researches for national security by taking advantages of NSFC's evaluation system and mechanism, so as to explore new research directions, discover new phenomena and laws, upgrade the innovative ability of science and technology in national defense, and foster young professionals in this area. NSFC and CAEP issue the *Guide to Programs* according to the research needs.

In 2009, NSAF Joint Fund received 99 applications in total, and 35 of them were funded through panel evaluation. The total funding was 14.10 million yuan with an average funding of 403,000 yuan per project. Among them, there were 1 Key Program project

with a total funding of 2 million yuan, 3 key funding projects with a funding of 1.38 million yuan (an average funding of 460,000 yuan per project), and 31 projects of "defined goals" with a total funding of 1.072 million yuan and an average of 346,000 yuan per project. Researchers who obtained the funding came from 22 research institutions (excluding collaborative ones).

In 2010, two types of projects to be supported are announced, namely, "Key Program projects", and "Projects with defined goals". Key Program projects have three directions, with the funding of 2 million yuan for each project, and the application is open to scientists in universities and research institutes in China. As for the projects with defined goals, 43 will be awarded and in particular, the applications are required to be within the research subjects listed in the *Guide to Programs*. The average funding for projects with defined goals will reach about 350,000 yuan per project. For detailed information, please refer to NSFC website (www.nsfc.gov.cn) or contact the administration office of the NSAF Joint Fund.

Key program projects

F1 Experimental and theoretical studies on phase change, melting and damage in material loading and unloading
F2 Design of single chip with high dynamic range and double system compatibility
F3 Stiffness and viscous reduction of melt casting explosives

Note: CAEP researchers may apply or participate, and cooperation with 2 to 3 units is encouraged.

Projects with defined goals

(1) Inter-atomic potential functions of transition metal in high pressure
(2) Packaging of laser ignited metal explosives
(3) Mixed gamma energy spectroscopy of neutron induced special targeted nuclide formation
(4) Preparation of embedded radioactive metal isotopic fullerene
(5) Synthesis of ring aromatic derivatives for rare earth metal separation
(6) Experimental studies on key technology of proton imaging, high energy proton flux
(7) Experimental and numerical simulation of microscopic mechanical behavior of PBX
(8) High precision measurement technology for geometric optical double eye vision of complex surface configurations
(9) Theoretical design and synthesis of high energy low sensitivity pyridine explosives
(10) Dynamical response of carbon fiber enhanced composite materials under impact
(11) Dynamical characteristics and numerical modeling of non uniform multiphase brittle

materials
(12) Analysis and control effect of last phase simple correcting mode
(13) Impact factors of silica aero gel composite thermal coating
(14) Basic research on hydrogen sensitive film and its micro optical fiber sensors
(15) Stress sensitive mechanism of piezo magnetic film and experimental studies
(16) High welting ability and high strengthen lithium alloy
(17) Design theory and experimental studies on reverse antenna arrays
(18) Theory and algorithm of simultaneous multi target detection based on signal part relevance
(19) Non-cooperative signal channel coding analysis
(20) Applied basic research on low temperature electrolyte of lithium ion battery
(21) Design theory of high directional antenna based on natural tree growth process
(22) Studies on inertia driven micro fluid conductance switch mechanism
(23) Aero elastic dynamics of dynamic pressure foil film bearings
(24) Key technology of high precision laser displacement measurement
(25) Preparation method of high damping, high strengthen alloy in low strain conditions
(26) Monitoring of forces in narrow gaps on closed spherical shells
(27) Preparation and performance of anti gamma radiation lead tungstate latex composite materials
(28) Laser molecular beam epitaxy growth of CeO_2 films and the structural and performance analysis
(29) Measurement of internal shape and shell thickness distribution of transparent target shells
(30) Optimization and enhancing film damage threshold by growth structural preference
(31) Studies on strong dispersion photon crystal materials
(32) Studies on the laws and technology of using ion beam surface treatment to increase loading
(33) Synthesis and mechanism of new types of heat resisting polymer imines
(34) Relativistic effect and electronic coherence effect in copper and gadolinium atomic dynamic process
(35) Research and programming of irregular grid Front Tracking method
(36) Applied research on artificial solution of computational dynamic equations and particle transport equations
(37) Research and programming of high efficiency finite volume method for radiation three temperature and energy equations
(38) Time reversal and its application in high power microwave technology
(39) Basic research on kilo eV X-ray band high order harmonic wave generation
(40) Studies on MHz high repeated frequency sub ns short pulse laser generation and amplification technology
(41) Studies on increasing breakdown threshold by low temperature plasma treatment of insulator material surface

(42) Chirped pulse spectroscopic shaping technology based on sub structure optical fiber gratings
(43) Studies on new types of nano/micro crystal and glass composite laser materials

Please see separate publications or go to the CAEP website www.caep.ac.cn for detailed information on specific content and form of research results, etc.

