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DEVELOPMENT OF SPACE ENVIRONMENTAL MONITORS ON CHINESE MANNED SPACECRAFT

Abstract

The manned spacecraft's orbits of 300 to 500 km altitude encounter all kinds of charged particles, neutral atmosphere, the electromagnetic fields, space debris etc. The space environment fluctuates in manned spacecraft's orbit can significantly affect the safety of astronauts and spacecrafts. The charged particles can cause SEU,SEL and the discharge of spacecraft's surface, even threaten the astronauts' safety. The retarded effects of neutral atmosphere make the spacecraft's orbit to descend. Oxygen denudation and Oxygen contaminations of atmosphere also cause the decline of the solar cell's efficiency and invalidation of thermoregulation material. For the purpose of ensuring astronauts' safety and normal operations of manned spacecrafts, space environmental monitors (SEMs) have been or will be mounted on Chinese manned spacecrafts. Detection of SEMs enables us to understand better the space environment in the manned spacecrafts' orbit, and to provide a good space environment services for astronauts and spacecrafts. In addition, by using the data from SEMs, we will achieve lots of scientific accomplishments. The development of Chinese manned spacecrafts is divided into 3 steps, and each step has mount SEMs. Space environmental detection of the first step was to preliminary understanding space environment of manned spacecraft orbits, and to provide the ensuring service for the formal manned flight. Detection of the second step has Chinese feature. Although 2 instruments have been installed, they can realize the integrating detection of charged particles and atmospheric environment. The former detector can detect multi-direction particles, multi-energy spectrum, radiation dose and LET spectrum. The latter detector can achieve atmospheric density, composition and contamination. The following step of space environmental detection still pay attention on the safety of astronauts and spacecrafts, then need to fill up the vacancy of detecting plasma, neutrals, cosmic rays and debris.