Programs of Joint Funds

The joint funds set up by NSFC and other relevant government departments, provincial 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 2011, the joint funds in the Guide include NSAF Joint Fund, Joint Fund of Astronomy, Joint Fund of Research on Major Science Facilities, Iron and Steel Joint Fund, Coal Joint Fund, Civil Aviation Joint Fund, NSFC-Guangdong Joint Fund and NSFC-Yunnan Joint Fund.

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.

In 2011, the funding intensity for all joint funds will be increased moderately, and the funding period will remain unchanged, namely, 3 years for General Programs and 4 years for Key Programs. The limits on the number of on-going and pending projects one applicant may hold also apply for Joint Fund Programs here. Please refer to the sections concerned in the Guide for detailed requirements in this respect.

NSAF Joint Fund

Jointly set up by NSFC and the Chinese Academy of Engineering Physics (CAEP), the Fund is aimed to encourage scientists in related fields to carry out basic and applied researches for national security by taking advantage 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 defence, and foster young professionals in this area. NSFC and CAEP issue *the Guide to Programs*

according to the research needs.

In 2010, NSAF Joint Fund received 77 applications in total, and funded 35. The total funding was 14.10 million yuan. Among them, there were 2 Key projects with a total funding of 4 million yuan, and 30 projects of "defined goals" with a total funding of 10.1 million yuan, the average funding being 337,000 yuan per project. Researchers who obtained the funding came from 24 research institutions.

In 2011, three types of projects will be funded, namely, "Key projects", "Encouraged research orientation projects", and "Projects with defined goals". Key projects include two 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. Encouraged research orientation projects include 2 directions, and Projects with defined goals include 34 topics, and in particular, the applications are required to be within the research subjects listed in the *Guide to Programs*. The average funding intensity for encouraged research orientation projects and Projects with defined goals will be 400,000 yuan per project (for 3 years). For more detailed information, please refer to NSFC subside (www.nsfc.gov.cn) or contact the administration office of the NSAF Joint Fund.

Key projects

F1 Studies on quasi isentropic compression properties of 100 GPa interior materials
F2 Numerical simulation studies on high energy proton photography
Note: CAEP researchers may apply or participate in key projects, and cooperation with 2 to 3 other institutions is encouraged.

Encouraged research orientation projects

GL1 high efficiency algorithm and performance optimization for peta flops supercomputing
GL2 multi scale numerical simulation for material science
Note: CAEP researchers may not apply for or participate in encouraged research orientation projects.

Projects with defined goals

(1) Theoretical studies on mechanism and laws of aluminum containing meta-stable intermolecular compound reactions
(2) Macro and micro structure regulation and property characterization of PZT95/5 ferro-electric ceramics
(3) Technology and media property of angular multiplexing multi-frame laser holographic recording

(4) Physical and chemical stability domain and uranium holding capability of pitchblende
(5) Studies on methods of finding mass abundance of uranium components using signals related to actively evoked uranium fission time
(6) Reduction of radioactive waste and recycling of nuclide using microorganism
(7) Generation and evolution of crystal defects in ammonium nitrate explosives
(8) Molecular design and synthesis of total nitrogen compound
(9) Theoretical studies on quantification of uncertainty in complex and systematic health evaluation
(10) Theory and application of structural movement and deformation coupling in centrifugal field
(11) Identification and method of variation prediction of structural characteristic parameters based on nuclear functions
(12) Preparation and performance of heat conducting particle filled PSF composite materials
(13) Studies on models of electric characteristics of MEMS 3-D THz passive components
(14) Studies on intelligent wireless TT technology based on cognitive radio
(15) Studies on spatial power combining technology and radiation characteristics of UWB THz source
(16) Multiple imaging and matching technology of special target based on large maneuverable moving platform
(17) Simulations of temperature, stress and tissue field coupling in quenching process of low alloy super high strength steels
(18) Studies on solidification of actinides by Gd2Zr2O7 pyrochlore
(19) Studies on preparation of Bragg grating and its wide band Properties
(20) Studies on mechanism of stress release under heat effect of anisotropic based high energy laser membrane
(21) Dynamics and mechanism of density gradient formation of polymer foam forming in confined system
(22) Studies on forming mechanism and properties of metallic nano particle doping and deuterated polystyrene conductive fiber
(23) Method of evaluating electromagnetic effect in complex electronic systems based on system electromagnetism
(24) Studies on design technology of conformal software antenna based on complex carrier
(25) Studies on technology of instability reduction by active and passive MR damping
(26) Studies on technology of online regulation of super conducting acceleration cavity frequency
(27) Studies on technology of automatic identification of abnormal behavior of moving targets
(28) Studies on behavior audit based on rough set knowledge reduction algorithm
(29) Studies on method of end simplified correction mode analysis and control efficiency

(30) Channel coding analysis of non-cooperative signals
(31) Design theory of super directive antenna based on natural tree growth process
(32) Studies on aero elastic dynamics of dynamic pressure foil bearings
(33) Studies on preparation and performance of γ resistant plumbous tungstate emulsion composite materials
(34) Studies on front tracking method of irregular grid and programming

Note: CAEP researchers may not apply for or participate in projects with defined goals. Please refer separate publications or the CAEP website (http://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. 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 issues. The sixth issue is not within the scope of Key Program projects. In 2011, the Joint Fund of Astronomy plans to fund about 4 to 6 Key Program projects.