Joint Fund of Astronomy

NSFC and the Chinese Academy of Sciences jointly set up the Joint Fund of Astronomy, which opens to all research institutions in China (especially non-astronomy research ones) and aims to combine NSFC's strength in evaluation, funding and management with the function and roles of the national research platforms (observation bases) in astronomical fields that have already been established by the Chinese Academy of Sciences. This combination will promote the effective use of these facilities to conduct astronomical research by researchers in universities and other research institutions, extend areas of space astronomical research, and make astronomical research in China better serve the national strategic needs.

The Joint Fund of Astronomy includes General Program and Key Program projects. It is included in the limitation search for research type projects (3 projects), but not included in the limitation search for General Program and Key Program. Key Program projects will not specify project titles and applicants may decide their project titles, research contents, research schemes and research funding according to the following 1-5 important scientific problems. The sixth problem is not within the scope of Key Program projects. In 2010, the Joint Fund of Astronomy plans to fund about 3 to 6 Key Program projects.

As a part of the National Natural Science Fund, the project application, evaluation and management of the Joint Fund of Astronomy will follow the regulations of NSFC and the agreement signed between NSFC and CAS. In 2010, the funding will be about 15 million yuan in total.

In 2010, the Fund will accept applications in the following six areas

(1) Scientists from research institutes and universities outside CAS astronomical observatory system to use optical, radio, infrared observation facilities and data to conduct observation and theoretical research on cosmology, galaxies, stars, the sun and solar systems and other basic astronomical areas (Researchers in CAS astronomical observatory system are not allowed to apply as PIs, but may be principal members of the

research group.);
(2) Research on observation techniques in space, including new observation techniques, new methods in space and pre-studies on key techniques of astronomical satellite, etc.;
(3) High energy, ultraviolet, optical, infrared and radio techniques related to astronomical observations, including the detection of week photoelectric signal, storage and transmission techniques, high energy, optical, infrared and radio techniques related to astronomical telescopes, automated control techniques and machinery, etc.;
(4) Storage, computation and sharing of mass astronomical data and virtual observatory techniques;
(5) Basic astronomical methods and key scientific problems originated from national strategic needs;
(6) Analytical research centering around frontier scientific areas in large astronomic observation facilities that are under construction or planned, in order to provide scientific guidance on the research, testing and operation of the facilities. Specific contents include the selection and verification of frontier scientific problems and scientific goals, selection and optimization of observation model and strategy, selection of specific observation objects, processing of observation data and information acquisition, error analysis and control, and the development of observation experimental simulation and theoretical models (only General Program projects are accepted in this area).

Joint Fund of Research on Major Science Facilities

NSFC and the Chinese Academy of Sciences have jointly set up the Joint Fund of Research on Major Science Facilities, which aims at making use of NSFC's strength in evaluation, funding and management to attract researchers in universities and research institutes to do frontier and multidisciplinary and intercrossing researches by using national major science facilities built by the Chinese Academy of Sciences, foster research talents of major science facilities, develop new research directions, bring into full play the overall capability of these major science facilities, promote the exchange and opening up, upgrade our innovation capability in basic science and creativity in frontier science areas, and make Chinese basic research better serve national strategic needs.

As a part of the National Natural Science Fund, the project application, evaluation and management of the Joint Fund of Research on Major Science Facilities will follow the regulations of NSFC and the agreement signed between NSFC and CAS. The major science facilities referred to in this joint fund are BEPC and BES in Beijing, HIRFL-CSR in Lanzhou, SSRF in Shanghai and NSRL in Hefei.

The Joint Fund of Research on Major Science Facilities includes General Program and Key Program projects. In 2010, the total funding will be 40 million yuan (20 million yuan for General Program projects and 20 million yuan for Key Program projects). The average funding for a Key Program project is about 2.5 million yuan and that for a General Program project is about 400,000 yuan.

