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Inversion of Source and Transport Parameters of Relativistic SEPs from Neutron Monitor Data

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We present a new methodology to study the release processes of relativistic solar energetic particles (SEPs) based on the direct inversion of Ground Level Enhancements (GLEs) observed by the worldwide network of neutron monitors (NMs). The new approach makes use of several models, including: the propagation of relativistic SEPs from the Sun to the Earth, their transport in the Earth's magnetosphere and atmosphere, as well as the detection of the nucleon component of the secondary cosmic rays by ground based NMs. The combination of these models allows us to compute the expected ground-level NM counting rates for a series of instantaneous releases from the Sun. The amplitudes of the source components are then inferred by fitting the NM observations with the modeled NM counting rate increases. Within the HESPERIA project, we will develop the first software package for the direct inversion of GLEs and we will make it freely available for the solar and heliospheric communities.

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