As a part of the National Natural Science Fund, the application, evaluation and management of the Joint Fund of Astronomy comply with the regulations of NSFC and the agreement signed between NSFC and CAS. In 2011, the funding will be about 15 million yuan in total. There will be a moderate increase in the funding intensity. For the General Program, the average funding will be about 350,000 yuan per project for 3 years, and for Key Program projects, the average funding will be about 2 million yuan per project for 4 years.

In 2011, the Fund will accept applications in the following six areas

(1) Scientists from research institutions 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 participate in the research as 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 issues originated from national strategic needs;
(6) Analytical research on frontier scientific areas in large astronomic observation Facilities, those are under construction or planned, for providing scientific knowledge on 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 application, evaluation and management of the Joint Fund of Research on Major Science Facilities comply with 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 2011, the total funding will be 40 million yuan, with 20 million yuan for Key Program projects and 20 million yuan for General Program projects. The average funding for a Key Program project is about 2.5 million yuan (for 4 years) and that for a General Program project is about 450,000 yuan (for 3 years).

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

Main research areas for General Program projects in 2011

Multidisciplinary research on synchrotron radiation in physics, chemistry, life sciences, medical sciences, environmental sciences, material sciences, geology, agriculture, 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 sciences, medical sciences, material sciences 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 2011

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

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) Studies on large bio molecular structure and functional relations using integrated methods and technology

(4) High resolution biomedical imaging technology and method

(5) Multi level micro structure formation and evolution in preparation process of polymer materials

(6) Structure and property of new functional material and special composite material

(7) Electron structure and physical properties in strong coherence systems

(8) Structure and property of matters inside earth

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) Radioactive nuclear beam physics based on HIRFL

(2) Technology and method of ground simulation of space radiation environment and effect of single particle effect

(3) Biological effect of heavy ion radiation and mechanism of cancer treatment

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

(1) Key technology for optical devices and detection devices for synchrotron radiation

(2) New theory and key technology of advanced light source

(3) Key technology of high performance running of strong beam accelerators

(4) Precision and stability of synchronization mode setting up on CSR

(5) Key physics and technology in strong heavy beam transportation and preparation

(6) Precision checks for long mirror shape at nano radian level

Joint Fund of Iron and Steel Research

The Joint Fund of Iron and Steel Research was set up by NSFC and Baoshan Steel Complex. The Joint Fund aims closely at major issues and the strategic development of Chinese iron and steel industry. The Joint Fund supports foresighted and innovative research, promotes the integration of knowledge and technology innovation, speeds up the research and development of new technologies and products in metallurgy and materials through scientific and technological innovation, upgrades traditional industry,

and increases the competitiveness of Chinese iron and steel industry. The budget for 2011 is 12 million yuan, in which the funding intensity is 350,000 to 450,000 yuan per General Program project for 3 years, and 2 to 2.4 million yuan for each Key Program project for 4 years.

The Joint Fund is open to scientists all over China, with the key funding areas ranging from new metallurgical technologies and relevant techniques, materials, energy, environment, equipment, to information science and so on, which are of great significance to the nation's iron and steel industry.

The application, evaluation and management of the Joint Fund comply with the regulations of NSFC for relevant programs. Applications are accepted and processed by NSFC's Department of Engineering and Materials Sciences, and administered jointly by NSFC and Baoshan Steel Complex.

The Joint Fund promotes collaborations among the industry, university and research institutions, gives priorities to young talents, encourages applications from non-metallurgic universities and research institutes, and encourages further joint funding from other sources.

Research areas for General Program projects in 2011

1. Technologies in energy, environmental protection and sustainable development related to iron and steel industry

(1) Applied basic research on the efficient recycling of heat in high temperature steel slag and value added utilization

(2) Laws of heavy metal exhaust in sintering smoke and new technology of coordinated control of persistent organic pollutants

(3) Basic research on bio mass metallurgy (sintering, coking, blast furnace, etc.)

(4) Development of technology and metallurgical process for efficient use of poor iron containing resources

(5) Basic research on all component, large quantity and efficient recycling of hard-to-treat solid metallurgical wastes

(6) Applied basic research on value added, fine and direct use as materials of solid metallurgical wastes

2. Basic research in iron and steel industry

(1) Studies on scale reduction technology

(2) Studies on low density light steels

(3) Basic research on new nano Oxide Dispersion Strengthened steels

(4) Studies on mechanism of toughening of super martensite stainless steel

(5) Copper and boron containing heat resistant stainless steels
(6) Mechanism of corrosion resistance and high temperature strengthening of new high temperature materials used in advanced super supercritical power station
(7) Studies on precipitate on thin strip continuous casting low carbon micro alloy

3. New technology and new method in iron and steel industry
(1) Using limestone to replace lime slag in oxygen converter
(2) Segregation control in continuous casting of high carbon and high sulfur steel
(3) Studies on mechanism of defect formation in surface of cold rolling silicon steel
(4) Tissue control of hydrogen damage on nickel based alloy
(5) Studies on mechanism and performance of fine strengthening of surface nano crystal low alloy plate using supersonic bombardment

4. New equipment technology in iron and steel industry and applications of information and control technology
(1) Distribution and mechanism of temperature within heat crossing layer in induction heating
(2) Laws of metal flow in rolling process of varying thickness
(3) Mechanism of electro transfer of surface morphology in cold rolling and smoothing process of UHSS plate
(4) Method of prediction and control of deformation after spot welding on UHSS component

Research areas for Key Program projects in 2011

1. Studies on development and application of oxygen rich (or pure oxygen) technology in steel making and key technology of CO2 capture
Development of oxygen rich burner and study of combustion process; numerical simulation and analysis of oxygen rich combustion process; influence and analysis of oxygen rich combustion on product quality and yield; CO2 separation, capturing technology and related technical studies; property of coal gas after CO2 separation and technology related to recycling; analysis of the economics of the oxygen rich combustion and CO2 capturing system.

