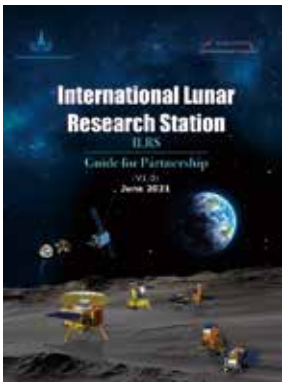
In This Issue

Moon Station Embraces Global Participation

In their joint statement aired in late April, China and Russia invited all potential partners across the world to join the International Lunar Research Station (ILRS) initiated by them. Now on June 16, the two sides further released the *International Lunar Research Station Roadmap (V1.0)* and the *International Lunar Research Station Guideline for Partnership (V1.0)*, to give more detailed information on the ILRS itself and guidelines for potential international partners who are interested in this joint venture. For more, please refer to page 68.



Cover of the Guideline for Partnership as released by the two sides. (Credit: CNSA)

InFocus | *Zhurong* Starts Working on Mars Surface

The Mars rover-lander complex of *Tianwen*-1, China's first Mars probe, touches down on Mars surface on May 15, and later released *Zhurong*, the Mars rover to conduct *in situ* investigations across the rugged and complicated terrains. During its adventure lasting for 90 Martian days, the five-ton vehicle will have to survive the harsh conditions to obtain and deliver valuable data for the preset scientific objectives.

To meet this goal, CAS scientists have developed state-of-the-art materials to secure that the vehicle stay endurable, reliable and stable despite the large daily temperature variations, and the possible hits and impacts against the Mars surface. On the other hand, they also built advanced instruments for the rover's exploration. For details, please turn to page 72.

Panoramic picture of the landing site of *Tianwen*-1's lander-rover complex (Credit: CNSA/MARS)

Special | Towards Next-generation Rice – Following the Footprints of Late Academician YUAN Longping

Late academician YUAN Longping, well known as "father of hybrid rice", left us in May. His dedication and passion to breed China's super hybrid rice has been passed down to the next-generation researchers. To see into the future of next-generation rice, BCAS invites a number of leading scientists from China to share with us their own studies and how these studies will implicate and inspire the next-generation rice. Turn to page 76 for more detail.

Highlight | LHAASO Peers into an Unknown Ultrahigh-energy Universe

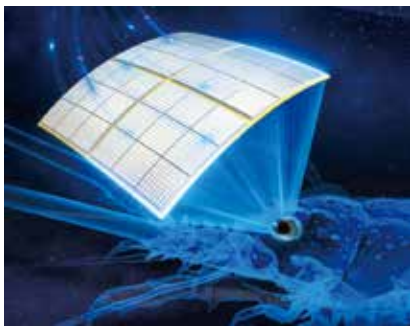
An international team of astrophysicists working on the Large High-Altitude Air Shower Observatory, an instrument for detection of cosmic rays located at a site 4,410 meters above sea level, discovered a dozen of gamma-ray sources emitting photons of extremely high energies – the most powerful ones even exceed 1.0 petaelectronvolts (PeV, or 10^{15} eV), touching on the so-called "knee" of the cosmic-ray spectra. Such sources can accelerate cosmic particles to ultrahigh energies (UHE) and hence got a nickname as "PeVatrons", as an analogue to Tevatron, a literally man-made particle accelerator that can accelerate particles to TeV-level energies once operative at Fermi Lab.

LHAASO is illustrated catching the UHE photons from Cygnus Cocoon, a star-forming region in the Milky Way. (Credit: IHEP)

LHAASO's discovery has aroused great interest in the astrophysical circle, as it not only has doubled the very limited number of known PeVatrons, but has also offered new clues about the origin of cosmic rays, a century-long puzzle. Moreover, such extremely rare UHE photons, never detected before, open a window on the ultrahigh-energy universe, an unexplored world where unknown laws might be found underlining the violent physical processes.

For the full story, please turn to page 86.

Int'l Cooperation | Joining Hands for Transient Monitoring and Detection



The wide-field-of-view X-ray camera onboard EP makes it ideal for transient monitoring. (Credit: NOAC)

The Einstein Probe (EP), a scientific satellite for astronomical observation from X-ray wavelengths, is set to launch by the end of 2022. Aimed at transients, classes of quickly fading out astronomical phenomena, this mission can help scientists understand some very violent episodes in the cosmos – for example, a star being caught and torn by the gravity of a black hole to fall onto it.

The EP mission, sponsored by the Chinese Academy of Sciences (CAS) under the Phase II of its Strategic Priority Program for Space Science, is meanwhile jointly supported by the European Space Agency as a Mission of Opportunity. How is the cooperation going on? What will this cooperation mean for the two sides, for the astronomical circle, and for the society? Now amid the busy engineering development, we have the honor to invite Dr. Erik Kuulkers, the mission's Project Scientist at ESA, to talk about the cooperation between CAS and ESA on EP, and what the cooperation can bring about. Read more on page 94.

ThinkTank Report | Promoting Nutritious Crops

A group of scientists led by CAS Members advise that the country shall encourage the breeding and promoting of nutritious crops, which have better nutritional values than ordinary ones, but have long been neglected in the nation's layout for agricultural development. To improve people's health and wellbeing, the country shall shift its agricultural emphasis from quantity to quality, and improve the nutritional quality of farm produce in China, argue the experts. For more, please turn to page 99.

Science Watch | FAST Helps Detect and Understand Pulsars

A team working on FAST has designed and conducted a survey for pulsars, sources of regular radio pulses in the Universe. According to the data released by the team online at http://zmtt.bao.ac.cn/GPPS/, as of May 20, the team had detected and charted a total of 212 pulsars, including many very faint pulsars, 42 millisecond pulsars (MSPs), and 16 pulsars in binaries. For more, please read on page 104.

FAST in a bird's-eye view (Credit: NAOC)

FAST is also helping scientists better understand the nature of pulsars – another name for fast-spinning neutron stars originated from the imploded cores of massive dying stars through supernova explosion. Based on data obtained by FAST, another team has found the first evidence for three-dimensional (3D) spin-velocity alignment in pulsars, hence beginning to understand the origin of the initial spin and velocity of them. More on page 103.