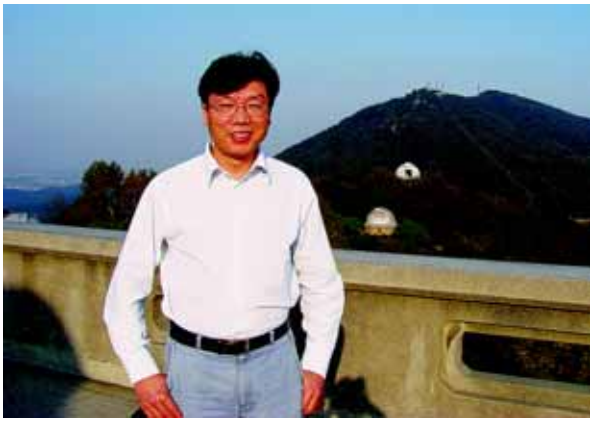
PART III
Introduction on Selected Grantees of the National Science Fund for Distinguised Young Scholars and PIs of the Creative Research Groups

Dr. Chang Jin

Research Professor, Purple Mountain Observatory, Chinese Academy of Sciences
Grantee of the Fund in 2009



Dr. Chang Jin's major research interests are focused on space astronomy including theory and instrument development. Under the support of NSFC, he has made major research achievements as follows:

1. Dark matter particle search. By observing cosmic ray electrons and gamma-rays, people can find some 'signals' from dark matter. Chang Jin developed a simple way to observe high energy electron and gamma-ray by using high energy resolution calorimeter and applied this method into one cosmic ray detector (ATIC). Compared to normal methods, the weight of new detector is reduced by at least 1/3. ATIC instrument was developed to investigate high energy cosmic rays such as proton and He nucleus. After detailed Monte Carlo simulation and beam test, the high energy cosmic ray electrons and gamma-rays have been successfully observed by this detector.

2. High energy electron and gamma-ray data analysis and calibration. Observations of cosmic-ray electrons are difficult due to the large flux of cosmic ray hadrons. The systematic error is the major issue. Chang Jin developed a method to reduce systematic errors by using gamma-ray as an in-flight calibration for electron observation. The first high energy resolution cosmic electron spectrum from 20 GeV to 3 TeV has been measured by this method. The results revealed the evidence that the surplus between 300 and 800 GeV in the electron spectrum may resulted from the annihilation from dark matter particle.

3. Space X-ray and low energy gamma-ray detector development. Scintillator detector, room temperature solid state detector and new-type LaBr3 detector have been developed for space observation and applied to Shenzhou-2 spacecraft, Chang'e-1 and Chang'e-2 lunar missions in China.

The high energy cosmic ray electron results have been published in *Nature* (Nov.20, 2008) and attracted serious concern all over the world. This paper has been listed as most-cited research articles of 2009 (24th) in high-energy physics by SPIRES database team. The research results was selected by the American Physical Society as one of the top 10 physics achievements in 2008 and regarded as the best physics development of 2008 in November by the European Physical Society.

Dr. Wu Qiao

Professor, School of Life Sciences, Xiamen University
Grantee of the Fund in 2004

Prof. Wu Qiao is working at the School of Life Sciences in Xiamen University as the deputy director of the Key Laboratory of the Ministry of Education for Cell Biology and Tumor Cell Engineering. Her main research areas are focused on the functional mechanisms of nuclear orphan receptors and their signal transduction pathways, as well as pharmaceuticals using orphan receptors as targets. Professor Wu, as a corresponding author, has published more than 30 papers in renowned international academic journals, in which she has achieved several breakthroughs in the mechanism and regulation of nuclear orphan receptors. Prof. Wu's work has caused strong repercussions both nationally and internationally, and is often cited by researchers in the same field within summary reports and thesis papers. She has also been invited to write several summary reports. She is currently in charge of more than 20 projects including the National Science Fund for Distinguished Young Scholar, Key Program and International Joint Research Program from NSFC, Ministry of Science and Technology and Ministry of Education.

Prof. Wu and her group mainly focus their research on the modification and regulation of proteins for exploring the functional mechanisms of orphan receptor TR3 (also called Nur77). They have not only discovered a unique function of TR3, as a negative regulator in the regulation of protein acetylation and methylation, and put forward to a novel regulatory feed-back model regulated by TR3, but also determined various modifications of TR3 by phosphorylation, isomerization, ubiquitination pathways, which often occur in the TR3 nucleocytoplasmic translocation, and effectively impair the TR3 functions in the apoptotic induction of cancer cells. Furthermore, Prof. Wu and her group present the first evidence of TR3 on inhibition of oncoprotein MDM2 mediated by p53 (*The EMBO Journal*, *2006*) in their study of cell signal transduction, It is revealed that the TR3's novel function in protecting p53 degradation from MDM2, suggesting TR3 as a potential target to develop new anticancer agents that restrict MDM2-induced tumor progression.

Although the physiological ligand of TR3 has not been identified up to data, Prof. WU and her group recently identified an octaketide, cytosporone B (Csn-B) isolated from *Dothiorella* sp. HTF3, an endophytic fungus, to be a naturally occurring agonist for TR3. It was found that Csn-B stimulated the transactivation activity of TR3, increased TR3-mediated induction of apoptosis, growth inhibition of tumor xenografts, and regulation of gluconeogenesis in the liver of mice (*Nature Chemical Biology*, *2008*). This study represents a breakthrough in both theoretical and clinical settings. They further offer new insight into therapeutic agonists of TR3 through determining a unique pharmacophore for activation of TR3, and expounding the structure-activity relationship. A recent significant development in their work is the discovery of a potential lead compound that can decrease glucose levels through TR3 mediation, based on the mechanism of TR3 in regulating signal of gluconeogenesis. Therefore, Csn-B and its derivatives have important pharmacological implications for developing new therapeutic drugs to treat cancer and hypoglycemia.

