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**SPECIAL ISSUES****Sparkle Program Boosts Rural S&T Service**

Under the guidance of the market, the National Sparkle Program has gradually established a novel rural S&T service system integrated with tailored services, which becomes a lead to the establishment of S&T service organizations in different forms in the rural areas.

The program has helped 900 rural S&T service intermediaries at the national level to build up their capacity, which spurs up the further development of a thousand S&T service intermediaries in the rural areas at different levels. More than 20 provinces have enhanced the demonstration and diffusion part of the so-called S&T envoy system and Torch expert group, which facilitates the development of a string of S&T service innovations, including S&T Propagation Station in Hebei, S&T CEO in Chongqing, technology contracting in the rural areas of Shanxi, and agricultural S&T co-op in Hunan. Efforts have also been made to support the establishment of campus based rural S&T service demonstrations, such as Northwest University of Agriculture and Forestry for Yangling rural area, Sichuan Provincial Academy of Agricultural Sciences for Deyang rural area in Sichuan, and Sichuan Agriculture University for Ya'an rural area in Sichuan. The program has established a new S&T service system in selected rural areas using different approaches, and published a technology finding collection for farmers.

Shanxi authorities has established and perfected an S&T service system for agricultural produces; Tianjin municipal government introduces diverse steps to establish a rural S&T service system, with a booming number of special associations, co-ops, and production/marketing organizations working to increase farmers' income in the rural areas; In Zhejiang Province, the development of rural S&T service system pays more attention to the role played by training and expertise. 5 high-yield demonstration centers have been established in the major food and edible oil producing areas. Ningxia makes the technology and economic co-op a major carrier of science and technology for farmers. As of the end of 2005, the co-op in the autonomous region has reached 1,415 in number.

**Sparkle Training Enhanced**

The Chinese Ministry of Science and Technology (MOST) has recently reinforced its training activities under the National Sparkle Program, with focus on providing technology and skill training for a million of farmers. In 2005, farmer who received training have reached 10 million person/time. MOST also enhanced the capacity building of 50 national Sparkle training centers and 629 Sparkle schools, which boosts the training aspect of the program. It has kept working on three collaborating networks for Sparkle training, in an attempt to facilitate cross-regional training and exchanges for farmers.

In the meanwhile, a nationwide effort has been initiated to strengthen S&T training, through perfecting the S&T training system that is made up of distance-learning, training schools, learning modules, TV lectures, and a process to disseminate S&T information to the rural areas. The efforts has produced new generation farmers who have some knowledge of technologies, operation, management, and innovation. For example, a Sparkle campaign of "rejuvenating the dairy industry and training 10,000 farmers" was staged in Lindian County, Daqing Municipality in Heilongjiang. A project named "producing a university student from each village" is vigorously promoted in Hebei Province. Inner Mongolia has strengthened the construction of Sparkle schools, which allows 1 million rural population being trained. The peach training organized by the Shanghai rural S&T service system has contributed to an increase of peach yield by 50% or more. Jiangsu Province disseminates S&T information collected from universities and research institutes to rural households, through the Sparkle Program, in line with industrial demands for medicinal herbs, fruits/vegetables, and aquatic products. In Shandong Province, a novel training mechanism is established to attract the involvement of public efforts in providing training for the rural population. A range of S&T service activities have been staged in the Gongcheng County, Guangxi Autonomous Region, including 198 workshops, 312 technology feature movies, 192 field demonstrations, and

a training course running for 156,000 farmers, or 75% of the village population in the county.

## INTERNATIONAL COOPERATION

### China-US Cooperation on CODATA

A China-US roundtable meeting was held on October 20, 2006 in Beijing to discuss CODATA related policies. ZHANG Xianen, Director of Basic Research at the Chinese Ministry of Science and Technology, and Prof. Roberta Balstad, US Co-Chair from Columbia University, jointly presided over the meeting. Representatives, from the US National Academy of Sciences, American Society for Scientific Sharing, the Chinese Academy of Sciences, Peking University, the State Oceanography Bureau, the State Seismological Bureau, and MOST Dept. of Policy, Regulations and Reform, Dept. of Basic Research, and S&T infrastructure platform, attended the meeting. Experts from both sides briefed the meeting of the development of CODATA laws and policies in their respective country, and had an in-depth discussion of a range of issues concerning incentive mechanism, evaluation policies, and long term operational mechanism of data centers. Participants also discussed future cooperation perspectives for CODATA activities. Participants agreed that it is extremely useful for both sides to share experience and practice in formulating the policies concerning scientific data sharing. Both sides share some common concerns over scientific data sharing, though under different cultural backgrounds, which adds the necessity for mutual learning and further cooperation in the area.

## RESEARCH AND DEVELOPMENT

### New Generation Artificial Sun

Not long ago, a study group, made up of 29 scientists from world-class fusion research institutes in Europe, the United States, Russia, Japan, Korea, and India, visited the Plasma Institute of the Chinese Academy of Sciences. After viewing the discharge experiment and associated experimental equipment, and listening to researchers' presentation, visitors thought highly of China's new generation artificial sun EAST that has made a successful discharge. A ten-hour long in-depth discussion of the construction, system enhancement, and future experiment plan between visitors and researchers has resulted in a conclusive report on the device.

It is stated in the report that EAST is the only super-conducting magnet nuclear fusion experimental device in operation in the world. All the magnets rolled out by the Plasma Institute on its own have reached designed indicators.

The construction of the device has impressed the visitors. They point out that the design, pre-phase study, construction, and experimental operation of the device in such a short time makes an important milestone in the world history of fusion energy development. It marks China's noticeable contributions to the international study of nuclear fusion, and demonstrates the physical and engineering capability of Chinese scientists.

