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Effects of Nuclear Cross Sections at Different Energies on Space Radiation Exposure from Galactic Cosmic Rays

Abstract content

Space radiation from galactic cosmic rays (GCR) is a major hazard to space crews, especially in long duration human space explorations. For this reason, they will be protected by radiation shielding that fragments the GCR heavy ions. Here we investigate how sensitive the crew's radiation exposure is to nuclear fragmentation cross sections at different energies. We find that in deep space cross sections between about 0.2 and 1.2 GeV/u have the strongest effect on dose equivalent behind shielding in solar minimum GCR environments, and cross sections between about 0.6 and 1.7 GeV/u are the most important at solar maximum. On the other hand, at the location of the International Space Station, cross sections at higher energies, between about 0.6 and 1.7 GeV/u at solar minimum and between about 1.7 and 3.4 GeV/u at solar maximum, are the most important. This is due to the average geomagnetic cutoff for the ISS orbit. We also show the effect of uncertainties in the fragmentation cross sections on the elemental energy spectra behind shielding. These results help to focus the studies of fragmentation cross sections on the proper energy range in order to improve our predictions of crew exposures.

If this papers is presented for a collaboration, please specify the collaboration

Summary

Reference

Primary author(s) : Dr. LIN, Zi-Wei (University of Alabama in Huntsville/NASA Marshall Space Flight Center)

Co-author(s) : Dr. JAMES, Adams (NASA Marshall Space Flight Center)

Presenter(s) : Dr. LIN, Zi-Wei (University of Alabama in Huntsville/NASA Marshall Space Flight Center)

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