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Connecting solar flare hard X-ray spectra to in-situ electron spectra using RHESSI and STEREO/SEPT

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The energy spectrum of impulsive solar energetic electron events is believed to carry the imprint of the flare acceleration process which can be studied by analyzing the hard X-ray (HXR) spectrum of the flare. We have identified 17 energetic electron events well-observed with the SEPT instrument aboard STEREO which show a clear association with a hard X-ray (HXR) flare observed with the RHESSI spacecraft. We compare the spectral indices of the RHESSI HXR spectra with those of the interplanetary electrons. Because of the frequent double-power-law shape of the in-situ electron spectra, we pay special attention to the choice of the spectral index used for comparison.

We find a significant correlation of about 0.8 between the spectral indices of the HXR flare and the in-situ electrons. The correlations increase if only events with significant anisotropy are considered. This suggests that transport effects can alter the injected spectra leading to a strongly reduced imprint of the flare acceleration. Although our results suggest a clear imprint of flare acceleration for the analyzed event sample, most of the studied events occur with onset delays at the spacecraft and in temporal coincidence with coronal mass ejections (CMEs). Therefore, a secondary acceleration, which would account for the observed onset delays, could be involved. However, the limited and variable pitch-angle coverage of SEPT could also be the reason for the observed delays.

Student poster?

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