Nuclear Physicist Gets Top Science Award

YU Min, a hero behind China's first hydrogen bomb explosion, has won this year's State Supreme Science and Technology Award. On January 9, 2015, he received the award from Chinese President XI Jinping at the Great Hall of the People in Beijing.

Born into a clerk's family in Tianjin, YU grew into one of the most talented students in his high school. Almost missing college due to his family's financial plight, he managed to enroll at Peking University where he developed a strong interest in physics. In 1951, he joined the Institute of Modern Physics, Chinese Academy of Sciences to conduct nuclear physics research.

In the early 1960s, YU was assigned by the institute to study hydrogen bomb theories. Leading a squad of scientists, YU worked day and night to tackle crucial technical problems with the bomb's design. "We used to argue over all sorts of technical problems," said ZHENG Shaotang, YU's former colleague. "The results have always proved him right. His brain was like a computer."

In 1967, a hydrogen bomb was successfully exploded in Xinjiang Uygur Autonomous Region, making China the fourth nation in the world to possess such weapons. It was only 32 months after its first atomic bomb test.

"Our working condition back then was very shabby and difficult. But we worked real hard. In three months we used piles and piles of draft paper and slept on straw-covered beds at night. Everyone was very enthusiastic and passionate,"said another colleague CAI Shaohui.

Work took up so much of YU's time that he never got enough time to spend with his family. YU Yuan, his daughter, remembered her father as "a shadow". "He was always reading and thinking," she recalled.

"My father worked in a top secret environment and was seldom with us," his son YU Xin noted. The only time he remembered his father helping with his homework was to teach him how to draw a circuit diagram. "His approach

was very different from my teacher's. Later, I got a great score in the exam and was able to show off in front of my classmates."

"As a scientist, research has always been my main responsibility," YU claimed.

In fact, his work was kept top secret until 1988 when the mission was fully declassified. Even his late wife SUN Yuqin didn't realize what her husband had been really up to till then.

That same year YU retired and finally found time to revive his interest in history, classic Chinese literature and Peking opera.

Sitting in a wheelchair, YU accepted the by far highest honor of his life from President XI.

"No one's name is immortal in history, but it is quite comforting to know that one has contributed to the motherland's prosperity," YU said.

"Even today, many developments in nuclear weapons are based on YU's theories. He richly deserves this honor, and I congratulate him," commented senior physicist HE Zuoxiu who is an academician of the Chinese Academy of Sciences.

YU would receive a five million yuan ($826,000) prize like 24 previous laureates of the award.

CAS Honors Scientists, Research Groups with Outstanding Achievement Prize

The Chinese Academy of Sciences announced on January 19 that three scientists and four research groups had won its Outstanding Science and Technology Achievement Prize for 2014.

Archeologist XU Xing from the Institute of Vertebrate Paleontology and Paleoanthropology, materials scientist JIANG Lei from the Institute of Chemistry, and virologist GAO Fu from the Institute of Microbiology are the

individual laureates of this year.

According to a fact sheet released by the prize's evaluation committee, XU Xing has conducted extensive field investigation in northern China which led to the discovery of numerous Mesozoic terrestrial vertebrate fossils, as well as world-leading research that "greatly enriched our knowledge of Jurassic and Cretaceous terrestrial ecosystems" and "contributed significantly to the understanding of dinosaur evolution and bird origins". JIANG Lei has pioneered the study of bio-inspired interfacial materials with super-wettability, and successfully prepared self-cleaning and water-oil separation nanomaterials which have great potentials for real world application. GAO Fu, as a distinguished expert in interspecies transmission study of influenza virus, "constructively combined epidemiological, functional and structural methods" to reveal the origin and drug resistance mechanism of flu viruses such as H7N9 and H10N8, and other enveloped viruses like MERS-CoV, measles virus and herpes simplex virus.

The four research teams which received the prize on the same day during the CAS annual work conference in Beijing include: the research group for single-molecule scale quantum control at the University of Science and Technology of China, the research group on Vanadium flow battery energy storage technology at the Dalian Institute of Chemical Physics, the research group on destruction of North China craton at the Institute of Geology and Geophysics, and the research group on the R&D of key ultra-large scale integration technologies at the Institute of Microelectronics.

