

Characteristics of Long Duration Gamma-Ray Flares

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Fermi LAT has observed >100 MeV emission from at least twenty-five events following impulsive flares with GOES X-ray classes from M1.5 to X5.4. The emission is consistent with pion-decay radiation produced by >300 MeV protons. Almost all the events are associated with fast (>800 km/s) CMEs, SEPs, and impulsive hard X-ray emission >100 keV. We discuss the time profiles of the LAT events on minute- and hour-long scales and information derived from a four-year systematic study of 95 energetic solar events and their association with sustained >100 MeV emission. We also discuss spectroscopic studies of the impulsive flares and sustained-emission phases that provide information on the numbers of >500 MeV protons and their spectra at the Sun and compare these properties with those observed in SEPs. This work was supported by the NSF-SHINE and NASA-Fermi-GI programs.

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