According to a briefing, it takes 8 years for Chinese scientists to independently complete the development of EAST device, with an investment worth RMB 200 million. EAST made its first successful discharge on September 28 at 200 kiloampere with a duration approaching 3 seconds. EAST enjoys a less investment, faster construction, earlier operation, and earliest discharge after operation, compared with similar devices in other countries.

### Two-qubit Quantum Teleportation

Not long ago, Prof. PAN Jianwei, the University of Science and Technology of China, and his collaborators have realized for the first time in the world the quantum teleportation of a two-qubit composite system. The finding was published as a cover story in the October issue of *Nature Physics*.

Prof. Pan and his Austrian colleagues realized the first teleportation of single qubits in 1997, which is acknowledged a milestone for quantum information development. Compared with the teleportation of single qubits, the quantum teleportation of a two-qubit composite system makes a more difficult technical challenge.

A research team of the University of Science and Technology of China, headed by Prof. Pan, in collaboration with its German and Austrian colleagues, has worked on the world class challenge for nearly a decade. Researchers modified the pulse laser device in the first place, to produce an intensity sufficient for manipulating three entangled photon pairs. One of them is made for quantum teleportation of a two-qubit composite system, while other two into quantum channels in parallel for teleporting the quantum state of the two-qubit composite system. Experimental results show that not only the quantum state of the two-qubit composite system is precisely teleported, but also the relationship of the two-qubit composite system. In addition to being the first quantum teleportation of a two-qubit composite system in the world, the experiment also realized for the first time the manipulation of six-photon entanglement.

### Precision Moon Probe

According to a briefing issued not long ago, the Xi'an Satellite Control Center has achieved major progresses in working on the national and defense projects assigned to it. For example, the Center, in collaboration with Nanjing University and the National University of Defense Technology, has found solutions to a number of key technologies involving orbit maintenance, multi-satellite networking control, return orbit control, and precision prediction for returning. The accomplishment secures a substantive breakthrough in precision calculation of geosynchronous and near-earth orbits, making the Center a domestic leader in orbit determination, orbit attitude control, and return control.

Researchers at the center have rolled out an automatic monitoring and earlier warning system for satellite based remote sensing activities, along with an intelligent failure fixation system and a long term satellite management system. The efforts has greatly improved the Center's satellite management quality and associated automatic process, realized the change of long term satellite management module from empirical single satellite to intelligent multi-satellite.

The Center has recently launched a pre-phase study of deep space orbit calculation and

control. It also established a high caliber expert database for the moon probe project, and dispatched experts to study abroad. The success of the "dual-satellite" control mission over a range of 80,000 km provides technical evidences for future deep space probes.

#### Natural S&T Resources Sharing

During the 10th Five-year period (2001-2005), Chinese authorities has worked diligently to raise the public awareness of public resources sharing, through the construction of a platform, in an attempt to facilitate the regulated management of eight major natural S&T resources, and improve the management of these resources. Researchers who have a direct involvement in the construction of the platform approach 5,000 in number, with 47% of them possessing a senior academic title. The construction of the platform has resulted in the promotion of some 700 personnel, and nurturing of 900 graduate students. A stable high caliber research contingent with young people as the backbone is formed to ensure a long term commitment to resources sharing and related service. Up to date, derived from the efforts are some 100 monographs, over 1,000 papers, and more than 100 patent applications.

During the 10th Five-year period, the natural S&T resources sharing platform has shared 448,000 physical resources with research and production sectors on a combined basis, or three times the preceding sharing efforts, of which specimen sharing increases by eight times. Resources sharing has produced noticeable economic and social benefits, through expanding the scope for such sharing. For example, the plant germplasm resource component has provided 63,000 improved plant germplasm materials. Statistics show that the improved plant germplasm has produced a direct economic return worth RMB 5.2 billion, while new varieties bred up using improved plant germplasm have brought up an economic return of RMB 30.6 billion.

#### Capacity Building for Software Industry

Beijing software industry and its service capacity building, a project initiated under the National Key Technology Program in the 10th Five-year period and implemented by the Beijing Software and Information Service Promoting Center, has heralded a success for implementation. Based on the experience learned from its overseas counterparts, including the software productivity promoting center in Canada, IT industry promoting center in Korea, and productivity promoting center in Hong Kong, the project is designed to address a range of issues troubling the development of software industry in Beijing, including a weak foundation, insufficient connection with market, and poor localization capability.

The project has resulted in the establishment of a public technology supporting system for software industry in the Beijing Zhongguancun Software Park. The system is made up of a number of components, including tool database, open source code database, software construction and public software development platform, testing platform, quality control platform, and service and management platform. As the largest and most advanced software infrastructure in the country, the new system has been connected to major software parks, incubators, and research institutes through broadband. The effort makes a successful attempt to provide support for decision making, and enhance the capacity building of productivity centers for information service, through raising the efficiency and utilization of software resources, and improving the flow management and process control of software making.

#### Key to Regulating Plant Growth

A research team, headed by Prof. ZHANG Dapeng at the Institute of Biology, part of China Agriculture University, has discovered, based on its decade long study, the ABA receptor, a protein involving in the biological synthesis of chlorophyll. The finding makes a key to regulating the movement of plant air vent and seed development. Researchers explain that the "key" can open the gate leading to understanding the mechanism and application of ABA, and further to free regulating the movement of plant air vent and seed development. The finding was published in an October issue of journal Nature. Prof. ZHANG named the protein "ABAR" for his discovery of it as a receptor involving in the biological synthesis of chlorophyll.

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