



German-Chinese SIMBOX ready for launch

28 October 2011

The world's first international bilateral cooperation within the scope of China's Shenzhou programme

A very special space breakthrough is approaching; on 31 October at 23:00 CET (1 November at 06:00 local time) the Chinese spacecraft Shenzhou-8 will be launched on board a Long March rocket from the Jiuquan Satellite Launch Center in Inner Mongolia. On board will be the SIMBOX (**S**cience in **M**icrogravity **B**ox) experimental facility containing 17 experiments from the fields of biology and medicine, which will be conducted by German researchers together with their Chinese colleagues.

This is the first time that the China Manned Space Engineering Office (CMSEO) has cooperated with another nation in the use of Shenzhou – the core of China's human spaceflight programme. The German Aerospace Center's (Deutsches Zentrum für Luft- und Raumfahrt; DLR) Space Administration was tasked with the programme and project management for the German part of the mission share by the Federal Ministry of Economics and Technology (Bundesministerium für Wirtschaft und Technologie; BMWi). Astrium in Friedrichshafen built the SIMBOX facility and seven German universities have contributed experiments to the SIMBOX project. This uncrewed flight of the Shenzhou-8 spacecraft to Tiangong 1, the first module of the Chinese space station now under construction, will be China's final rehearsal for future crewed space flights.

Research facilities no bigger than a smartphone

In the scope of SIMBOX, plants, nematodes, bacteria and human cancer cells will be exposed to zero gravity and space radiation for nearly three weeks. These experiments will include investigating the crystallisation of medically relevant biomacromolecules. The objective is to tackle fundamental biological and medical questions. Where exactly does gravity intervene in biological processes? How can the immune system be strengthened?

Researchers at the Universities of Erlangen, Hohenheim, Magdeburg, Tübingen, Freiburg, Hamburg and the Charité Berlin are involved in these studies. In addition to the six German experiments, the Universities of Erlangen and Wuhan are carrying out a joint experiment, in which, using a miniature ecosystem with algae and fish, researchers are studying the material and energy flows in a closed system. The aim is to develop a biological life-support system to produce oxygen and food as well as treat water in future long-duration space missions. In a second German-Chinese experiment, scientists at the University of Hamburg and the Institute of Biophysics in Beijing will investigate the crystallisation of medically relevant proteins in space. Both proteins and enzymes play a major role in the development of new active pharmaceutical ingredients, targeting the multidrug-resistant bacteria MRSA (**M**ethicillin-**R**esistant **S**taphylococcus **A**ureus) and the vector-borne parasites that cause malaria.

The SIMBOX facility accommodates a total of 40 experimental units, each approximately the size of a smartphone. The test facility weighs 25 kilograms and has a volume of 34 litres. Some experimental units are simple devices such as miniature aquariums or plant chambers, but there are also complex types equipped with several chambers, pumps, lighting and sensors, as well as measuring systems. In orbit, some of the experimental units are exposed to zero gravity, whereas others are placed in a centrifuge producing Earth-like gravity. A comparison of pairs of samples will provide information on the effects of microgravity on the biological specimens.

A milestone for Chinese human spaceflight

Two days after launch, Shenzhou-8 will be docked to Tiangong-1. This module has been in Earth orbit since the end of September 2011. After approximately 17 days in space, Shenzhou or 'Divine Craft' will undock and, after re-entering Earth's atmosphere, it will land by means of a parachute. The samples will then be recovered by helicopter search teams and transported to Beijing for evaluation.

The flight of the Shenzhou-8 spacecraft represents a milestone in China's human spaceflight programme. The mission is aimed at building a Chinese space station, which is expected to be fully operational by 2020. Following Shenzhou-8, more Shenzhou spacecraft will be docked to Tiangong-1. Shenzhou-10 will be the first mission in which two or three Chinese astronauts, or taikonauts, will be working in the module on a trial basis.

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Shenzhou 'Long March' launcher on its way to the launch pad in Jiuquan



The 'Long March' launch vehicle that will carry Shenzhou-8 and SIMBOX into space, on its way to the launch pad at Jiuquan Satellite Launch Center in Inner Mongolia. On board is the SIMBOX (Science in Microgravity Box) experimental facility containing 17 experiments from the fields of biology and medicine, which will be conducted by German researchers together with their Chinese colleagues. This is the first time that the China Manned Space Engineering Office (CMSEO) cooperates with another nation in the use of Shenzhou – the core of China's human spaceflight programme.

Credit: DLR (CC-BY 3.0).

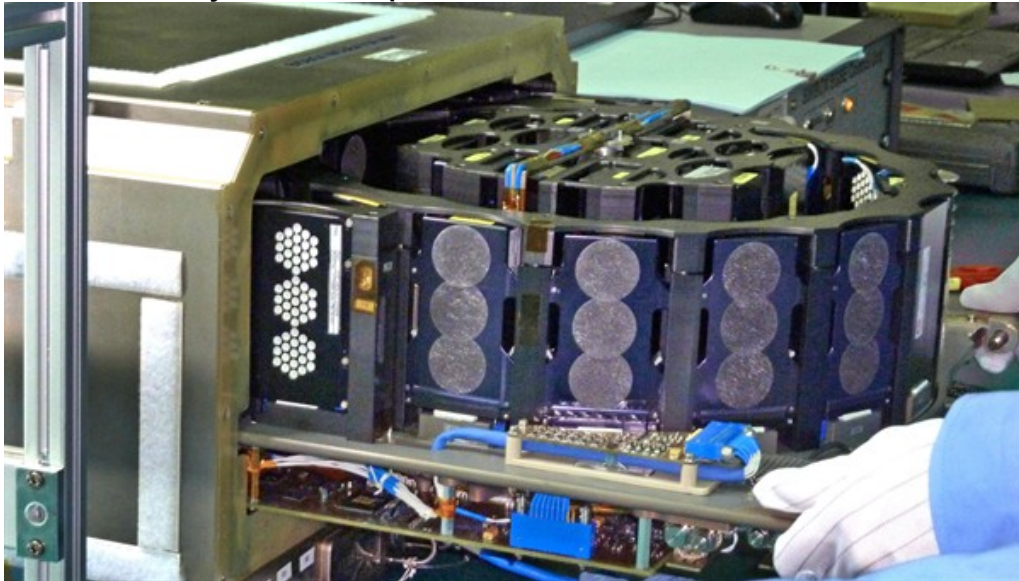
Biological sample preparation in a laboratory of the Chinese Academy of Sciences



German and Chinese researchers prepare biological samples in a laboratory at the Chinese Academy of Sciences.

Credit: DLR (CC-BY 3.0).

Made in Germany - SIMBOX experiment hardware



The SIMBOX experiment hardware, consisting of a heated chamber and centrifuge, will carry biological samples in 40 compartments.

Credit: Astrium.

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