Prof. Wu is funded by the National Science Fund for Distinguished Young Scholars (2004), and engaged as a Distinguished Professor under the "Min-jiang Scholar" Scheme. She is currently the council member of the China Biophysics Association (CBA), member of sev-

eral high-profile committees including the Bio-membrane and Cell Biology Committee of CBA, Tumor Research Committee of China Pathology and Physiology Association, and the Cancer Drug Committee of China Anticancer Association. She also serves as the editor at the *Chinese Journal of Cell Biology*. She has supervised more then 20 MSc and Ph.D. students to date and is the awarder of the "Lu Jiaxi Outstanding Postgraduate Student Supervisor" Award.

Dr. Wu Kongming

Professor, Institute of Plant Protection, Chinese Academy of Agricultural Science
Grantee of the Fund in 2006

Prof. Wu Kongming is currently engaged in the research to develop technologies and theories for monitoring, early warning and control of cotton bollworm populations. The major achievements acquired in recent years are summarized as follows:

1. The investigation of the migration patterns of cotton bollworms in China. The study revealed that: (i) under the influence by East Asian Monsoon, the first and second generations of amphitropical cotton bollworms migrate towards north with southerly wind from May to July to the temperate regions such as the north of Shanxi and Hebei, Inner Mongolia, Liaoning and Jilin and so on, where is not for overwintering; while (ii) the third and forth generations of amphitropical cotton bollworms migrate towards south with northerly wind after mid-August. It was found that the major causes triggering cotton bollworm migration are the high population density and/or the adverse environment. Research using entomological radar technology suggested that cotton bollworm has the habitude of orientation migration following wind. Normally the flight altitude of cotton bollworm ranges from 300 m to 500 m and the flight distance is about 150-300 m per night. Based on the knowledge, an analogy model has been established for forecasting the migration trajectories and routes of cotton bollworm. These studies have clarified the habitude of cotton bollworm populations in the different areas of China, and laid the theoretical foundation for long-distance and regional forecasting of cotton bollworm populations.

2. The population dynamics of cotton bollworms in Bt cotton and conventional cotton fields was systematically investigated in Hebei Province from 1997 to 2007. The results combined the model analyses with data obtained from 100 experimental points in North China from 1992 to 2006 demonstrated that the large scale adoption of Bt cotton destroyed the food chain of cotton bollworms shifting among different host crops seasonally. It compressed the ecological niche of cotton bollworm, and it thus not only efficiently reduced the damage of cotton bollworm on cotton plants, but also highly suppressed the occurrence of cotton bollworm on corn, soybean, peanut, vegetables and other host plants. These results clarified the ecological effects of Bt cotton on the target pests, and provided the theoretical basis for understanding the regulation mechanism of transgenic crops on population evolution of insect pests. Moreover these results have the great guiding significance for developing new technologies using Bt plants to the sustainable suppression of regional occurrences and catastrophes of cotton bollworm. The findings were published in *Science* on September 19, 2008.

3. By laboratory selection using Bt proteins, 8 cotton bollworm strains, which showed resistance to Bt cotton, have been sequentially obtained, and moreover the near isogenic lines of the high resistance strains have been established at the same time. Analyses by classic genetics showed that the resistance inheritance mode is certainly different for different resistance strains of cotton bollworm. In addition, it was found that the number of resistance genes is related to the factors of recessiveness and resistance level, etc. A model has been established for the description of Bt toxin binding to the midgut membranes of susceptible or resistance cotton bollworms by radioisotope tracer technique, and the competitive-binding assays demonstrated that the reduction of binding ability of Bt toxin to receptors and the absence of binding sites in resistant cotton bollworm midgut are mainly responsible for Bt-resistance. Using gene clone and expression techniques, the relationships were analyzed between Bt resistance and the receptors in cotton bollworm's midgut such as cadherin, Aminopeptidase N and alkaline phosphatase. The results revealed that the mutation of cadherin and Aminopeptidase N are major causes for Bt resistance evolution of cotton bollworm. In addition, based on the quantitative evaluation of the function of natural refuge for cotton bollworms under Chinese farming systems, the theory and strategy were proposed for delaying the resistance evolution of cotton bollworms by companion planting of multi-corps at small-scale farms.

Prof. Wu is currently head of the Institute of Plant Protection, Chinese Academy of Agricultural Sciences, and director of the State Key Laboratory for Plant Diseases and Insect Pests, and president of China Society of Plant Protection. Since 2005, he has published over 60 papers in SCI journals such as *Science*, *Annual Review of Entomology*, etc. In 2007, Prof. Wu won a second class prize of the National Science and Technology Progress Award for his excellent accomplishment of "Research and application of cotton bollworm regional migration patterns and monitoring and early warning technology". In addition, he was awarded a prize of Science & Technology Award for Chinese Youth in 2006. In 2007, Prof. Wu was nominated as the grantee of the "Ten Million Talent Project" by the Ministry of Personnel.

Dr. Liu Jiongtian

Member of the Chinese Academy of Sciences
China University of Mining and Technology (CUMT)
Grantee of the Fund in 2004

Prof. Liu has long been engaged in research on fine particles processing and clean coal technology. He was awarded several national research projects, including NSFC Research Fund for Distinguished Young Scholars, the National High Technology Research and Development Program (863 Program), and the projects from the National Key Technologies R&D Program during the 9th, 10th and 11th Five-Year Plan periods. He invented methods and equipment for "Coal Preparation by Column Flotation" based on cyclonic-static micro-bubble, developed equipment for the integration of coarse roughing and scavenging, and the closed-circuit of "Two-stage beneficiation", which developed Chinese column separation technology of "Multi-rheological characteristic intensified flotation". He found one green method entitled minerals-hardness to solve the problems associated with difficult-to-settledown slime water, and constructed a chemical system of circular slime aqueous

