THE BALANCE BETWEEN FLUXES OF GALACTIC COSMIC RAYS AND SOLAR ENERGETIC PARTICLES, DEPENDING ON SOLAR ACTIVITY

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The results are presented of analyzing the relative role of the fluxes of galactic cosmic rays and solar energetic particles in interplanetary space during different solar activity periods. The analysis is based on experimental data and uses the galactic cosmic ray [1] and solar energetic particle (SEP) flux [2] models. In particular, the solar energetic particle model describes, to within a high accuracy, the solar energetic protons measured during all solar activity periods, so-called "quiet Sun" periods included.

The radiation hazard level in interplanetary space depends on solar activity because two high-energy particle flux components (GCR and SEPs) are solar activity-dependent. The galactic particle flux intensity varies rather slowly with solar activity. The SEP occurrences are random, but this feature of the SEP phenomenon camouflages some of the important regularities, namely, the mean SEP event occurrence frequency is proportional to sunspot number [3], while the normalized SEP distribution function is independent of (invariant to) solar activity [4].

It has been concluded that the SEP event proton fluences count much during all the solar activity periods. This means that the SEP models, which neglect the SEP events in the "quiet Sun" periods, cannot be used because such type models lead to an inaccuracy of up to a few orders in determining the particle fluxes at energies <100 MeV. Our analysis has demonstrated that there exists a substantial probability for the SEP particle fluences to appear during low solar activity.

References

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