2. Evolution of the second phase of nickel base alloy oil well pipe and its effect on corrosion resistance
Study on types, structure and laws of evolution of the second phase generation in thermal treatment process such as forging, hot extrusion, solution treatment and by different component of ferro and nickel base austenite alloy; analysis of the laws of influence by nucleating thermodynamics, distribution, micro regional component and elastic deformation of the second phase; study on the mechanism of local corrosion and stress

corrosion of nickel base alloy in high sulfur containing environment, explore the mechanism of second phase induced corrosion; explore the technical basis of controlling local corrosion and stress corrosion from material components, technology and tissue controls.

3. Effect of fast heat treatment process cooling and heating speed on steel tissue and precipitation phase

Pay attention to the thick plate of carbon steel, micro alloy steel and high strength steel and thin plate of stainless steel. Study on the thick plate including the effect of original crystal particle size, the effect of alloy element such as C, Mo, B, Cr; the effect of tempering heating speed and tempering temperature. Study on the thin stainless steel including the changes of the tissue property in the intermediate solution treatment process, the softening treatment, and the product heat treatment process.

4. Studies on mechanism of fatigue on the high temperature end and corrosion on the cold end of super pure ferrite stainless steel used in automobile exhaust system

Study on the laws of influence of component and time on fatigue life and fatigue strengthen of super pure ferrite stainless steel, the morphology of fatigue fracture and evolution of micro tissue structure induced by fatigue, the role of creeping and oxidation in high temperature fatigue damage of super pure ferrite stainless steel, and the development of the prediction model of high temperature fatigue life of super pure ferrite stainless steel. Study on the corrosion mechanism including the simulation of corrosion process at the cold end of the exhaust system and electro chemical mechanism, the mechanism and laws of influence of alloy type and contents in steel on corrosion resistance, and the method of fast evaluation of corrosion.

5. High temperature oxidation behavior in crystal boundary of nickel base alloy plate and strip

Analyze of laws and mechanism of crystal boundary oxidation of typical nickel base alloy materials under different temperature conditions. Study on the laws of influence of alloy element such as Cr on oxidation behavior on crystal boundary, the effect of crystal particle size on oxidation behavior on crystal boundary, and the role of different technology on improving crystal boundary condition and high temperature oxidation.

6. New technology and new techniques in iron and steel industry

3 to 5 Key Program projects will be selected and funded from the above-mentioned areas.

Joint Fund of Coal Research

The Joint Fund of Coal Research was set up by NSFC and Shenhua Group Corporation

Limited (Shenhua Group in short hereinafter). The first phase is 3 years (2011-2013) with the funding of 150 million yuan. This Joint Fund aims closely at major issues and the strategic development of Chinese coal, thermal power, coal chemical engineering, new energy industries, and supports fundamental, foresighted and innovative research, promotes the integration of knowledge and technology innovation, fosters S&T talents and improves the competitiveness of Chinese coal and related energy industries.

This Joint Fund is open to all researchers in China, mainly support basic research in areas of coal development and utilization.

(1) Coal development include: coal mining, production safety, utilization and preservation of mining resources, coal quality improvement, and coal-bed gas development;
(2) Coal utilization include: thermal power, clean coal conversion, Energy Conservation & Emission Reduction and related new energy areas;
(3) Research project having important scientific merit and coal development background.

The Joint Fund promotes collaborations among the industry, university and research institution, gives priorities to young talents, encourages applications from non-coal universities and research institutes, and encourages further joint funding from other sources.

As a part of the National Natural Science Fund, the application, evaluation and management of the Joint Fund of Astronomy comply with the regulations of NSFC. NSFC and Shenhua Group manage jointly this joint fund, and the Department of Engineering and Material Sciences is responsible for applications and evaluations.

The budget for 2011 is 50 million yuan. According the actual application, 10-15 projects of the Key Program with the funding of 2.3 to 3 million yuan per project (for 4 years), and 30-50 projects of the General Program with the funding of 400,000 to 700,000 per project (for 3 years).

Research areas for General Program projects

1. Production safety in coal mine
(1) Theory of ventilation and gas prevention and control for extra large mine shaft
(2) Control of water and sand inrush in coal mine
(3) Laws of deformation, damage and motion of excavation rock layer in deep thin base rock region of shallow coal mine in west China
(4) Mechanism of coal spontaneous combustion transition and detection of hidden fire in mined area

(5) Laws and evaluation methods for dynamic damage and destruction of bolt-spray support structure in tunnels
(6) Principle and method of wireless communication in mine shaft
(7) Key issues in mobile and emergency communication in mine shaft

2. Clean processing and integrated utilization of coal
(1) Basic research on the quality improvement of brawn coal
(2) The development and integrated utilization of coal and associated resources

3. Eco environment in mining site
(1) Basic research on the relationship between mining and surface eco environment
(2) Laws of evolution and principle and method of preservation and eco recovery of ecological fragility in mining site

4. Basic research on the efficient and clean coal firing power technology
(1) Basic research on key technologies of sea water desalination for "hydro power integration" in coal firing power plants
(2) Basic research on the power generation by 700℃ super supercritical coal firing
(3) Integrated theory for near zero emission power generation and IGCC all around production system