Since 2003, CAS has been conferring the Outstanding S&T Achievement Prize on individuals and groups from within the Academy who have made significant achievements in scientific and technological innovations in the past five years. Now awarded once every year, the prize goes to no more than ten winners each time. By far, 10 individuals and 33 teams have received the prize.

US and Swedish Scientists Recognized for Collaboration Efforts

The 2014 CAS Award for International Scientific Cooperation went to US chemist Peter J. Stang and Swedish bio-separation scientist Jan-Christer Janson.

As a distinguished expert in organic chemistry, Prof. Stang has made outstanding contributions to the study of molecular architecture and supramolecular chemistry via self-assembly. Over the years, he has been actively involved in training doctoral applicants, postdoc researchers and visiting scholars from China, and played a key role in facilitating the visit of an American Chemical Society delegation to China in 2005.

"Peter is an old friend of Chinese people," said WAN Lijun, director general of the CAS Institute of Chemistry. "His cooperation with Chinese chemistry can be dated back to many years ago. Thanks to his efforts, a delegation from the American Chemical Society got to visit China in 2005, first of its kind since the founding of the country. The visit proved to be a milestone in strengthening the cooperation between the US and China in the field of chemistry."

Jan-Christer Janson

Peter J. Stang

"I'm most grateful and honored to receive this award," Prof. Stang said. "And I very much enjoyed my collaboration with Prof. Wan Lijun. By taking advantage of his expertise in molecular chemistry and surface chemistry and my expertise in self-assembly, we were able to do some very nice studies that resulted in several excellent publications in premier journals."

Jan-Christer Janson is the inventor of Sepharose CL and Sepharose FF chromatographic media and columns,

which are widely applied in the bio-pharmaceutical industry. Since 1980, he has been extensively engaged in the collaboration with Chinese colleagues. He helped China to design and develop the industrial separation and purification processes for several recombinant pharmaceuticals such as hepatitis B virus and interferon gamma.

"Prof. Janson has been working with us for more than two decades," noted SU Zhiguo, director of the National Key Laboratory of Biochemical Engineering at the Institute of Process Engineering. "He helped us build a platform for the separation and purification of protein pharmaceuticals. Together, we developed a novel proteins refolding technique which is 30% to 50% more effective than the traditional technique."

"It's a very great pleasure and honor for me to be given this award. I have had so many years' very, very fruitful collaboration with Prof. SU Zhiguo and Prof. MA Guanghui at the Institute of Process Engineering, and we have been very successful in our collaboration. I hope I can support them in the future, and build more collaboration with China," Prof. Janson said.

Groundbreaking at JUNO

Jiangmen Underground Neutrino Observatory (JUNO), the second China-based neutrino project, held its groundbreaking ceremony on January 10 in Jiangmen City, Guangdong Province, China. More than 300 scientists and officials from China and other countries attended the ceremony and witnessed this historical moment.

Following the Daya Bay Reactor experiment as the second neutrino project, JUNO is designed to determine the neutrino mass hierarchy via precision measurements of the reactor neutrino energy spectrum. The experiment is scheduled to start data-taking in 2020, and is expected to operate for at least 20 years. The neutrino detector, which is the experiment's core component, will be the world's largest and highest precision liquid scintillator detector.

After the determination of θ_{13} by the Daya Bay and other experiments, the next challenge to the international neutrino community is to determine the neutrino mass hierarchy. Sensitivity analysis shows that the preferred range for the experiment stations must be 50-55 km away from a nuclear reactor.

Jinji Town, located in Kaiping, Jiangmen City, Guangdong Province, was chosen to be the experiment site for JUNO experiment. The site is 53 km from both Yangjiang and Taishan Nuclear Power Plants (NPP), with six 2.9 GW reactors at Yangjiang NPP and four 4.6 GW reactors at Taishan NPP, giving a total thermal power of 35.8 GW. By 2020, the effective power will be the highest in the world. The experiment hall will be located 729 m underground.

The JUNO experiment is in the spotlight of the world scientific community for its experimental significance and unique design. On July 28, 2014, the JUNO international collaboration was established. Over 300 scientists from 45 institutions in nine countries and regions have joined the Collaboration, and over ten institutions from five countries

are planning to join the Collaboration.

