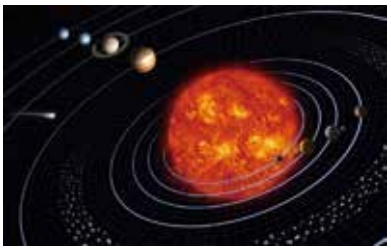
In This Issue

SPACE SCIENCE

Flying beyond the Moon



[Image Credit: Harman Smith and Laura Generosa (nee Berwin), NASA]

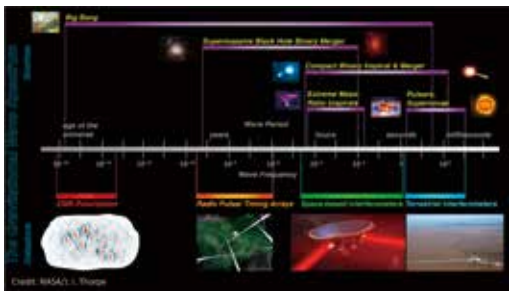
When the scientific community and the public are celebrating the 50th anniversary of the first manned landing on the Moon, China is preparing for its fifth lunar mission, the *Chang'e*-5, as well as a Mars mission, both to be launched in 2020. This country is extending its space exploration to deeper space and outer planets, including the Mars, asteroids and the Jupiter. For the time being, Chinese scientists are talking about the long-term layout of lunar and deep space explorations, including the scientific goals for its first Jovian mission, the Gan De.

Working towards peaceful exploration and utilization of space, China is seeking international cooperation in a more open and comprehensive sense. Drawing on experience of its past collaborations with overseas scientists and institutions, the China Lunar Exploration Program has launched a plan to jointly design and build a Lunar Research Station open to the whole humankind together with the European Space Agency and Russian Space Agency.

For more please refer to page 72.

ASTROPHYSICS

Hailing the dawning era of multi-messenger astronomy



(Image: NASA/J. I. Thorpe)

The third observing run (O3) of the LIGO-Virgo coordination kicked off in April 2019 and has so far raised a new wave of expectation – the physical community is earnestly anticipating a reoccurrence of the global synergy observation on GW170817, which not only emitted gravitational waves, but also electromagnetic signals, making it possible for traditional telescopes all over the world to follow.

With this aspiration, astronomers and astrophysicists from all over the world convened in Kunming, Yunnan China to share what they discovered lately, and to discuss what the international physical community shall do to improve the sensitivity, accuracy and efficiency of GW detection and follow-up observations on GW sources, especially in the cases where electromagnetic signals are emitted from such sources. Particularly, Chinese astronomers and astrophysicists are trying to establish observational networks to secure better follow-up observation in the near future. Meanwhile, they seek to make the best from multi-messenger astronomy, to better understand how the universe works.

For more, please refer to page 80.

ASTROPHYSICS

The "last piece of the mosaic"

(Image: ESO/M. Kornmesser, CC BY 4.0)

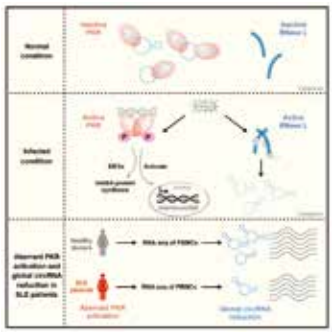
Quasars are a type of compelling celestial bodies that let out a great amount of energy through radiations. How they have got the energy has been perplexing scientists for a long time, and the black hole accretion model has risen to explain this.

Despite its great success in explaining many observed phenomena of quasars, this model was yet to complete – the last piece of the mosaic model had been missing – until a joint team of scientists detected a large amount of hydrogen and helium atoms on the outer brim of the accretion disks of a group of quasars. The redshifted broad absorption lines left by these atoms betray the trajectories of the accreted gases – they are captured by the gravity of the central black holes and hence falling on them at freefall-like speeds. This has provided the first unambiguous observational evidence for inflows that fuel the accretion disks surrounding the central black holes, the long-sought-after "last piece" of the mosaic of the black hole accretion model.

For details please see page 87.

EPIGENETICS

Misunderstood "mistake"



(Image: SIBCB)

Circular RNAs, which generally do not inform protein production, were once thought mistaken products of the cellular machinery.

This long-misunderstood group of heretic RNAs eventually stands out as a hero. Recently, a joint team of biologists and pathologists revealed that this obscure group turns out to be a natural inhibitor of an important antiviral factor, whose overactive behavior is associated with autoimmune diseases like lupus. This discovery offers new hope for clinical diagnosis and effective treatment for such diseases.

For more detail, please refer to page 91.

VIROLOGY

Enterovirus B sneaks into victim cells through accomplice receptors

(Image credit: one frame taken from the film *Troy*.)

A successful plot of viral cell entry is in some way like a Trojan Horse – encapsulating destructive power with an innocent appearance – that tricks its way into the castle and brings the city into ruins once the hidden warriors within get out. Over the past few years, the group of enterovirus B (EV-B) viruses are the Trojan Horses that have imposed a substantial risk on children in a global range.

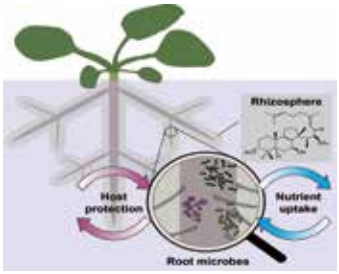
Thus far, there is no approved drug or vaccine specifically against EV-B infection due to our limited knowledge and lack of animal models. Until

recently, a vital piece of information concerning how these viruses sneak into cells with the help of accomplices from the victim cells was revealed and reported in *Cell*. Based on this new finding, scientists are seeking to develop new antiviral drugs or vaccines to fight against these viruses.

Read more on page 96.

PLANT SCIENCE

Plants are good at socializing with soil microbes



(Image credit: YAN Fusheng)

Plant root proved quite active in socializing with other living things, particularly soil microbes, by deploying its "root chemical diplomacy". In a recent report in *Science*, researchers from the Institute of Genetics and Developmental Biology, Chinese Academy of Sciences and their cooperators from the John Innes Center, UK unraveled new evidence that plants can release certain root chemicals to mould soil microbes to its advantage, such as improved nutrient absorption and protection from pathogens. How they made this discovery is illustrated on page 101.

ECOLOGY & EVOLUTION

A small fish dwelling under huge pressure

A soft-bond snailfish (*Pseudoliparis swirei*) living more than 6,000 meters underwater shows its survival tricks to handle the immense hydrostatic pressure it has to endure deep down in the Mariana Trench: Be soft and make sure having a hole in the head. Having sequenced its genome, CAS scientists together with collaborators from the Northwestern Polytechnical University revealed the genetic adjustments – or the intrinsic drives – that make it standout from its high-elevation cousins. This study was appeared on the 15 April issue of *Nature Ecology & Evolution*. For more detail, please refer to page 121.

(Image credit: Text by YAN Fusheng; Image by HE Shunping, CAS)