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Radiation Fields, Effects and Risks in Human Space Missions (5)

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RADIATION FIELDS, EFFECTS, AND RISKS IN HUMAN SPACE MISSIONS

Abstract

Human space exploration is an exciting and challenging field, but it also presents significant risks to the health and safety of astronauts. One of the most significant hazards of long-duration space missions is exposure to ionizing radiation, which can cause acute and chronic health effects, including cancer, cardiovascular disease, and central nervous system damage. This research aims to explore the radiation fields encountered by astronauts during human space missions, the potential health effects of radiation exposure, and strategies for mitigating radiation risks. Firstly, this research investigates the sources of radiation in space, including galactic cosmic radiation, solar particle events, and trapped radiation belts. The nature and characteristics of these radiation fields will be analyzed, including their energy spectra, particle types, and flux levels. Secondly, the research examines the biological effects of radiation exposure, including the mechanisms of radiation damage to DNA and cellular processes. The research will also examine the current understanding of radiation-induced cancer and other long-term health effects. Thirdly, this research will review the existing strategies and technologies for mitigating radiation risks in space. This includes shielding materials, radiation detectors, and medical countermeasures. The effectiveness and limitations of these strategies will be assessed, along with the potential for developing new technologies to better protect astronauts from radiation exposure. The research will also investigate the potential impact of radiation exposure on the human mission to Mars, which is planned for the near future. Given the longer duration and higher radiation exposure levels expected during a Mars mission, this will be a critical factor in ensuring the safety and health of astronauts. Overall, this research will provide a comprehensive overview of radiation fields, effects, and risks in human space missions. The findings will have significant implications for the design and planning of future space missions, as well as for the development of radiation protection strategies and technologies. Ultimately, this research will contribute to ensuring the health and safety of astronauts and enabling the continued exploration and discovery of the universe.