THE SLOPE OF THE ENERGY SPECTRA OF 10-200 MEV PROTONS

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We consider the energy spectrum of protons in the 10-200 MeV range. Spectra are constructed from the observations of various energetic particle instruments aboard IMP-8, for 89 quiet-time periods between 1974 and 1991. We approximate these spectra by $J(E)=A\cdot E^{-\gamma}+ C\cdot E^{\nu}$, where the first term is responsible for solar particles and the second one describes the galactic (and possibly anomalous) component. Theoretically, a value of $\nu \sim 1$ is expected in the low-energy regime where adiabatic cooling is predominant. The distribution of ν was found to be approximately Gaussian. However, the statistical analysis of 77 spectra yields an average of $<\nu>=1.15$ and dispersion $<\Delta\nu >=0.05$, that is, ν turns out significantly larger than unity. ν does not show any correlations with the other inferred parameters A, γ, and C. Comparing ν with the count rates of the Deep River neutron monitor for the same periods a slight positive correlation is found. The remaining 12 spectra lie outside of the Gauss distribution and have the values ranging from $\nu \sim 0.6$ to 1.7. Theoretical implications and possible interpretations are discussed.