5. Reduction of coal firing pollutants
(1) Coordinated control of multiple pollutants in coal firing smoke
(2) Emission control of coal fired super fine particles

6. Basic research on key technology of large wind farm operation
(1) Analysis of anemometer tower data and prediction of wind power in wind farm
(2) Monitor and warning of wind farm equipment
(3) Safe and stable running of wind farm and powerless adjustment and control

7. Basic research on the high efficiency graded use of low price coal

8. Efficient coal conversion catalyst
(1) Basic studies on the catalyst of direct coal liquefaction, ferro catalyst of indirect liquefaction
(2) Basic research on the development of catalyst for oil product refinement such as direct liquefaction of coal, the oil extraction from liquefaction residue, low temperature pyrolysis of coal tar, and indirect liquefaction of coal
(3) Basic research on the catalyst for methane productions from coal

9. New technology and new method in coal conversion

(1) Basic research on physical and chemical properties of medium to low temperature tar

(2) Basic research on properties of mixed refinement of low to medium tar and crude oil

(3) Basic research on the relevant technological method of direct liquefaction of coal to oil, oil extraction from liquefaction residue, low temperature pyrolysis of coal tar, and indirect liquefaction of coal

10. Basic research on coal chemistry

(1) The Chemical basis of direct liquefaction of coal process

(2) Laws of variation of gasification reaction of various microlitho components of different quality coals

(3) Mechanism of making coke water slurry using semi-coke of brown coal as raw materials and principle of selecting additives

11. Temporal behavior and long term performance of bridge structure for heavy haul railway

(1) Creep property of heavy haul railway bridges

(2) Fatigue and damage mechanism of heavy haul railway bridges

(3) Studies on the mechanism of performance degeneration of heavy haul railway bridge structures under multiple influencing factors and numerical methods for analysis of performance evolution

(4) Theory of analyzing temporal behavior and long term performance of heavy haul railway bridge structures

(5) Performance evaluation and life prediction of heavy haul railway bridge structures

12. Basic research on the key technology for heavy haul railway transportation

(1) Optimization of braking control system of heavy haul trains

(2) Theory and method of bridge design on heavy haul railway for heavy loading and frequent traffic

(3) Mechanism of damage and strengthening technology for sub-grade structures of heavy haul railway

(4) Studies on the mechanism of rail damage in heavy haul railway

13. Basic research on the key technology for integration of signals of railway communication

(1) Wireless wide band communication and computation for heavy haul trains

(2) New technology of communication signals integration

14. Key technology for port and shipping path safety

(1) Mechanism of mud and sand movement for muddy and sandy coast

(2) Mechanism of back sedimentation in shipping path in muddy and sandy coast

(3) Basic research on the water depth monitor in shipping path and port

Research areas for Key Program projects

(I) Coal excavation and safety

1. Basic research on the safe ventilation technology for intensive production using one mining face

Study on the characteristics, relations with excavation layout of ventilation system in mine shaft for highly intensive production, the optimization of ventilation network and method to improve reliability, stability and efficiency of ventilation system

2. Theory and method of fire region control in coalfield

Study on the mechanism of spontaneous combustion of coal layer in large coalfield, and the cause, mechanism, the influencing factor of fire occurrences, the distribution of fire region and laws of development, and the method of controlling fire regions

3. Basic research on the fracture of rock and seepage in deep thin base rock region of shallow coal mine

Study on fractures caused by mining and characteristics of gap network, scaling law and theory and method of inversion generation in deep thin base rock region of shallow coal mine, the mechanism of coal rock fracture and laws of block distribution in strong unloading conditions and fast advancing of work face, the development of the relationship between macro mechanical behavior of coal rock and crack network topological parameters in laboratory, laws of rock layer deformation, damage, dislocation and movement of high rock layer in 5m, 6m, 7m excavation layers, and the development of the method for calculating the roof pressure in deep condition of shallow coal mine, as well as laws of creeping of water and gas in fractured coal rocks

4. Basic research on the fast excavation and support in large cross section mine shaft

Study on the damage and destruction of dynamic loading such as explosive excavation on early bolt-spray support structure, and the damage and destruction of mining dynamic loading on early bolt-spray support structure

5. Monitor and communication of coal mine production safety

Study on the electromagnetic compatibility in mine shaft; the method of no-blind-region layout of sensors; the wireless communication in mine shaft; the automatic identification of coal and rock boundary, and key problems in mine shaft mobile and emergency communication, early warning of major disasters using monitor system, as well as the image based method of bunker level detection

6. Clean processing and utilization of coal and dehydration and quality improvement of brown coal

Study on the basic theory of occurrence and separation of organic component of coal, the various interface behavior and control mechanism in coal separation and quality improving process, and the basic theory of high efficiency selection of multi phase complex separation system. Study on the thermo compression technology of brown coal quality improvement and mechanism of process forced dehydration.

