

Flux and spectrum dynamics of relativistic solar protons in the event of 29 September 1989: New computational modeling by the ground level data

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Using a technique of computational modeling, the parameters of spectrum, pitch-angle distribution and anisotropy of relativistic solar protons (RSP) for 17 moments of time in the event of 29 September 1989 have been obtained. It allowed to construct the intensity profiles in different ranges of energy and to study the energetic spectrum dynamics in detail. The event has been shown to comprise the early, rigid impulse-like intensity increase (prompt component, PC) and late gradual increase with a soft spectrum (delayed component, DC). The spectrum of prompt component was exponential in rigidity and softened with time. The DC spectrum had a variable slope which did not change during almost an hour in the late phase of event. Based on those results, we suggest a combined model of generation of two RSP components in a system "reconnecting current sheet - coronal mass ejection (CME)". The PC particles are proposed to be accelerated by electric field arising in the reconnection process in a tailing part of ascending CME. The DC particles are probably due to the acceleration by CME-driven shock wave.