

High energy astrophysical hazards for habitability

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So far about 600 astronauts have spent substantial time out of the atmosphere. Since the Yuri Gagarin's short flight up to the last missions onboard the ISS, they have experienced very different conditions, thought sheltered by the protective Earth magnetic shield.

Only 24 people have flown in the outer space during the mission to the Moon and, so far, the Apollo flights crew are still the only human exposed for several days to space environment. In fact, the human adventure out of the magnetosphere started with the Apollo 8 mission, the 21 December 1968, lasting 6 days and 20 revolutions around the Moon.

Among the Apollo program astronauts, only 12 of them experienced a "full" exposure to the external environment walking on the Moon surface for periods from a few to tens of hours.

The major astrophysical hazards to manned space flights are due to several types of radiation, such soft X-rays and gamma rays, and particle radiation from Galactic Cosmic Rays (GCRs) and **Solar Particle Events (SEP)**, both including high energy protons, electrons and heavy nuclei, and radiation from secondary neutrons.

Although significant progress has been made in the last decades in the field of radiation biology, a major problem is presently to assess and limit the risk of effects due to long term exposure to GCRs and short term exposure to SEPs.

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Short Summary

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