

## China 2021: Space Glimpses

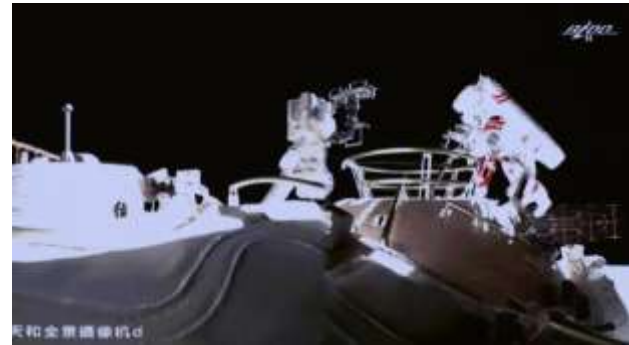
### *Taikonauts conduct first CSS EVA*

Taikonauts Liu Boming and Tang Hongbo have successfully conducted the second ever Chinese Extravehicular Activity (EVA), or spacewalk, and the first in a series to support of the construction of the newly launched Chinese Space Station (CSS) named Tianhe.

The EVA began on July 4 at 00:11 UTC and completed at 06:57 UTC, for a total duration of six hours and 46 minutes. This duration is more typical of the regular spacewalks conducted outside the International Space Station (ISS) compared to China's first EVA on Shenzhou 7, which lasted only 22 minutes.



*Fig. 1 Robotics Arm on Chinese Space Station*



*Fig.2 Liu Boming and Tang Hongbo during EVA*

One more spacewalk is set to be carried out during Shenzhou 12's remaining months on the CSS, although the China National Space Administration (CNSA) has yet to release an official statement regarding the goals of the second EVA, when it will occur, and which taikonauts will take part. [1]

### *CSS Tianhe's Robotics Arm (see Fig.1)*

The 10.2 meter long robotic arm installed on the Tianhe module can carry up to 25 tons of weight. It consists of seven joints, two limbs, two sets of extension gears, two sets of end cameras and end effectors (also known as end-of-arm tooling), a set of central controls, and an elbow camera.

With limbs and joints, the mechanical arm can work like a human arm with a shoulder, an elbow, and a wrist. By rotating each joint, the arm is able grip the equipment and work at any angle and position. "The end effector of the arm can dock with a target adapter installed on the outer surface of the space station. Docking and disconnecting the end effector and aiming adapter allows the arm to move and crawl on the surface of the space station," said Wang Youyu, a mechanical arm designer at the China Academy of Space Technology (CAST).

In addition to being able to work independently, the arm of the core module can also be combined with the mechanical arms installed on the laboratory modules that are expected to be launched in the next year. The combined arm can achieve a working diameter of 15 meters. [2]

### *First "Space Rice"*

The so-called "space rice" that returned from its lunar mission on board the Chinese spacecraft Chang'e 5 was recently (July 2021) harvested in an experimental rice field in the southern Chinese province of Guangdong.

Eight months ago, the 40 grams of "space rice seedlings" were still on board the Chang'e 5 spaceship, which in November 2020 had covered more than 760,000 kilometers on its 23-day lunar mission. On December 17, the spaceship returned to Earth with a safe landing in Inner Mongolia. After landing, the rice seedlings were placed in a specially designed greenhouse at the National Plant Space Breeding Engineering Technology Research Center, located at the South China University of Agricultural Sciences. After weeks of careful care, the seedlings were then taken to the University's test field base in Zengcheng in the southern Chinese province of Guangdong and planted there.

Compared to normal rice seedlings, the "space rice" had to be planted much more carefully and tented according to an elaborated plan developed by experts.

After planting in the test field, the special rice seedlings were carefully pruned, fertilized and sprayed.

Now the “space rice” has grown into golden, heavy ears in the test field of the South China University of Agricultural Science. With the harvest of the ripe rice, the first round of planting “space rice” was successfully completed.

At the beginning of autumn, the seeds of the "space rice" will be seeded and grown within the laboratory and then transplanted to larger rice fields, where they will be reproduced for generations to come in the rice fields of Guangdong Province. After a certain optimization, the "space rice" should become a completely new type of rice with an extraordinary past.

Researchers at the South China University of Agricultural Sciences believe that common rice varieties that have been irradiated by heavy ions in space on board a spaceship could be cultivated into high-quality varieties after careful selection and breeding on Earth. China has grown hundreds of space crops since the 1980s. [3]



*Hot summer, golden rice fragrant. On July 9th, in the large field of the teaching and research base of South China Agricultural University, the "space rice" on the Chang'e-5 moon journey ushered in the harvest.[4]*

*After the ordinary seeds on the earth are processed in the deep space environment, they will be selected and tested on the ground, which is expected to cultivate new varieties of high-yield and high-quality crops. [4]*

### ***Suborbital Space Carrier***

A reusable carrier for suborbital space transport developed independently by China has successfully completed its maiden flight. As part of a flight demonstration and a verification project, the space carrier landed stable on Friday July 18, 2021 at an airport in the Liga Alxa in northern China's Inner Mongolia Autonomous Region.

The aircraft-like space carrier was launched the day before from the Jiuquan satellite launch center in the northwestern Chinese Gobi desert.



The reusable suborbital carrier was developed by the China Aerospace Science and Technology Corporation (CASC) and can be used in the space transportation system. [5]

*The image is a screenshot found in the Internet – the vehicle might only be representative of the carrier described above.*

### **References:**

[1] Taikonauts first CSS EVA

<https://www.nasaspaceflight.com/2021/07/taikonauts-second-spacewalk-first-station-construction/>

[2] Robotics Arm [http://german.xinhuanet.com/2021-07/07/c\\_1310047493.htm](http://german.xinhuanet.com/2021-07/07/c_1310047493.htm)

[3] Space Rice [http://german.cri.cn/china/china\\_heute/3255/20210716/687739.html](http://german.cri.cn/china/china_heute/3255/20210716/687739.html)

[4] Images Space Rice <https://baijiahao.baidu.com/s?id=1705074513870606484&wfr=spider&for=pc>

[5] Suborbitaler Raumflugträger (CRI)

[http://german.china.org.cn/txt/2021-07/18/content\\_77635093.htm](http://german.china.org.cn/txt/2021-07/18/content_77635093.htm)

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September 2021, compiled by Joachim J. Kehr, Editor SpaceNews for Journal of Space Operations & Communicator  
<https://opsjournal.org>