(II)Areas of coal power generation

7. Large scale CO2 capture in coal firing power plant smoke

Study on new types of high efficiency and low energy consumption absorbent for large scale low cost pretreatment of smoke, basic problems in design and development of large and high efficiency capture equipment, and gather characteristics of all process energy optimization and CO2 phase, as well as analysis of sensibility and economics of different transport phase technologies

8. Basic research on the key technology for the low cost and long lifetime desulfurization of active coke

Study on the regenerating desorption mechanism of absorbing/catalyst materials after pollutant removal, focusing on the reducing decay rate of active property and improving lifetime of adsorption materials, providing the technical scheme for regenerating desorption and design basis. Research on the key technology and equipment for the regenerating desorption of adsorption/catalyst materials

Study on the mechanism of transition and occurrence of sulfur element in active coke based on desulfurization process, and the matching mechanism of gap structure of active coke. Study on the adsorption/catalyst materials for different raw materials according to actual situation of water-deficient areas

9. The Safety and lifetime management of heating surface in super supercritical generator boilers

Study on the property of metallic material for heating surface in large thermal power plant boiler, the principle and control technology of high temperature oxidation of heating surface in boilers. Study on the theory and key technology for the lifetime evaluation of high temperature and high pressure components, and the development of the evaluation program for lifetime of key component of 1000MW generator, as well as the optimal integration of lifetime evaluation program for various key components

(III) Areas in coal conversion

10. Separation of liquid products in graded coal refining, mechanism of hydrogenation and integrated utilization

Study on the mechanism of separation of liquid product and hydrogenation in graded coal refining, including: basic studies on characterization, component analysis of liquid product in graded refining at molecular level and measurement of basic physical and chemical data; study on the separation technology and mechanism of liquid product in graded refining; and basic research on the hydrogenation process, catalyst and reaction mechanism for liquid product of graded refining

11. Combustion of solid product (semi-coke) in graded coal refining and characteristics and mechanism of gasification

Study on the combustion and characteristics of gasification of solid product in graded coal refining. Specific contents include: basic research on the characterization and component analysis and measurement of basic chemical data of solid product in graded refining; combustion characteristics, combustion dynamics and mechanism of solid products in graded refining; and study on the gasification property, gasification dynamics and mechanism for solid product in graded refining

12. Basic research on the integrated utilization of residues of direct liquefaction of coal

Study on the coal slurry ability and rheology behavior of making coal water slurry using liquefaction residue and low metamorphic bituminous coal; the coking capability of fast heating of different ratio of liquefaction residue and low metamorphic bituminous coal water slurry mixture; the gasification reaction ability of liquefaction residue and low metamorphic bituminous coal water slurry

13. Mechanism of formation of hydrogen free radicals in direct liquefaction of coal and mechanism of hydrogenation liquefaction reaction

Study on the behavior of free radical generation in pyrolysis process of different component in coal; the role of catalyst, the co-catalyst in chemical bond breaking and hydrogenation liquefaction; the mechanism of hydrogen free radical transition of hydrogen supply solution in direct liquefaction of coal, and how hydrogen gas becomes hydrogen free radical

Joint Fund of Civil Aviation Research

The Joint Fund of Civil Aviation Research is set up jointly by NSFC and the Civil Aviation Administration of China (CAAC). The Fund is open to all scientists in China. It is aimed to attract researchers from the universities and research institutions across China

to participate in basic research and applied basic research in the development of aviation science and technology, so as to enhance the ability of original innovation in the aviation industry, promote the integration of knowledge and technology innovation in the field, and contribute to making China a nation with strong aviation industry.

Under mutual agreement, NSFC and CAAC established the third phase of the Joint Fund of Civil Aviation Research from 2010, with an annual budget of 10 million yuan for 5 years.

As a part of the National Natural Science Fund, the Joint Fund is managed by both parties. Researchers in non-aviation sectors are encouraged to carry out joint research with those in aviation sectors.

In 2011, 2-3 Key Program projects, and about 20 General Program projects will be funded. The average funding for Key Program project is 2 million yuan (for 4 years). The average funding for General Program project is 400,000 yuan (for 3 years), and the number of projects to be funded is decided according to the actual application and evaluation.

Main research areas for General Program projects

1. New theory and technology, the simulation technology for civil aviation system, basic theory and technology for aviation safety, intelligent air traffic and information security, new theory and methods for security check, the theory and methods of system reliability and system security, and the theory and technology for airport sensing

2. The theory and methods for the management of national aviation resources, the theory on aviation security management and aviation crime prevention and controls, and the contingency decision system for emergency

3. New materials and rock and soil engineering theories for runway surface, new materials, new technical theory and techniques for aircrafts

Research areas for Key Program projects

1. Basic theory and key technology for positioning of ground interference source affecting ground to air communication
2. Noise monitor and evaluation of its environmental impact on airport sensing system
3. Basic theory and key technology for monitoring runway foreign objects for airport sending system
4. Basic theory and key technology for wireless wideband ground to air communication system in civil aviation

NSFC-Guangdong Joint Fund

NSFC and the Guangdong Provincial Government jointly set up the second phase of Joint Fund of Natural Science (NSFC-Guangdong Joint Fund for short) from 2011 to 2015, trying to attract outstanding scientists in Guangdong Province and other areas in the country to solve common and major scientific and key technical issues in the future development of economy, society, science and technology in Guangdong and surrounding areas, and promote the scientific and technological development and the fostering of talent teams in the region.

The 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 comply with the regulations of NSFC and the detailed procedures of the Joint Fund.

In 2011, the Joint Fund plans a total funding of 77 million yuan, accepting applications in 5 areas listed below. The Joint Fund mainly supports Key Program projects, with a funding of 2.5 million per project for 4 years, and at the same time, supports some General Program projects with average funding of 600,000 yuan per project for 3 years. Eligible researchers all over the country are welcomed to apply for this fund according to the scope and requirement in the Guide.

I. Agriculture

1. Evaluation and bio studies on germplasm resources of special crops in south China

Research on the evaluation of germplasm, genetic laws and functional genomics and the physiology and molecular biology related to growth and development, yield and quality, and resistance property focusing on important food and oil crops, fruit and vegetables and flowers in south China.