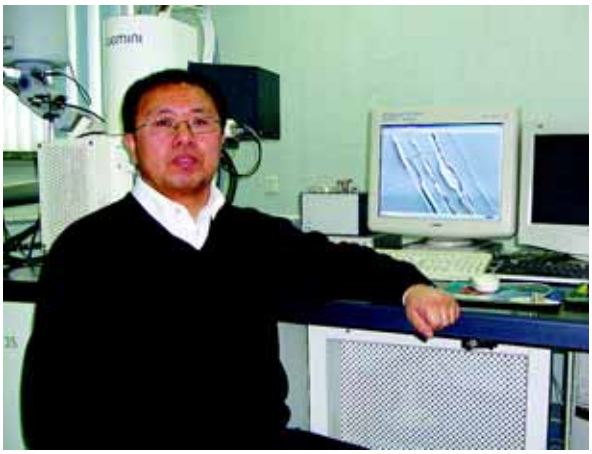
with two types of water hardness, which set up the water hardness-controlled technology of slurry water. The relatively perfect theory of fine coal preparation was put forward based on the above work. Prof. Liu exploited efficient technology with desulfurization of coal ash reduction process, developed demonstration projects of coal desulfurization and ultra-pure preparation. The above work promoted the technology progress of Chinese efficient coal separation, along with the development of coal-based materials industry. As the first contributor, Prof. Liu obtained the second class prize of the National Technology Invention Award for two times. Moreover, he obtained the second class prize of the National Science and Technology Progress Award as the fourth and sixth contributor both in 1999 and 2008. He was awarded 17 patents (including 2 international inventions). 120 papers, 5 books or textbooks were published, and 50 papers were indexed by SCI and EI.

Prof. Liu is serving as vice-president of CUMT, and academic leader of mineral processing engineering, which is the national key discipline. He is also the director of the Key Laboratory for Coal Processing & Efficient Utilization of the Ministry of Education, and director of the Engineering and Technique Center for Clean Coal and Ecological Recovery of Mines of the State Environmental Protection Administration. Prof. Liu is the vice chairman of the Professional Committee of Coal Preparation, China Coal Society, vice-president of the Coal Branch, China National Coal Association, and vice chairman of the Mineral Academic Committee, China Nonferrous Metals Society. He is also the editor of two journals: *Journal of Coal Science & Engineering* (*China*), and *Journal of China University of Mining & Technology*. Prof. Liu has received a number of prestigious awards including the National Top 100 Excellent Ph.D. Thesis Award in China, Sun Yueqi Energy Awards, Guanghua Engineering Award for Young Scientists, and Science and Technology Award for Chinese Youth. He was selected as one of national model teachers and first candidates for the National Talent Program. He was also appointed as one of ten outstanding youths and one of the young experts with outstanding contributions, and chief scientist of "333" Program in Jiangsu Province.

In 2009, Prof. Liu was elected as Member of the Chinese Academy of Engineering (CAE).

Dr. Zhang Zhefeng

Research Professor, Institute of Metal Research, Chinese Academy of Sciences
Grantee of the Fund in 2006



Dr. Zhang Zhefeng has been engaging in his study at the State Key Laboratory of Materials Mechanical Behaviors, Department of Materials Science and Engineering, Xi'an Jiaotong University and the State Key Laboratory for Fatigue and Fracture of Materials, Shenyang Institute of Metal Research (IMR), Chinese Academy of Sciences since 1988. His main research interest covers the areas of mechanical properties of metallic materials, strengthening and toughness mechanisms and strength theory, fatigue damage mechanisms and life prediction, and fracture theory.

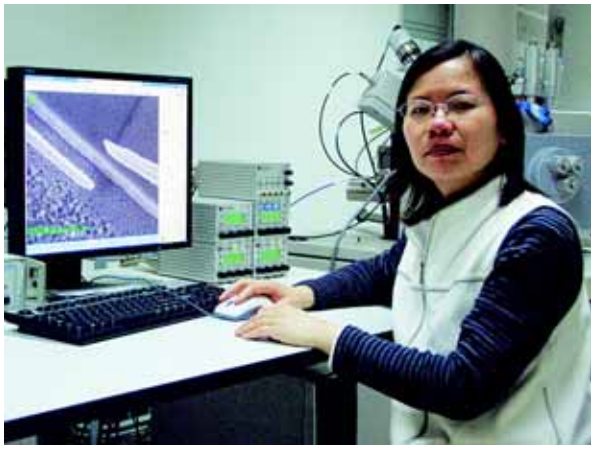
In 2000, his Ph.D. thesis was selected as "One of the National 100 Excellent Ph.D. Thesis" From 2000 to 2003, he worked at the Advanced Institute of Science and Technology (AIST), Sendai, Japan as a JSPS fellow;

Institute for Metallic Materials, IFW-Dresden as an Alexander von Humboldt (AvH) fellow; and Max-Planck Institute for Metal Research, Stuttgart, Germany as a visiting scientist. In 2004, he was supported by CAS Hundred Talent Program. He won the National Science Fund for Distinguished Young Scholars of NSFC in 2006 and the Major Program of NFSC in 2008. As one of the PIs, he also took part in the National Basic Research Program in 2009. During the implementation of the abovementioned programs, he carried out investigations on the cyclic deformation behaviors, dislocation evolution and fatigue cracking mechanisms of different FCC crystals, Cu bicrystals, Cu-Al and Cu-Zn polycrystals, and also devoted to his studies on the fracture and strength of bulkmetallic glasses, strengthening and toughening mechanisms of ultrafined grained materials. Based on the above studies, he achieved new advances in several aspects including: (i) revealing the fundamental mechanisms of dislocation evolution of dislocation patterns of various FCC crystals; (ii) revealing the effects of grain boundaries on cyclic deformation and fatigue damage; (iii) revealing the asymmetries on the fracture mode and strength of metallic glassy materials; (iv) proposing a unified tensile fracture criterion to unify the four classical strength theories. Based on these research results, Dr. Zhang has published more than 170 papers in international SCI journals, including *Acta Mater.*, *Phys. Rev. Lett., Nature Mater.*, etc. His publications have been cited for more than 860 times by SCI papers including *Nature*, *Science*, *Phys. Rev. Lett.*, *Nature Mater.* and *Acta Mater*. His work on the "Effects of Grain Boundaries and Crystallography on Cyclic Deformation and Fatigue Damage" was awarded a second class prize of the Natural Science Award from Liaoning Province in 2004. He was awarded the top 10 excellent talents of Liaoning Young Science and Technology Prize in 2009.

