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A new type of ground-based simulator of inner radiation field of a spacecraft in deep space

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The problem of full-scale ground-based modeling of cosmic radiation using heavy ion accelerators for space radiobiology is very relevant. A new type of cosmic radiation simulator based on a ^{56}Fe ion beam with an energy 1 GeV/n is proposed. The simulator uses rotating converters consisting of segmented targets of various thicknesses. This design ensures the uniformity of the fields of all secondary particles behind the targets using a flat uniform field of primary ^{56}Fe ions. The proposed setup with four replaceable converters makes it possible to simulate not only the distribution of linear energy transfers (LET) of cosmic radiation represented by the galactic cosmic rays (GCR) component, but also to reproduce continuous energy spectra of all charged fragments of a projectile ion from protons up to Co ions. The results of modeling the internal radiation field inside the habitable module of a spacecraft with a shell of 15 g/cm^2 Al, generated by particles of galactic cosmic rays during solar activity in the range from 0 to 190 Wolf numbers are presented.

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