Main research orientations:

(1) Research on the germplasm evaluation and functional genomics of major specialized food and oil crops such as peanuts, sweet corn and Camellia oleifera etc. (Select C1304 for application code II);

(2) The germplasm evaluation of specialized fruit and vegetables (banana and melon) in south China, and studies on physiology and molecular biological properties. (Select C1502 for application code II);

(3) The germplasm evaluation and biological studies on specialized flowers in south China (Zingiberaceae family and orchid family) (Select C1503 for application code II).

2. Basic research on the biology of healthy breed and disease control of animals

Research on the mechanism of reduction in reproductive ability of livestock and poultry cause by high temperature and high humidity climate in south China, the interaction between pathogen and host for major diseases of major economic animals such as pig, chicken and prawn etc., and the pathogenic mechanism and provide basic theory for disease control.

Main research orientations:

(1) Research on the mechanism of reduction in reproductive ability of livestock and poultry cause by high temperature and high humidity conditions; (Select C1701 for application code II)

(2) The pathogenic mechanism of major diseases of high quality chickens (Select C1802 for application code II)

(3) Basic research on the biological and environmental control of important virus caused diseases of prawns (Select C1906 for application code II)

3. Preservation, processing of agricultural products and food safety

Basic and applied research on major scientific problems in preservation, processing and safety areas of specialized agricultural products in south China

Main research orientation:

(1) The chemical characterization and bio mechanism of quality control in processing tropical and sub tropical fruits (lychee and longan) (Select C2002 for application code II)

(2) The bio mechanism of chilling damage of fruits (Select C1501 for application code II)

(3) The basis of molecular identification for immunological inspection of chemical contaminates in food (Select C2001 for application code II)

4. Eco recovery and eco security of agricultural eco systems

Basic research on the major need of eco security and sustainable development of agriculture in south China

Main research orientations:

(1) Research on the mechanism of invasion and control measures for invasion of major alien species in south China. (Select C0313 for application code II)

(2) Studies on models of eco recovery and sustainable development of degenerated agriculture and forestry ecosystems in red soil region in south China (select C0312 for application code II)

II. Population and health

1. Studies on high incidence cancer

Basic research on the mechanism of pathogenesis and control of high incidence regional cancer among population in south China

Main research orientations:

(1) Molecular basis of the pathogenic risk prediction of esophagus cancer (select H1617 for application code II)

(2) Molecular basis of the individualized treatment of Nasopharyngeal Cancer (select H1625 for application code II)

2. Studies on the regional high incidence disease

Study on the pathogenic mechanisms including various complex clinical phenotypes and control measures focusing on the regional high incidence diseases such as Mediterranean Anemia as the research subject and by using of integrated means such as genomics, molecular genetics and induced pluripotent stem cell（iPS).

Main research orientations:

(1) Basic research on the phenotype diversity of Mediterranean Anemia (Select H0803 for application code II)

(2) Basic research on the stem cell development, differentiation and early interference of Mediterranean Anemia (Select H0803 for application code II)

3. Prevention and control of major diseases in south China

Basic research on pathogenesis focusing on the common major diseases in south China.

Main research orientations:

(1) The mechanism of improving heat failure using Cardiac Resynchronization Therapy (Select H0212 for application code II)

(2) Pathogenesis of type I diabetes (select H0713 for application code II)

(3) Basic research on the prevention and control of dengue fever (Select H2609 for application code II)

(4) Methods and mechanism of new therapy of chronic hepatitis B (Select H0316 for application code II)

4. Theory of Traditional Chinese medicine (TCM) and modernization of Chinese herbal medicine

It is aimed to strengthen the combination of traditional theory and method of TCM with modern disciplines, improve the capability of controlling public health issues using TCM,

and promote modern development and application of special methods and technology in TCM.

Main research orientation:
Basic research on the laws of TCM physique, diagnosis and treatment for the population in Lingnan region (Choose H2701 for application code 2)

III. Resources and environment

1. Water environment and eco system in Pearl River valley

In conjunction with the climate change and human activity and the water pollution in Pearl River valley, it is to study the formation process of major pollutants in key sub valleys, eco effect and mechanism of the degeneration of the eco system, and propose means of water eco system recovery for the valley region.

Main research orientations:
(1) The formation, transition and control principles of persistent toxic pollutants in industrial waste water concentrated regions (Choose D03 for application code II)
(2) The toxicological eco effect of typical organic pollutants in water sediments in Pearl River valley (Choose D03 for application code II)
(3) The mechanism of the degeneration and recovery of river ecosystems in Pearl River valley (Choose D01 for application code II)

2. Transition and conversion mechanism of air pollutant in Pearl River Delta

With the serious air pollution in cities in the Pearl River Delta, it is to study the interchange of toxic pollutants in air with soil and water surface, and the cross regional transport, conversion and settlement of pollutants.

Main research orientations:
(1) Interchange of toxic and harmful pollutants on environmental interfaces and the mechanism of cross-regional transport (Choose D05 for application code II)
(2) The impact of industrial structure change on regional air quality and related mechanisms (Choose D05 for application code II)
(3) Characteristics and control of volatile organic pollutant emission in fast growing industrial regions (Choose D05 for application code II)

3. Eco restoration of polluted soil

Studies on the eco-restoration of soil in consideration of the serious soil pollution resulted and accelerated by the industrialization of the Pearl River delta region.