This joint fund mainly supports research in the following three areas:

(1) Research using general equipment, focusing on multi-disciplinary research in physical sciences, information science, material science and environmental science, etc, and the development of new research directions;
(2) Research using special devices, such as high energy physics research on BES and nuclear physic research on HIRFL-CSR in Lanzhou;
(3) Research on techniques and methods that improve experimental capability of major facilities and development and key technology for small specialized devices.

Main research areas for General Program projects in 2010

Multidisciplinary research on synchrotron radiation in physics, chemistry, life science, medical science, environmental science, material sciences, geology, microelectronics and micromechanics; experimental studies on τ-charm physics on BESII and basic research on relevant software and data analysis; nuclear physics experimental studies on HIRFL-CSR in Lanzhou and applied basic research on heavy ions; studies on ion beam in life science, medical science, material science and semiconductor defect engineering, etc.; new principles, new technology and methodology of beam line; particle accelerator and key technology, method and equipment for particle detectors.

Main research areas for Key Program project in 2010

Research areas are more than funded projects in number, applicants may decide project title, research content and research scheme according to their own situation. It is encouraged that applicants collaborate with researchers of the facility.

1. Basic and applied research based on synchrotron radiation facility

(1) Environmental interface process and environmental pollutant structure and mechanism of transfer and transformation
(2) Catalyst structure and *in-situ* studies on catalyzing process
(3) Frontier problems in structural biology
(4) High resolution cell imaging
(5) Structure and property of new functional and structural materials (such as new energy material, light high strength composite materials, temperature sensitive nano material and room temperature rare magnetic semiconductors, etc.)

(6) Electron structure and physical properties in strong coherence systems
(7) Water and its composite system
(8) Ion liquid properties

2. Physics based on BESIII

(1) Method and software of experimental data analysis;
(2) Charm physics and charmonium physics

3. Physics and applied research on HIRFL-CSR in Lanzhou

(1) Chemical properties of ultra heavy element
(2) Mass measurement based on CSRe short life nuclide
(3) Ground simulation of space radiation environment

4. Technology, principle and methodology of particle accelerator, detector and beam line station

(1) Highly integrated reading technology for detecting devices
(2) Beam instability and control technology
(3) Key problems of high charge state heavy ion RFQ
(4) CSR short pulse synchrotron radiation technology
(5) Development of key optical devices for synchrotron radiation

NSFC-Guangdong Joint Fund

NSFC and the Guangdong Provincial Government jointly set up the Joint Fund of Natural Science (NSFC-Guangdong Joint Fund for short), trying to attract outstanding scientists in Guangdong Province and other areas in the country to solve major scientific problems and key technical problems in the future development of economy, society, science and technology in Guangdong and the Pearl River delta region, and promote the scientific and technological development and fostering of talent teams in Guangdong Province.

NSFC-Guangdong Joint Fund is open to scientists all over China, and is part of the National Natural Science Fund. NSFC is responsible for receiving applications. The application, evaluation and management will follow the regulations of NSFC and the detailed procedures of the Joint Fund.

In 2010, the Joint Fund plans a total funding of 48 million yuan, accepting applications in 5 areas listed below. The Joint Fund mainly supports Key Program projects, with a funding of 1.5 to 2.5 million per project, and at the same time, supports some General Program projects with a funding ranging from 300 to 600 thousand yuan per project.

Eligible researchers all over the country are welcome to apply according to the scope and requirement in the Guide.

I. Agriculture

1. Agricultural bio (genetic) resources and functional genome

To conduct research, by focusing on important agricultural products in Guangdong, on bio (genetic) resources and functional genome, and to provide theoretical basis for industrial development.

Main research directions:
(1) Basic research on new high quality and disease resistant genes and molecular design breeding of rice (select C1306 for application code II);
(2) Developmental mechanism of marine pearl oyster (select C1401 for application code II).

2. Animal and plant resistant mechanism and disease control

To conduct research on relevant resistant mechanism, and promote healthy industrial development by focusing on important agricultural products in south China.

Main research directions:
(1) Epidemics of common fruit tree disease epidemiology in south China (select C1501 for application code II)
(2) Basic research on finding and utilization of important pest natural enemy resources in south China (select C1406 for application code II)
(3) Cold resistance mechanism of main aquaculture farming species in tropical and sub tropical regions (select C1901 for application code II)
(4) Drug resistance mechanism of important poultry disease germs (select C1807 for application code II)
(5) Research on molecular mechanisms of disease resistance and reverse resistance of Solanaceae vegetables in high temperature and high humidity conditions (select C1502 for application code II)

3. Eco safety

Invasion of alien species is an important eco safety issue in south China. To conduct basic research on the mechanism of invasion, damaging effect and eco-risks by taking ampullaria gigas as research objective.