Prof. WANG Yifang, JUNO Collaboration Spokesperson and Director of the Institute of High Energy Physics explained that at present, seven other experiments from five different countries and regions – Japan, Europe, the USA, India and Korea – are focusing on the determination of the neutrino mass hierarchy.

He is, however, confident of JUNO's leading role in the field. "With leading liquid scintillator detector technologies, rich experience in reactor neutrino experiment, and innovative experiment design, the JUNO experiment could be the first to determine the neutrino mass hierarchy." commented Prof. WANG.

Neutrinos are elementary particles, and are very difficult to detect. Based on particle physics experiments, matter consists of twelve fundamental particles, including three types of neutrino. They have no electrical charge and have a very small mass (less than one millionth of the mass of the electron), and their speed is nearly equal to the speed of light. Since neutrinos have very little interaction with matter, their detection is very difficult. Of all the

fundamental particles, people know least about neutrinos.

The JUNO experiment aims to determine the neutrino mass hierarchy, a hot topic in international neutrino research. The neutrino mass hierarchy is very important in the evolution of the universe and in the probability of neutrino oscillations. It is also the basis for determining the absolute neutrino mass, and helps the neutrinoless double beta decay experiments. Neutrinos are a probe for studying celestial bodies as well as the Earth's interior, thus will play a key role not only in testing supernova burst mechanisms, but also in verifying geophysical models and studying other aspects of solar physics and geophysics. JUNO should be able to measure 3 out of the 6 neutrino mixing parameters to better than 1% precision, as well as studying supernova neutrinos, solar neutrinos, geo-neutrinos, atmospheric neutrinos and sterile neutrinos.

Delegations from the Chinese Academy of Sciences, the Ministry of Science and Technology of the People's Republic of China, the National Natural Science Foundation of China and the Italian National Institute for Nuclear Physics (INFN) were present at the ceremony. (IHEP Press Release)

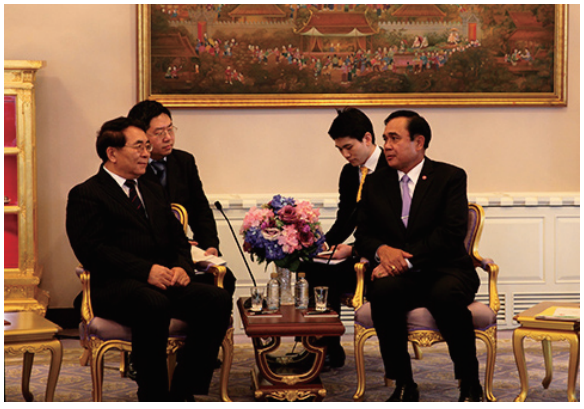
CAS, Thailand Research Fund Ink MoU

A Memorandum of Understanding (MoU) was signed between the Chinese Academy of Sciences (CAS) and the Thailand Research Fund (TRF) in Bangkok early this year to boost partnership on communication satellites, alternative energy, railroad development and biodiversity between the two nations.

According to the MoU, cooperation will be carried out through joint research and personnel exchange, both short and long term. Four priorities to be addressed in the coming year include the exchange of knowledge on communication satellites, railroad development, alternative energy, and biodiversity.

Prior to the signing of the MoU between CAS President BAI Chunli and TRF President Suthipun Jitpimolmard, Chinese President XI Jinping had discussed with Thailand Prime Minister Prayut Chan-o-cha on deepening Sino-Thailand collaboration in fields such as railroad development, garbage management, rubber, car testing, as well as military and space exploitation.

The MoU not only witnessed the 40th anniversary of China-Thailand diplomatic ties (1975-2015), but will hopefully benefit both parties in the future, said Capt. Yongyut Maiyalap, the spokesperson of Thailand Prime Minister's Office.



During his visit to Bangkok from January 5 to 8, BAI also met with Thai Premier Prayut and Princess Sirindhorn. They talked over the potential of setting up CAS branches in Thailand, and vowed to promote bilateral scientific and technological collaborations to a new level.

TRF was established in 1993 by the Thai government to support the development of researchers and research-based knowledge through grants allocation and management.