Main research orientations:

Repair and restoration of soil polluted by electronic trash (Choose D06 for application code II)

4. Marine resources and environment in South China Sea

South China Sea and especially the resources and environment in the northern part of South China Sea are closely related to the sustainable development of economy and society in Guangdong. Studies should be focused on the formation and distribution of metal mineral deposit, production capability of alga, and occurrence and early warning of marine disasters in these sea areas.

Main research orientations:

(1) The dynamic mechanism of deposit in continental shelf in the northern part of South China Sea and laws of mineral deposit distribution (Choose D02 for application code II)

(2) Basic research on marine alga production capacity in South China Sea (Choose D06 for application code II)

(3) Mechanism of the formation of storm surges in South China Sea in climate change conditions and the prediction of disasters (Choose D06 for application code II)

IV. Materials and manufacturing

1. Basic research on new energy and related materials

Along with the fast development of economy and society, energy problems have become strategic concerns of all countries in the world.

(1) Studies on the development of high efficiency materials for solar cells including the low energy consumption technology for solar cell production and the light, flexible, low cost and easy to process in large area materials and related basic research (Choose the proper code under E02 and E03 for application code II)

Main research orientations:

(ⅰ) Basic research on membrane solar cell materials

(ⅱ) Basic research on organic/inorganic hybridization solar cell materials

(2) Studies on basic scientific problems such as aerodynamics of large wind turbine, corrosion resisting technology and materials, and system control technology that are suitable to China's situations, which are focused to improve wind energy conversion rate, reduce the cost of wind power generation, and increase the stability and reliability of wind turbine operation. (Choose proper code under E05, E06, and E07 for application code II)

Main research orientations:

(ⅰ)Aerodynamic and aero elasticity problems and aerodynamic optimization of large wind turbines
(ⅱ) Fluid and solid coupling problems for wind turbine on the sea
(ⅲ) Integrated control technology and corrosion resistant technology and materials for wind turbine on the sea

(3) Others
Basic research on new materials such as fuel cell, lithium-ion battery materials, and membrane solar cell materials (Choose proper code under E01 to E06 for application code II)

2. New materials technology
(1) Applied research on the preparation and devices of new electronic information materials and nano materials to meet the need of photo electric information industry development of Guangdong (Choose proper code under E02 and E03 for application code II).

Main research orientations:
(ⅰ) The preparation and application of metallic oxide epitaxial materials
(ⅱ) Micro and THz devices based on cold cathode of nano materials

(2) Studies on key basic scientific issues of biomedical materials focusing on the major clinical need of tissue repair and alternative functional biomedical materials (Choose proper code under E01, E02 and E03 for application code II).

3. Advanced manufacturing
Basic research on the high speed, high precision feeding platform and fine structure processing technology focusing on the requirement of precision manufacturing in automobile, machinery, medicine, microelectronics and energy fields.

(1) Key scientific and technological issues in the microelectronic manufacturing moving platform (Choose proper code under E05 for application code II)
(2) Key scientific and technological issues in the micro nano surface texture (Choose proper code under E05 for application code II)

4. According to the existing industrial layout and plans for emerging industry development, research on the high efficiency utilization of cement materials and green preparation of polymer materials is encouraged
(1) Key scientific issues in the high efficiency utilization of cement materials (Choose proper code under E02 for application code II)
(2) Basic scientific problems in the green preparation of polymer materials (Choose

proper code under E03 for application code II)
(3) Basic research on the high performance rubber materials for wheels (Choose proper code under E03 for application code II)
(4) Basic scientific problems in surface modification of high performance aramid fiber (Choose proper code under E03 for application code II)

V. Electronic and information technology

1. Network information and content service security

Study on theory and technology innovation for scientific and key technological issues in the future development of digital community network information security, such as the theory and key technology of network media content service security, mobile equipment information security, the theory and key technology for wireless network information merging security.

Main research orientations:
(1) Theory and key technology for network media content service security (Choose F02 for application code II)
(2) Theory and key technology for mobile terminal information security (Choose F02 for application code II)
(3) Theory and key technology for wireless network information merging security (Choose F02 forapplication code II)
(4) Network warning and fast location of problems (Choose F02 for application code II)

2. Processing of cross-media magnanimity information

Focusing on scientific issues and key technology of cross-media information processing, study on the basic theory and key technology for the semantic description logic and temporal spatial model of magnanimity information, digital family cloud computing, media content analysis and understanding and magnanimity information acquisition and intelligent processing

Main research orientations:
(1) Modeling and expression of cross-media information (Choose F02 for application code II)
(2) Theory and key technology of cross-media cloud computing (Choose F02 for application code II)
(3) Media content analysis and understanding (Choose F02 for application code II)
(4) Cross media co-processing and service (Choose F02 for application code II)

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 Plan for the Innovative Yunnan", to attract more talented professionals, and to carry out basic research on important and key scientific and technical issues of the economy, society, science and technology in Yunnan and surrounding regions, to booster the development of science and technology and the construction of talent teams, to facilitate 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 in accord with 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 2011, the Joint Fund plans a total funding of 48 million yuan, mainly for applications for Key Program in 4 areas listed below, with the average funding of 2 million yuan per project (for 4 years). Eligible researchers all over the country are welcomed to apply for this fund according to the research scope and requirements in this Guide.

I. Protection of biodiversity

Studies on the biodiversity at three levels (i.e. species, genetics and ecosystem) focusing important economic organisms in the plateau regions.