Dr. Zhang is now professor and assistant director of CAS Institute of Metal Research and Shenyang State Laboratory for Materials Science, and head of Materials Fatigue and Fracture Division and Failure Analysis Center of Materials. He is also a member of the International Conference on the Strength of Materials (ICSMA), council member of the Materials Research Society of China, head of secretary, Fatigue Association, Materials Research Society of China, and member of the Young Scientsts Association, Materials Research Society of China. He is the editorial member of two journals, *Science Bulletin* and *Acta Metallurgica Sinica.*

Dr. Chen Qing

Professor, Key Laboratory for the Physics and Chemistry of Nanodevices of MOE, Peking University
Grantee of the Fund in 2009



Professor Chen Qing focuses her research mainly on nanomaterials and related devices, especially on fabrication, structure analysis, property study and relationship between structure and properties of nanomaterials and nanodevices. Being one of the founders of the laboratory, she is the associate director of the Key Laboratory for the Physics and Chemistry of Nanodevices of MOE, Peking University. Professor Chen and her research group have been supported by NSFC for many years. Their main achievements are as follows:

The structure of titanate nanotubes was proposed and determined for the first time, which was fabricated through hydrothermal reaction between TiO_2 and NaOH. The

formation process of the nanotube was systematically studied and proposed that the formation mechanism of the nanotube is through peeling and rolling Ti-O layer of titanate. Many titanate nanostructures were synthesized, and their structure as well as basic physical properties and formation mechanism were studied. These results are important for the synthesis and application of titanate nanomaterials.

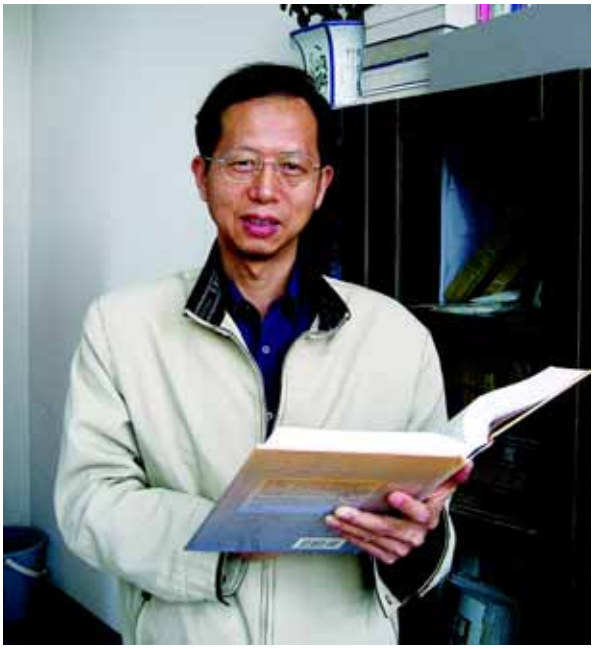
To solve the problem that structure characterization and properties measurements are in many cases not from the same nanostructure, Professor Chen Qing and her collaborators established an *in situ* study platform to systematically investigate nanomaterials and nanodevices. They invented "nanoknife" and some other *in situ* manipulating, modifying and measuring methods inside electron microscope. She and her students studied *in situ* the mechanical, electronic and electromechanical properties and their relationship with structure of individual carbon nanotube. Several of their papers were published as cover page of important journals. The work on "nanoknife" has been introduced and highlighted by the journals of *Nature nanotechnology, Nature China* and *Small*.

In the research on nanodevice, she and her students made some fundamental exploration work which explored methods to fabricate carbon nanotube field effect transistors (CNT FET), and fabricated the first CNT FET in China that uses individual carbon nanotube as conducting channel and high-k dielectric as dielectric insulator of the top gate. She and her students fabricated a large amount of CNT FET from double-walled carbon nanotube and Bi_2S_3 nanowires and systematically studied their properties. At the same time, she and her collaborators together achieved breakthroughs on high-performance CMOS and invertor based on single-walled carbon nanotube.

Professor Chen Qing has published more than 100 SCI papers on journals like *Adv. Mater., Phys. Rev. Lett.* and *Nano Lett*. Her papers have been cited by others for more than 1,500 times, and particularly, 5 papers have been cited for more than 100 times per paper (313, 275, 171, 147 and 106 times) with H factor being 20. 8 inventions from her research were patented. She also won the first class prize of Beijing Science and Technology Progress Award. She has given her invited talks eight times in important conferences. She is now also the director of CSMNT and editor of *Acta Metallurgica Sinica.*

Dr. Zhao Xiaobo

Professor, Department of Industrial Engineering, Tsinghua University
Grantee of the Fund in 2004



Since the beginning of this century, logistics has increasingly received attentions from researchers, practitioners and the government, because it plays an important role in the economic development. Goods flow from original point to consumers through sequential nodes such as raw material supplier, manufacturer, wholesaler, retailer, etc. Therefore, the key task of management is focused on logistics over the whole supply chain, rather

than a single enterprise. For a comprehensive logistics system, planning and operations management can have significant impact on system performance. This induces many challenging issues in logistics management that need to be studied. Supported by the National Science Fund for Distinguished Young Scholars of NSFC, Professor Zhao Xiaobo from the Department of Industrial Engineering, Tsinghua University conducted his research project on the integrated comprehensive logistics system for managers in logistics management to support their decision making. Detailed research topics include modeling and optimization analysis of major issues in logistics such as supply process, production system, inventory control, service operations, and management decision. Major achievements are as follows:

1. A model is formulated for JIT supply with stochastic leadtimes, for which a rolling approach is developed to obtain system performance. The research provides an efficient methodology for analyzing JIT systems with stochastic leadtimes.

2. For mixed model assembly line with stochastic operation times, a Markov chain model with continuous states is formulated, for which a convergent approach is proposed to obtain system performance. The methodology can be a fundamental analysis of such systems. Moreover, optimizations of balance and sequence for mixed-model assembly lines are discussed, with managerial insights revealed.

3. Considering capacitated resource in inventory system, a model with resource constraint is formulated to optimize continuous review (R, Q) policy. Algorithms are proposed for finding optimal solution to single-item system and finding undominated solution to multiple-item system. The result is an advance in theory of inventory control.