Sino-Africa Joint Research Center Kicks off Construction in Kenya

December 4, 2014 witnessed the launch of construction work at the Sino-Africa Joint Research Center in Kenya. The country's Deputy President William Ruto, the Charge d'affaires of the Chinese Embassy in Kenya TIAN Lin, and the Deputy Director General of the Bureau of International Cooperation of CAS QIU Huasheng attended the ground breaking ceremony.

In his remarks, Ruto hailed the Sino-Africa cooperation

in science, technology and innovations to accelerate the continent's socio-economic transformation. "Science and technology has been the bedrock of great civilizations and has a critical role in shaping our future," Ruto said, noting that Kenya will be a hub for research and innovations thanks to China's support.

According to TIAN Lin, the center aims at "conducting mutually beneficial cooperation" with relevant African countries in areas like biodiversity conservation, eco-environment protection and anti-desertification efforts.

QIU Huasheng said that China will extend technical and financial support to propel sustainable development in Africa. "The establishment of a joint research center marks an important milestone in Sino-Africa cooperation. It will help address bottlenecks to sustainable development in Africa," he said, adding that 24 young Africans are currently studying in China under CAS' sponsorship, and that "a series of joint scientific investigations have been organized in biodiversity and lake ecology conservation".

The center and its affiliated 40-acre botanical garden, which are funded by the Chinese government, will be hosted by the Jomo Kenyatta University of Agriculture and Technology (JKUAT). (Based on Xinhua/NAN news release)

First P4 Lab of China Unveiled at WIV

The day Jan 31, 2015 witnessed the inauguration of the National Laboratory of Biosafety, CAS held at the CAS Wuhan Institute of Virology (WIV) as the first biosafety level-4 (BSL-4) facility in China, after over one decade's construction. Specially designed and administered for research on class-four pathogens (P4), this facility is anticipated to equip scientists with armor and weapon to better combat the most dangerous infectious diseases including Ebola hemorrhagic fever, which had claimed a death toll of 8,414 people during the latest outbreak in West Africa countries Sierra Leone, Liberia and Guinea as of Jan 11, 2015.

Well awaited by scientists and the public, the project of this high-level biosafety started in August 2003 in wake of the outbreak of Severe Acute Respiratory Syndrome (SARS), a highly virulent aerosol-transmitting infection, as an effort to support studies needed in containing highly virulent viruses like SARS virus. Jointly built by CAS and the Wuhan Municipal Government and funded by the National Development and Reform Commission, the project is also supported by the *Fondation Mérieux*, the French National Institute of Health and Medical Research (*INSERM*) and the *Institut Pasteur* of France under a framework agreement on prevention and control of emerging infectious diseases between Chinese and French governments.

Any operation on live P4-level pathogens, namely

Researchers are seen operating in a manoeuvre in the P4 lab newly unveiled at WIV. (Images by courtesy of WIV)

dangerous and exotic pathogens that could pose high risks of aerosol-transmitting laboratory infections, or agents that could cause severe to fatal diseases in humans for which vaccines or other treatments are not available, like Ebola virus, has to be conducted in a BSL-4 facility due to their virulent nature. Such facilities of top biosafety level were only available in a handful of developed countries before inauguration of the Wuhan facility.

The past absence of BSL-4 facilities in China had restricted the research on highly dangerous viruses like Ebola virus in this country to certain areas, hence impeding the R&D activities targeting control and prevention of this lethal disease.

Now the completion of this facility is anticipated to enhance the capacity of the existing cluster of high-BSL R&D platforms including a P3 laboratory based at WIV, a leading research body for virology. This will endow scientists from WIV and beyond with further enhanced forces for etiology and biosafety research on emerging and highly infectious diseases, providing support for the prevention and control of virulent infectious diseases and R&D aimed at new drugs and vaccines.

Based on the newly established P4 laboratory, WIV has joined hands with the Chinese Center for Disease Control and Prevention to build a joint center for research on emerging infectious diseases and biosafety, aiming to conduct studies on emerging infectious diseases and virulent pathogens, and provide S&T support for the control and prevention of emerging infectious diseases and emergency reactions to public health events.