1. Preservation and utilization of biodiversity

Main research directions:

(1) The origin, evolution and maintaining mechanism of biodiversity of special species in key regions (Choose C0312 for application code II)

(2) The molecular marker, genetic diversity and genetic resource exploration of important bio resources (Choose C0601 or C0602 or C0603 for application code II)

(3) The mechanism of disease and pests control by biodiversity for crops and forest (Choose C1406 for application code II)

(4) The exploration and utilization of species resources of wild plants in Yunnan (Choose C0206 or C0404 for application code II)

(5) Basic research on the preservation and utilization of species resources of typical livestock and poultry in Yunnan (Choose C1701 for application code II)

2. Problems of special concern

Main research orientations:

(1) Models of optimal plantation of rubber trees and models of reclamation (Choose C1611 for application code II)

(2) Basic research on the exploration and disease and pests control of disease resistant resources of Sanchi (Panax notoginseng FHChen) (Choose C1406 for application code II)

II. Population and health

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

Main research orientations:

(1) Discovery, optimization and functional mechanism of new natural active materials (Choose H3002 for application code II)

(2) Basic research on the ethnic medicine (Yi, Dai, etc.) in Yunnan (Choose H2818 for application code II)

(3) Basic research on the protection and cultivation of important endangered herbs (Choose H2801 for application code II)

(4) Basic research on the structure, function and roles of bioactive materials in special toxicogenic animals in Yuannan (Choose H3002 for application code II)

(5) Construction of primate model for evaluation of drugs for major diseases (Choose H31 for application code II)

(6) Basic research on new vaccines (Choose H1014 for application code II)

2. Study on the pathogenic mechanism, genetic characteristics and control of major regional diseases, high incidence diseases and genetic diseases in Yunnan and surrounding regions

Main research orientations:

(1) Basic research on high incidence diseases (Choose H2401 for application code II), tumor (choose H16 for application code II) and genetic diseases (Choose H2401 for application code

II) In ethnic minority regions

(2) Basic research on the control of high incidence diseases (Choose H2401 for application code II) and epidemic disease (Choose H19 for application code II)

(3) Basic research on drug addiction and rehabilitation (Choose H0918 for application code II), and treatment of AIDS (Choose H1904 for application code II)

III. Resources and environment

1. Integrated restoration of eco environment in Yunnan Guizhou plateau is a major problem in sustainable social economic development of Yunnan. Conduct basic research on new theory, new ideas and new methods of protecting plateau lakes and wetlands

Main research orientations:

(1) Basic research on the protection and sustainable utilization of plateau lakes in Yunnan (Choose D01 for application code II)

(2) Studies on the health of plateau wetland eco systems (Choose D01 for application code II)

2. Basic research on the proper development and utilization to meet the need of energy and mineral resources, focusing on rich water resources and mineral resources in Yunnan and surrounding regions, conduct.

Main research orientations:

(1) Studies on the optimal use of water resources in Yunnan and its ecological impact (Choose D2 for application code II),

(2) System and mechanism of mineral deposit in typical mineral deposit regions in Yunnan and surrounding regions (Choose D02 for application code II),

3. Studies on the mechanism, early warning and counter measures of major disasters in mountain and valleys in Yunnan Plateau

Main research orientations:

(1) Mechanism of the formation and warning of highland and mountain disasters in mountains (Choose D02 for application code II)

(2) Environmental changes and eco restorations in regions affected by major engineering projects (transportation, mining) in Yunnan (Choose D02 for application code II)

4. Basic research on the theory and technology for weather forecast, climate change process and formation of extreme weather events， focusing on frequent meteorological disasters and abnormal weather caused by complex terrains and diversified climate types

Main research orientations:

(1) Mechanism of formation and prediction of extreme weather events in Yunnan (Choose D05 for application code II)

(2) Mechanism of response of typical eco system in Yunnan to global weather change (Choose D05 for application code II)

IV. Utilization of mineral resources and new materials

Taking advantage of industrial strength and meeting the need of industrial development

in Yunnan, basic research on the theory and technology for the integrated utilization of mineral resources for sustainable development of mineral industry and high tech industry in Yunnan.

1. Basic research on the application of new technologies in non-ferrous metal extraction and processing

Main research orientations:

(1) New method and new technology of high efficiency extraction of non ferrous metals from low grade complex multi metal minerals (Choose proper code under E04 for application code II)

(2) New technology and new method of deep processing of non ferrous metal products (Choose proper code under E04 for application code II)

2. Basic research on the precious metal material preparation and applications

Main research orientations:

(1) Second enrichment technology of precious metals (Choose proper code under E04 for application code II)

(2) Applied basic research on noble metal catalyst materials (Choose proper code under E01 or E04 for application code II)

3. Photoelectric materials and basis of preparation

Main research orientations:

(1) New technology of polycrystalline silicon preparation using metallurgical methods (Choose proper code under E04 for application code II)

(2) Applied basic research on membrane semiconductor inferred detection materials and devices (Choose proper code under E02 for application code II)

4. High efficiency use of mineral resources and energy

Main research orientations:

(1) Basic research on the photo, electric and thermal conversion of solar energy (Choose proper code under E02, E03, E04, E06 for application code II)

(2) Applied basic research on efficient use of geothermal resources (Choose proper code under E4, E06 for application code II)

(3) Basic research on new secondary battery and its materials (Choose proper code under E01, E02, E03, E04 for application code II)

(4) Basic research on integrated uses of tailings and conversion to resource (Choose proper code under E04 for application code II)

(5) Basic research on efficient selection and metallurgy of titanium minerals (Choose proper code under E04 for application code II)