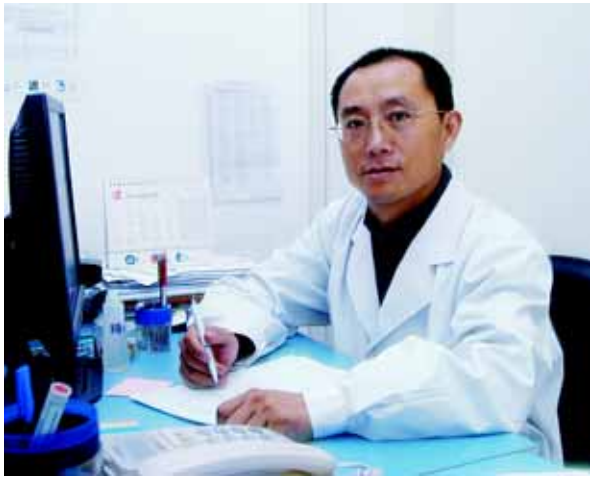
4.Motivated on logistics service, a model of priority queueing system with priority transfer is established. Stability conditions are given by theoretical analysis. Moreover, the steady state probability distribution is characterized.

5. A model of Markov decision process with multiple chains is discussed, for which information of optimal policies is revealed through a method of data transformation. Results can be useful in stochastic dynamic programming for logistics systems.

The above researches have both academic contributions and practical significance. Collaborations with professional scholars from abroad have been established during the studies. The achievements are published in major journals, including *Operations Research*, *Mathematics of Operations Research*, *Naval Research Logistics*, *Operations Research Letters*, *Queueing Systems*, *International Journal of Production Research*, *European Journal of Operational Research*, etc. Some research results received attentions from international and domestic scholars. Consultations were provided to enterprises and the productivities and efficiency were improved.

Dr. Gong Qiyong

Professor, Center for Medical Imaging at the West China Hospital of Sichuan University.
Grantee of the Fund in 2007



Professor Gong's research work is mainly focused on the imaging characterization and psycho-pathological investigation of the psychiatric illness. Supported by the Fund for Distinguished Young Scholars of NSFC, the major scientific accomplishments were achieved by Prof. Gong as follows:

1. Radiological signs and pathological mechanisms
By focusing on the major psychiatric illnesses, important imaging findings were made as the following:

(1) Clinically diseased state of the brain structure, regional functions and connectivity:
Dr. Gong was the first to perform the joint analysis of optimized MR brain structural volume and function, and studied the brain structure, neural network characteristics and the clinical correlates in patient with first-episode schizophrenia, as well as revealed the clinical symptom related changes in brain gray matter volume and the corresponding connectivity alteration, which provides further insight into the mechanisms of neural pathology from a system perspective. Furthermore, the brain functional MR study showed that over activation in specific brain regions can lead to the worsened clinical state. These results are of important implications in early diagnosis, prognosis and drug efficacy evaluation of the patients with schizophrenia.

(2) The cerebral blood flow characteristics of disease subtype
Hypothesized that pathologically the reduction of regional brain blood flow can lead to refractory depression. Dr. Gong was the first to apply the novel quantification techniques with the application of Arterial Spin-labeled MR Imaging, and found the imaging characteristics of cerebral blood flow changes in refractory depressive disorder and non-refractory depressive disorder, which permits the clinical monitoring and therapeutic guidance using imaging technique and is of value in therapeutic management.

2. Imaging signs and pathological mechanisms in sub-clinical or early stage of the illness. By focusing on a cohort who experienced major stressful events, Dr. Gong was the first to observe the sub-clinical imaging changes of the brain in super-acute mental stress, thus improved our knowledge with respect to the mechanisms of depression, anxiety and other stress disorders. In particular, these important imaging findings are of clinical implications with respect to the screening of subjects who are at high risk of mental illness, in addition to disease prevention or early therapeutic management.

Since 2007, Dr Gong has published a number of SCI papers, and also awarded one patent. The representative works were published in internationally recognized journals including *PNAS*, *Am J Psychiatry*, *NeuroImage* and *Radiology*. He has been invited to give keynote speech 11 times in major international conferences, and was once nominated for the Young Investigator Award of the International Society for Magnetic Resonance in Medicine (ISMRM). In 2009, one of his major original works published in PNAS attracted considerable attention from the scientific community as well as the public. Over the short period of time, this was reported by over

60 major domestic and foreign media (including academic media).

Dr. Gong Qiyong is currently the director of the Center for Medical Image at the West China Hospital of Sichuan University, academic and technology leader in Sichuan Province, deputy head of the Magnetic Resonance Group of Chinese Society of Radiology, and member of editorial board for the *British Medical Journal* (Chinese version). In addition, Dr. Gong is serving as reviewer for a number of well known journals such as *Brain*, *Neuroscience and Biobehavioral Reviews*, *Biological Psychiatry*, *NeuroImage* and *Human Brain Mapping*, and he is also the honorary fellow of the University of Liverpool, UK.

Dr. Peng Shige

Professor, School of Mathematics, Shandong University

PI of the Creative Research Group in 2009

Professor Peng Shige, Member of the Chinese Academy of Sciences, born in December 8, 1947 in Binzhou, Shandong Province, China. He was graduated from the Department of Physics of Shandong University and got his doctorate de 3eme-cycle from Université de Paris Dauphine in 1984 and PhD in applied mathematics from Université de Provence (Marseille) in 1986, then did his postdoctoral research at Fudan University. He has passed the degree of Habilitation à Diriger des Recherches from Université de Provence. He was awarded with the Distinguished Professor of the Ministry of Education of China (Cheung Kong Scholarship Program) in 1999 and was elected Member of the Chinese Academy of Sciences in 2005. He is now professor in the School of Mathematics, Shandong University and a part time position in Fudan University. He is also the PI of a National Key Basic Research Program (973 Program) project "Quantitative Analysis and Computation in Financial Risk Management".

Professor Peng's research interests are focused on the stochastic control, probability theory, stochastic analysis and mathematical finance. He successfully completed a NSFC Major Program project "Financial Mathematics, Financial Engineering and Financial Management", which significantly promoted the development of mathematical finance in China.