Main research direction:
Research on the mechanism of invasion, path of invasion and eco-risks of major alien species in south China (select C0313 for application code II).

4. Food safety

Research on the monitoring and hazard mechanism of commonly occurred and important disease inducing food pollution in tropical and sub tropical regions.

Main research direction:

Studies on the genetic diversity and hazard mechanism of food related, commonly occurred and important disease inducing bacteria in south China (select C2001 for application code II).

II. Population and health

1. Prevention and cure of common diseases

To conduct basic research on the prevention and cure of common diseases among urban mid-aged to elderly people.

Main research directions:

(1) Basic research related to Osteoporosis type spinal degeneration and cure (select H0609 for application code II);

(2) Basic research on nutritional food for the control of metabolic diseases among population in the south (select H2603 for application code II);

(3) Radiation and chemical treatment of cancer in respiratory system and molecular mechanism of targeted treatment resistance (select H1615 for application code II).

2. Stem cell and tissue engineering

Research on the sources of stable stem cells, engineering composite materials and artificial organ aimed at developing biomaterial as alternatives, so as to replace self organ as the treatment of major organ functional failure and serve as supplementary ways of organ transplantation.

Main research directions:

(1) Basic research on stem cell formation, differentiation and identification (select H1822 for application code II);

(2) Basic research on stem cell applications (select H1822 for application code II).

3. Neural science

It mainly supports research on the basic process of neural system activities, neural information processing and new functional gene of neural system that can promote the overall development of neural science disciplines, focusing on major problems of research frontiers in neural science.

Main research directions:
(1) Molecular mechanism of neural damage, repair and apoptosis (select H0910 for application code II);
(2) Studies on important mental diseases (select H0919 for application code II).

4. Traditional Chinese medicine (TCM) and herbs

While inheriting and developing basic theory of TCM, to promote the intercrossing of TCM theory and other disciplines of modern science, focusing closely on goals of the national strategic development of TCM, and to solve major scientific problems in developing TCM in Guangdong Province.

Main research direction:
(1) Important basic research on herb germplasm in Lingnan Region (choose H2801 for application code 2);
(2) Theory and new methods in TCM (choose H2903 for application code 2).

III. Resources and environment

1. Studies on red soil in south China

To conduct relevant basic research by focusing on the impact of acid precipitation and industrial and agricultural activities on the sustainable use of red soil, agricultural product and eco safety and restoration of degraded soil.

Main research directions:
(1) Impact of human activity on the sustainable utilization of red soil resources, agricultural products and eco safety (choose D01 for application code 2);
(2) Principles of restoring technology for degenerated red soil in south China (choose D01 for application code 2).

2. Control of air pollution for cities in the Pearl River Delta

To conduct relevant basic research by focusing on the characteristics of composite air pollution, the formation mechanism and impact of human health and ecosystem in cities in the Pearl River Delta.

Main research directions:
(1) Structure, composition and source analysis of secondary organic aerosols in cities in the Pearl River Delta (choose D05 for application code 2);
(2) Regional effect and impact on human health by air pollution in the Pearl River Delta (choose D05 for application code 2).

3. South China Sea marine resources and environment

South China Sea marine resources are important strategic resources in the country, this project aims at basic research on South China Sea, especially on the deep sea in order to provide a theoretical basis for the reasonable exploitation and protection of South China Sea marine resources.

Main research directions:

(1) Mechanism of reservoir formation and drilling technology for deep oil, gas, natural gas and hydrates (choose D06 for application code 2);

(2) Biodiversity in the deep sea around Zhongsha and Xisha islands (choose D06 for application code 2);

(3) Near shore upwelling system in South China Sea and the resources and environmental effect (choose D06 for application code 2).

IV. Materials and engineering

1. Materials science

To conduct R&D on high performance, long life and high reliability structural materials and functional materials and their manufacturing technology to meet the demand of pillar industries in Guangdong Province.

Main research directions:

(1) Basic research on key technologies of cast forming with precision for large and light alloy parts (choose proper code under E04 and E05 for application code 2);

(2) Design, construction and performance of high strength, high conductivity and high wear resistance cooper alloys (choose proper code under E01 and E05 for application code 2);

(3) Basic research on polymer and hybrid materials (choose proper code under E03 for application code 2);

(4) Key scientific problems in the utilization of ceramic wastes (choose proper code under E02 for application code 2).

