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SUSTAINABILITY IN SPACE MISSIONS: INNOVATION IN RADIATION PROTECTION USING
RECYCLED WATER

Abstract

The demand for innovative and practical solutions to enhance astronaut radiation safety is critical, especially in environments with prolonged exposure to ionizing radiation, such as space. This research will propose an anatomical and functional design and prototype for astronauts that incorporates a water-based protection system, leveraging water's radiation attenuation properties and its recyclability on the International Space Station (ISS). The development will focus on improving existing designs, combining radiation physics simulations with experimental tests using high-energy gamma radiation sources, and employing advanced sensors to measure the suits' effectiveness. Variations in the suit's thickness and the water composition, such as the addition of non-polluting compounds to maximize protection against ionizing radiation, will be explored. This development aims not only to increase the efficacy of radiation protection but also to promote new responsible practices in the space context.