Co-authored with Pardoux in 1990, he published the paper on backward stochastic differential equations which is regarded as a foundational paper in this field. He and his collaborators El Karoui and Quenez jointly established a deep relation between BSDE and mathematical model of the option pricing, obtained nonlinear Feynman-Kac formula, i.e., the probabilistic interpretation of BSDE and solutions of a class of non-linear second order partial differential equations, which is known as the path-solution of PDE, and the general stochastic maximum principle in stochastic control, which is regarded as one of the two major advances in this field in the recent two decades.

He developed the theory of non-linear expectation (g-expectation) and the corresponding decomposition theorem of a g-supermartingale and recently established the theoretical foundation of G-Brownian motion and related law of large numbers and central limit theorem under probability measure uncertainty, as well as applied these results to dynamic pricing theory and dynamic risk measurement in finance. His work further developed modern probability theory which was established by Kolmogorov.

His papers have been cited for more than 1000 times and he has trained many excellent young scholars.

Professor Peng was awarded the National Research Fund for Distinguished Young Scholar of NSFC, a second class prize of the National Natural Science Award in 1995, the top prize of the Science and Technology Award of Shandong Province in 2003, Su Buqing Prize of Applied Mathematics in 2006, Scientific and Technical Progress Award (Mathematics and Mechanics) by the Ho Leung Ho Lee Foundation in 2007, and the prize of TAN Kah Kee Science Award on Mathematics and Physics in 2008. He is invited to give a plenary lecture at the International Congress of Mathematicians at Hyderabad, India in August, 2010. In the history of ICM, he is the first mathematician from the mainland China to get this honor.

Dr. Shang Yongfeng

Professor, School of Basic Medical Sciences, Peking University

PI of the Creative Research Group in 2006

Prof. Shang's main research interests include the epigenetic regulation of gene transcription and molecular mechanism of breast/endometrial carcinogenesis. Over the years, he first-authored or corresponded dozens of high-impact papers in international renowned journals such as *Nature*, *Cell*, *Science*, *Nature Reviews Cancer*, *Molecular Cell*, *Genes & Development*, *PNAS*, and *The Embo Journal*, etc.

Prof. Shang focused his research on the understanding of the comprehensive mechanism of estrogen receptor (ER)-mediated gene transcription when he was a postdoc at Harvard Medical School. He was the first to theorize the cyclic binding of ER-regulated transcription initiation complex on the promoters of its target genes, and was the first to develop the mammalian cell-based chromatin-immunoprecipitation (ChIP) assay, which becomes the widely used technique in studying proteins-DNA interaction. The related work, published in *Cell* in 2000, is considered as one of the classical and seminal studies in the field. In addition, Prof. Shang identified the mechanism underlying the increasing risk for endometrial cancer in patients who take tamoxifen as a treatment for breast cancer. He demonstrated that the tissue-specific response to tamoxifen was determined by

the sequence specificity of target gene promoter and the make-up of the co-regulating proteins present in the cell. The findings were published in the year 2003 issue of *Science*.

In 2002, Prof. Shang established his lab at Peking University and continued his study to explore the genetic and epigenetic mechanism of breast/endometrial carcinogenesis. In 2005, he published a paper in *Nature* as the correspondent author in which his group found that PAX2 is a key effector in mediating cell proliferation and carcinogenesis in response to estrogen and tamoxifen treatment in endometrium. The work shows that PAX2 is activated by estrogen and tamoxifen in endometrial carcinomas but not in normal endometrium, and this activation is associated with cancer-linked hypomethylation of the PAX2 promoter. This study gives an answer to a long-standing question about why treatment of breast cancer patients with tamoxifen which may lead to the rise of endometrial cancer, and provides useful information on the design of safer drugs for the treatment of endometrial cancer. The work was nominated as one of the "Top 10 news in the advancement of basic research in China" in 2005. Due to his pioneering work in the related field, Prof. Shang was invited by *Nature Reviews Cancer* in 2006 to write a review entitled "Molecular Mechanisms of Oestrogen and SERMs in Endometrial Carcinogenesis".

In 2009, Prof. Shang and his group reported in Cell that LSD1, the first histone demethylase identified, is a *bona fide* subunit of the NuRD complex, expanding the enzymatic repertoire of the NuRD complex to include an ATPase, a histone deacetylase, and a demethylase, which provided a molecular basis for the interdependence of histone deacetylation and demethylation in chromatin remodeling. The work also shows that LSD1 regulates a number of signalling pathways that are important in epithelial-mesenchymal transition and suppresses breast cancer metastasis, supporting the pursuit of LSD1 as a target for cancer therapy.

Prof. Shang and his group also identified and characterized several novel genes including ZIP, JFK, SIP, GAS, and DLP that are implicated in cell growth, differentiation, and tumorigenesis by mean of comprehensive approaches and systematic methods in the past years.

Prof. Shang has been honored with the Eli Lilly Scientific Excellence Award, the Ho Leung Ho Lee Foundation Science and Technology Advancement Awards, the National Science Fund for Distinguished Young Scholar, the Academic Excellence Award of the Society of Biochemistry and Molecular Biology. Prof. Shang is awarded the Cheung Kong Scholar of the Ministry of Education. He serves as the Senior Deputy Editor of *Chinese Journal of Biochemistry and Molecular Biology*, and member of the editorial board of *Journal of Biological Chemistry*. Prof. Shang was elected as a Member of the Chinese Academy of Sciences in 2009.

Dr. Jiang Guibin

Research Professor, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences
PI of the Creative Research Group in 2006

Prof. Jiang Guibin's research is mainly focused on analytical chemistry and environmental chemistry. His methodical and comprehensive research resulted in significant achievements on analytical development and environmental characterization of persistent organic pollutants (POPs), and the speciation of organometallic compounds, which contributed to the improvement and internationalization of these research areas in China.

Prof. Jiang was one of the pioneers in the research of emerging chemical pollutants in China and has discovered several new POPs. He also contributed to the implementation of the Stockholm Convention on Persistent Organic Pollutants in China. Under his leadership, the studies of this innovative group on emerging pollutants have attracted international attention. Some research results have already been included into the documents on new POPs by the UNEP. In recognition of his outstanding research on the analytical methodology, distribution, accumulation and toxicity of POPs, he was honored with the prestigious Chang Jiang Scholars Achievement Award in 2007.