2. Utilization of new energy and energy saving technology

To conduct research on new materials focusing on materials used in fuel cell, lithium battery and high efficiency and low cost solar cells, and to study thermal problems in large power lighting LED and energy saving drying technology for thermal sensitive materials.

Main research directions:

(1) Applied basic research related to new energy materials (choose proper code under E01 to E06 for application code 2);

(2) Thermo physical problems for intensive lighting LED (choose proper code under E06 for application code 2);
(3) Thermo physical problems for energy-saving drying technology for thermal sensitive materials (choose proper code under E06 for application code 2).

3. Advanced manufacturing

To conduct relevant basic research for electronics and information technology.

Main research directions:
(1) Precision manufacturing and key technologies for electronics and information technology (choose proper code under E05 for application code 2);
(2) Key theoretical problems in embedded numerically controlled system design and realization (choose proper code under E05 for application code 2).

V. Electronic and information technology

1. Digital creation and modern information services

To mainly study, by focusing on key problems and technical demand in future development of digital creation industry and modern information service industry, basic theory and key technologies in complex information system for digital-creation based life space and modern information service industry, sharing across areas and business coordination software in integrated applications.

Main research directions:
(1) Theoretical methods and core technology for digital-creation based life space (choose F02 for application code 2);
(2) Theory and supporting technology for cross-area sharing and business coordinated software in integrated applications (choose F02 for application code 2);
(3) Theory and key technology of digital multimedia representation and processing (choose F03 for application code 2).

2. New generation communication theory and application

To meet the need of wideband and isomerization for next generation communication and by focusing on the bottle neck problems in wideband mobile wireless communication network and ultra wideband wireless network in short distance, it is to develop the basic theory on physical level, transmission level and network level, achieve relevant core technologies with innovation, and to develop the new generation communication network system.

Main research directions:
(1) Theory and key technology of connection control and web formation in wireless ultra

wide bandwidth communication network (choose F01 for application code 2);
(2) Cognition and coordination theory and key technology of mobile wireless communication (choose F01 for application code 2);
(3) High speed coordinated wireless communication for individual domain network (choose F01 for application code 2).

NSFC-Yunnan Joint Fund

NSFC and the Yunnan Provincial Government jointly set up the Joint fund of Natural Science (NSFC-Yunnan Joint Fund for short) in order to implement the Outline of the National Medium- and Long-term Program for Scientific and Technological Development (2006-2020), to practice "Science and technology initiative for a better Yunnan", to attract more talented professionals, and to carry out basic research on important scientific problems and key technical tissues of the economy, society, science and technology around Yunnan and adjacent regions, to booster the development of science and technology and the construction of talents team, to advance the independent innovation and international competition, and to promote the sustainable development of regional economy and society.

The Joint Fund is open to scientists all over China, and is part of the National Natural Science Fund. NSFC is responsible for receiving applications. The application, evaluation and management will be performed following the Regulation on the National Natural Science Fund and related administrative measures as well as the detailed procedures of the NSFC-Yunnan Joint Fund.

In 2010, the Joint Fund plans a total funding of 27 million yuan, mainly for applications for Key Program in 4 areas listed below, with a funding of 1.5 -2.5 million yuan per project. Eligible researchers all over the country are welcome to apply according to the research scope and requirement in this guide.

I. Protection of biodiversity

Studies on biodiversity researches in three levels (i.e. ecosystem, species and genetics) aiming at the important economic organisms of plateau mountain regions to provide a scientific basis for the protection and utilization.

1. Preservation and utilization of biodiversity

Main research directions:
(1) Studies on the diversity of genomes of important bio resources and genetic resources (choose C0312 for application code 2);

(2) Biodiversity and eco adaptation mechanism in special environment (choose C0312 for application code 2);
(3) Coordinated evolution and coexistence of living organisms in tropical eco system (choose C0312 for application code 2);
(4) Impact of eco change on biodiversity in Lancang River, Nu River, Jinsha River and highland lakes (choose C0312 for application code 2);
(5) Basic research on sustainable utilization of important bio-resources in northwest Yunnan Province (choose C0312 for application code 2).

