Tracking the Voice of Dark Matter in Space

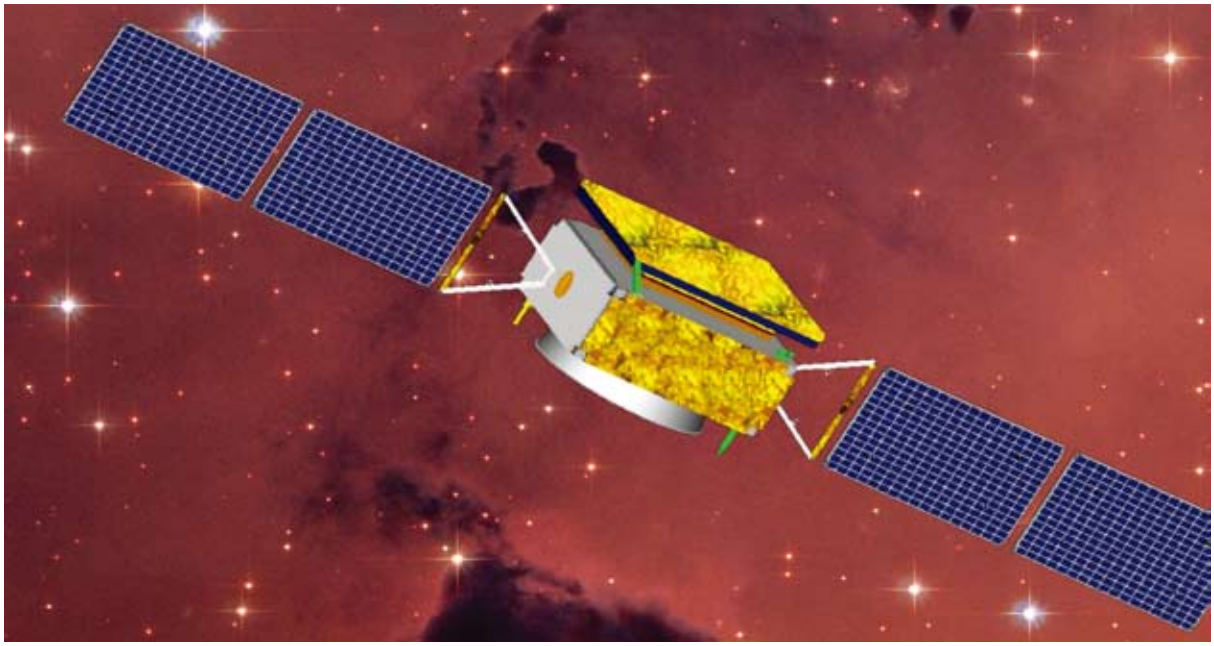
By SONG Jianlan (Staff Reporter)

On the morning of December 17, the Dark Matter Particle Explorer (DAMPE), a space telescope independently designed and developed by CAS, was successfully sent into the preset orbit by a Long March 2D rocket from the Jiuquan Satellite Launch Centre of China.

Aimed at detecting the traces of dark matter particles as predicted by physicists, and performing studies into high energy cosmic rays, its launch and in-orbit operation are anticipated to catalyze potential breakthroughs in the field of dark matter research, one of the most intriguing issues nowadays in the world of theoretical physics and cosmology. It also marks a milestone for China, which scarcely launched missions aimed at space science exploration, and might boost the sustainable development of its satellite series for purposes of science research.

Dubbed "*Wukong*" after the "Monkey King", a well-known hero from Chinese mythology, this satellite comes

The Carrier Long March 2D rocket blasts off at the Jiuquan Satellite Launch Center in Gansu Province, Dec 17, 2015, sending into space the country's first Dark Matter Particle Explorer Satellite, "*Wukong*". [Photo/Xinhua]



Artist's impression of the DAMPE.

as the first of the four for science experiments under the Strategic Pioneer Research & Development Program (SPRDP) sponsored by the Academy, featuring the widest spectrum and the best energy resolution for observation of this kind. According to the National Space Science Center, CAS, which is in charge of the overall management and operation of the project, *Wukong* will keep running in space for three years, or even longer as wished by the involved scientists.

Dark matter is a mysterious existence introduced by physicists to explain the great gravitational effects observed in very large scale structures like galaxies. The observed rotation of galaxies, for example, is much faster than the value predicted by the law of gravity. The great discrepancy and other astronomical phenomena, like the gravitational lensing of light by galaxy clusters that cannot be accounted for by the quantity of visible matter, all suggest huge "missing" mass of such large structures. Physicists believe that as much as about 95% of the mass of the universe is made up by unknown matter, which is described as dark matter/energy.

This obscure matter got its name from the fact that it hardly emits or reflects light or other electromagnetic radiation — this means it is almost "dark" in the view of telescopes and hence very hard to observe. An indirect method to observe it is to capture the trace or products from its possible annihilation or decay in outer space, given that it is predicted to exist in the form of a kind of particles much heavier than any others known by humanity.

That is exactly what *Wukong* is going to do. It will also observe high-energy electrons and heavy nuclei, in hope of shedding light on the origin of cosmos rays, and perform some observations of high-energy *gamma* rays.

The success was hailed by *Nature* on December 18 as launching the era of space science of China, and welcomed by *Science* as an effort to join the international hunt after dark matter.

The rest of the four satellites under the SPRDP, respectively for purposes of hard *X*-ray modulation, quantum science experiments, and microgravity and space life science research, are scheduled to launch in 2016.

Prof. Roger-Maurice Bonnet, former Science Director of European Space Agency described the above-mentioned four missions as "very ambitious", and gave his comments in an interview with *BCAS*. (For more please refer to page 211.)