He has systematically studied the speciation and toxicity of heavy metals, and developed several hyphenated techniques based on chromatography and atomic spectrometry. Field studies in the Chinese Bohai Sea indicated that organotin compounds were probably the inducers of imposex to the marine mollusk *Rapana Venosa*. Another mollusk, *Mya Arenaria*, could be used as a bioindicator for tributyltin in marine environments, and the cellular proteasome was found to be the main molecular target for organotins. Part of this research was awarded the National Natural Science Award in 2003.

In 2005, he set up the Asia Office of the *Journal of Environmental Science and Technology (ES&T)*, the first editorial office of the American Chemical Society in China. From January 2006, he was formally appointed the associate editor of ES&T. It has been noted that the publication of Chinese scientists in ES&T have increased from 13 papers in 2003 to 145 in 2008.

Under his leadership, the State Key Laboratory of Environmental Chemistry and Ecotoxicology was established, and the Dioxin Laboratory has participated in several international intercomparison studies. Due to its high quality, the Dioxin Laboratory was named a pilot laboratory by UNEP. He has been appointed as principle investigator of two national basic research programs (973 Program). Two doctoral theses of his former students were awarded the National One Hundred Excellence Ph.D. Thesis.

Prof. Jiang has published over 300 papers in SCI journals, among which 120 papers were published in journals with IF> 3. His publications have been cited more than 3,000 times. He has given more than 200 plenary and keynote presentations in conferences and invitational lectures in renowned institutes and universities.

Dr. Wang Chi

Research Professor, Center for Space Science and Applied Research, Chinese Academy of Sciences
Grantee of the Fund in 2003
PI of the Creative Research Group in 2006

Prof. Wang's research interests focus on the large-scale solar wind structure and dynamical processes in the heliosphere, and the interaction of the solar wind with the magnetosphere. The main achievements include:

1. He developed a new multi-fluid solar wind model, which includes the affect of the interstellar neutrals, and found a reliable evidence of the solar wind slowdown in the outer heliosphere. This important finding, "a gradual deceleration of the solar wind associated with mass loading by pick up ions was detected in the distant heliosphere", has been listed as one of the six significant accomplishments in the last decade in the 2003 National Research Council Decadal Survey.

2. Using multiple spacecraft observations, he explored the propagation and evolution of the coronal mass ejections and their driven shocks from the Sun to the outer heliosphere. It is found that an interplanetary strong shock does not necessarily correspond to a strong solar eruption on the solar surface, many small shocks driven by CMEs interact with each other and merge into a strong interplanetary shock.

3. He systematically studied the response of the geospace to interplanetary shocks, and proposed a new method to estimate some interplanetary shock characteristics and associated geosynchronous magnetic field variations from sudden impulses observed on the ground.

In recent 5 years, Prof. Wang has published more than 30 peer-reviewed papers in *Nature*, *JGR*, *GRL*, etc., and been invited to give talks in many important international conferences. He won the Achievement Award of Returned Overseas Students in 2003, the 9th Science & Technology Award for Chinese Youth in 2006, and was selected as one of the national candidates for the Talents Project in New Century in 2006.

Prof. Wang is now the director of the State Key Laboratory of Space Weather, and also chief engineer of the Meridian Project, National Major Scientific Infrastructure Construction Project, and chief commander of the Scientific Application System of the Chinese-Russian Mars Exploration Program. Prof. Wang is currently a member of the IAGA Executive Committee starting from 2007.

Dr. Zhang Renhe

Professor, Chinese Academy of Meteorological Sciences Grantee of the Fund in 2002
PI of the Creative Research Group in 2009

Professor Zhang has made systematic and creative researches in the areas of ENSO dynamics, impact of ENSO on the East Asian monsoon and ocean data assimilation. He proposed a kind of tropical eastward propagating unstable waves coupled between the equatorial atmospheric and oceanic Rossby waves and their importance in ENSO events, and indicated that the self-excited oscillations in the non-linear tropical air-sea coupled system can produce variabilities in the interannual time scale and their possible role in the ENSO cycle. He also proposed a kind of physical process through which the East Asian monsoon is affected by ENSO events and indicated that the convective cooling anomaly over tropical western Pacific associated with ENSO events leads to an anomalous anticyclone over northwestern Pacific as a Rossby wave response to the cooling anomaly, which affects significantly the East Asian monsoonal circulation and precipitation. By using Argo data, he proposed a new parameterization scheme in the tropical oceanic model, and improved the temperature simulation in the tropical Pacific and ENSO prediction. Through the establishment of a harmonious assimilation scheme between temperature and salinity, Argo data was assimilated in the Global Ocean Data Assimilation System of the National Climate Center of China (NCC-GODAS), and the operational short-term climate prediction was improved.

Professor Zhang has been principal scientist in more than ten research projects, including the National Science Fund for Distinguished Young Scholars of NSFC and the National Basic Research program. He has published more than 110 research papers. His academic achievements have attracted wide attention in academic circles at home and abroad. Besides large amount citations of his papers, the originality and academic importance have been highly recognized. His achievements has been highly appraised by the American scientists by referring that "the physical mechanisms behind this delayed or prolonged impact of ENSO on EA summer monsoon" and "being made possible" "in more recent years, further progress in our understanding of the influences of ENSO processes on EAM variability". The research results on the ocean data assimilation has been affirmed internationally and the assimilated oceanic data of NCC-GODAS has been opened worldwide in the website of the United States. Because of his excellent research, he obtained the second class prize of the Excellent Young Scientist Award of the Chinese Academy of Sciences in 1993, Excellent Youth Award of the Chinese Academy of Sciences in 1997, China Youth Science and Technology Prize in 2004, first class prize of Research and Technology Development Award of the State Meteorological Administration of China, second class prize of the Oceanic Innovation Achievements Award of the State Oceanic Administration of China in 2007, etc.