2. Protection and utilization of agricultural bio resources

Main research directions:
(1) Mechanism of disease and pest control by biodiversity (choose C1406 for application code 2);
(2) Preservation and utilization of species resources of typical livestock and poultry in Yunnan (choose C1701 for application code 2);
(3) Basic research related to the analysis, evaluation, protection and utilization of important economic plant resources (choose C0206 for application code 2);
(4) Basic research on the high efficient use of important wood and bamboo resources (choose C1601 for application code 2);
(5) Basic research on the high efficiency use of bio energy and species resources (choose C1601 for application code 2);
(6) Basic research on the control of major animal diseases (choose C1805 for application code 2).

II. Population and health

1. Basic research on drug discovery aiming at major human diseases by using typical resources in Yunnan

Main research directions:
(1) Discovery, optimization and functional mechanism of natural pharmaceutical active materials (choose H3002 for application code 2);
(2) Basic research on ethnic medicine in Yunnan (choose H2818 for application code 2);
(3) Basic research on the protection and cultivation of important endangered herbs (choose H2801 for application code 2);
(4) Basic research on new types of highly effective low poison noble metal (platinum, etc.) anti cancer drugs (choose H3105 for application code 2).

2. Study of the occurring mechanism, genetic characteristics and prevention and cure aiming at frequently occurred diseases, genetic diseases and major regional diseases in Yunnan and its adjacent ethnic minority districts

Main research aspects:
(1) Basic research on highly occurred diseases, genetic diseases and tumors in ethnic minority regions (choose H2401 for application code 2);
(2) Basic research on drug addiction and withdrawal, and the treatment of epidemic diseases including AIDS (choose H0918 for application code 2).

III. Resources and environment

1. Basic research on the exploration and evaluation of non-ferrous metal resource

To meet the demands of mineral resources security and development of mining industry as the pillar industry of Yunnan Province and focusing on mineral rich regions in Yunnan and the surroundings, it is to conduct research on the laws of mineral distribution and deposit mechanism of metal ores.

Main research direction:
Studies on the deposit mechanism in metal rich regions in Yunnan and its surrounding areas (choose D02 for application code 2).

2. Mechanism of formation and warning of geological disasters in Yunnan-Guizhou Plateau

Focusing on special geographical landscape and climatic environment, it is to conduct basic research on the mechanism of formation, trend of changes and impact of geological disaster and dynamic background.

Main research directions:
Mechanism of the formation and warning of mountain disasters such as landslide, etc. (choose D02 for application code 2).

3. Basic research on eco-environmental restorations

Highland eco-environmental restoration is a major problem in the sustainable social and economic development of Yunnan Province. It is to conduct basic research on new theory and new methods of protection and pollution control for major engineering projects and highland lakes and wetlands.

Main research directions:
(1) Environmental impact and disaster effect of major engineering projects and modes of restoration (choose D01 for application code 2);
(2) Laws for the evolution, eco-environmental protection and restoration of highland lakes (choose D01 for application code 2).

IV. Utilization of mineral resources and new materials

1. Basic research on the preparation and processing techniques of new nonferrous metals and nonmetal materials

Basic research will be focused on the high efficiency use of non-ferrous and non-metal materials in Yunnan.

Main research aspects:

(1) Basic research on the design and application of high temperature alloy containing rare and precious metals (choose proper code under E01 and E05 for application code 2);

(2) Basic research on the structural design and preparation of ultra-hard metal materials (choose proper code under E01 and E04 for application code 2);

(3) Preparation and physical properties of new types of inferred photoelectric detection materials (choose proper code under E01 and E02 for application code 2).

2. Basic research on new metallurgical technology

To conduct basic research around the high efficiency and integrated use of mineral resources which is the strength of Yunnan Province and the demand of its industrial development.

Main research aspects:

(1) Basic research on the extract technology of high purity non-ferrous metals (choose proper code under E04 for application code 2);

(2) Basic research on the energy saving and low consumption technology for non-ferrous metal metallurgy (choose proper code under E04 for application code 2);

(3) Studies on new separation method for ores which are in low grade and hard to select and complex (choose proper code under E04 for application code 2);

(4) Studies on new method of reduction metallurgy of high phosphor content iron ores (choose proper code under E04 for application code 2);

(5) Key problems in the utilization of mining wastes (choose proper code under E04 for application code 2).

3. Others

Basic research on the high efficient use of renewable energy such as solar energy (choose proper code under E02, E04 and E06 for application code 2).