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Observations of the December 13 and 14, 2006, Solar Particle Events in the 80 MeV/n - 3 GeV/n range from space with PAMELA detector

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We present the space spectrometer PAMELA observations of proton and helium fluxes during the December 13 and 14, 2006 solar particle events. This is the first direct measurement of the solar energetic particles in space with a single instrument in the energy range from $\sim$ 80 MeV/n up to $\sim$ 3 GeV/n. In the event of December 13 measured energy spectra of solar protons and helium were compared with results obtained by neutron monitors and other detectors. Our measurements show a spectral behaviour different from those derived from the neutron monitor network. No satisfactory analytical fitting was found for the energy spectra. During the first hours of the December 13 event solar energetic particles spectra were close to the exponential form demonstrating rather significant temporal evolution. Solar He with energy up to ~1 GeV/n was recorded on December 13. In the event of December 14 energy of solar protons reached ~600 MeV whereas maximum energy of He was below 100 MeV/n. The spectra were slightly bended in the

lower energy range and preserved their form during the second event. Difference in the particle flux appearance and temporal evolution in these two events may argue for a special conditions leading to acceleration of solar particles up to relativistic energies.

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