Prof. Zhang used to be a member of the Scientific Steering Group of the international program "Climate Variability and Predictability" (CLIVAR), member of the Air-Sea Interaction Committee of the American Meteorological Society, member of the Steering Committee of the international program "Global Climate Observing System" (GCOS). Now he is a member of the Executive

Committee, Monsoon Panel of the Working Group on Tropical Meteorology Research (WGTMR), WMO Commission for Atmospheric Sciences. He is also a member of the Appraising Group of Atmospheric Sciences, State Council Academic Degrees Committee, member of the Advisory Committee of NSFC Department of Earth Sciences, steering councilor of the Chinese Meteorological Society, vice-president of China Society on Tibet Plateau, vice-chief editor of both Chinese Journal of *Atomosphere Sciences* and *Applied Meteorological Sciences*.

Dr. Li Ruxin

Professor, Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences
PI of the Creative Research Group in 2009

Prof. Li Ruxin has been engaged in the frontier research on high-field ultrafast lasers and their application and made a series of important creative achievements. He has long been responsible for the research projects supported by the National Basic Research Program, National High Technology Research and Development Program, National Natural Science Fund and the Chinese Academy of Sciences.

Since the mid-1990s he has made important progress in the research of transient collisionally excitation pumped x-ray lasers, high order harmonic generation, and ultraintense ultrashort laser pulse generation by the optical parametric chirped pulse amplification scheme. In recent years, he has obtained important achievements in the generation of petawatt level femtosecond laser pulses and intense few-cycle laser pulses, quantum control in the sub-optical-cycle regime under intense laser field, and new schemes for the generation and control of attoscond pulses in the XUV spectral region. For example, he developed the petawatt level femtosecond laser system with the highest peak intensity and the corresponding shortest pulse-width among similar laser systems worldwide in 2006, which was selected as one of the 2007 top ten scientific and technological progresses in Shanghai. Internationally-leading results about the table-top laser fusion and highly efficient neutron emission have been obtained by using this laser system. Moreover, he proposed and demonstrated experimentally a novel technique to control dynamically the intrinsic chirp of attosecond pulses and realized for the first time the compensation of negative chirp of attosecond pulses. Peer reviewers commented this result as "could open new opportunities for attosecond coherent control" and "represents a step forward to reach a complete control of attosecond light sources".

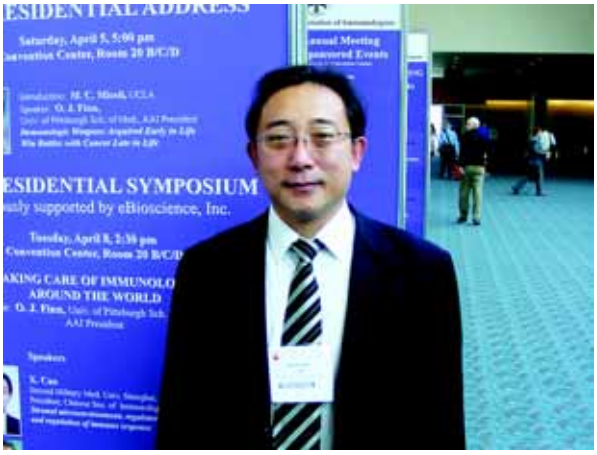
Prof. Li Ruxin has published more than 100 papers in important SCI journals and been awarded 20 patents. His publications have been widely cited and highly recognized. Prof. Li was recruited by the Hundred Talent Program of the Chinese Academy of Sciences in 1997, and awarded by the National Science Fund for Distinguished Young Scholars of NSFC in 1999. He won the National Excellent Ph.D. Degree Dissertation Award in 1999, and the Young Scientist Award of the Chinese Academy of Sciences in 2001. He was elected as one of the top ten outstanding youth in Shanghai in 2005. As one of main contributors, he was awarded the second class prize of the National Natural Science Award in

2001 and the first class prize of the National Science and Technology Progress Award in 2004.

Prof. Li Ruxin is currently the director of Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences and director of the State key Laboratory of High Field Laser Physics. He is a member of the editorial board of *Chinese Physics B*.

Dr. Cao Xuetao

Professor, Second Military Medical University
PI of the Creative Research Group in 2001



Supported by NSFC, Professor Cao Xuetao, director of the Institute of Immunology and the National Key Laboratory of Medical Immunology at the Second Military Medical University in Shanghai, and his group have been investigating mechanisms of immune recognition, immune regulation and the new strategies for treatment of immune-related diseases. In 2009, major progresses have been made in the following aspects:

1. The identification of new molecular mechanisms of immune recognition. Prof. Cao and his group reported that Nrdp1, an E3 ubiquitin ligase, which was independently discovered by this group ten years ago, can inhibit the production of proinflammatory cytokines but increase interferon-beta production in TLR-triggered macrophages, benefiting host to clear viral infection and attenatuate inflammatory damage. The results provides insight into the molecular mechanisms for anti-viral immune response and control of inflammation (*Nature Immunology*, 2009,10: 744 -752). In the recognition of a series of work from this group in the filed of immunology, Professor Cao was invited to provide a News & Views in *Nature Immunology* (2009,10:149-151) to review and summarize the frontier of immune recognition and immune regulation in this field and also outlined the direction for further investigation in the reference of the two original papers published in *Nature Immunology* and *CELL* at the same time, both of which identified a new DNA sensor for triggering innate interferon production independently.

2. The identification and investigation of a new type of regulatory dendritic cell subset and its regulatory mechanisms.

3. The discovery of the new ways to regulate the functions of immune cells: Fibronectin can maintain NK cell survival through CD11b/Src/ β -catenin/EPK pathways.

4. The investigation of the functions and underlying mechanism of several novel immune molecules identified independently. For example, Rab7b could inhibit proinflammatory cytokines and type I interferon production in macrophages by promoting lysosomal protein degradation through TLR9 pathway, which revealed a new negative regulatory mechanism about TLR9.

As corresponding author, Professor Cao Xuetao published 16 papers in SCI journals such as *Nature Immunology*, *Blood*, *Hepatology*, *J Immunol*, *J Biol Chem* in 2009. These research works were all supported by NSFC. Since 1995, Prof. Cao and his group has published 173 papers in SCI cited, peer-reviewed journals. They identified 22 novel immune molecules which have been designated by HUGO and granted with 12 national invention patents. Eight Ph.D. students have been granted with the National Top 100 excellent Ph.D. Dissertations.