



HESPERIA studies on the nature of high-energy solar gamma-ray events

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The FERMI/LAT gamma-ray experiment observed a surprisingly large number of solar events with gamma-ray emission above photon energies of 100 MeV. The emission is likely due to pion-decay photons. This implies that the acceleration of protons in the solar corona to energies above 300 MeV is much more frequent than previously thought. In some cases, the emission persists over several hours. In the frame of the HESPERIA project, funded by the Horizon 2020 programme of the European Union, we conduct an extensive study on the relationship between these gamma-ray emissions and electromagnetic signatures of accelerated electrons in the corona. This contribution is to present the results on a sample of 25 gamma-ray events, some with a very long duration signature (> 6 hours) and some with a shorter duration (<1 hour) starting immediately after the impulsive phase. We compare the durations of the gamma-ray emission with the durations of hard X-ray, metric, decametric and microwave signatures, to see if long-duration gamma-ray events are accompanied by signatures of long-duration electron acceleration. In our sample, we found the presence of type IV radio emission in the metric and decimetric range (lasting several hours) to be associated only with the gamma-ray events of very long duration. We also show that in each gamma-ray event electrons had rapid access to interplanetary space since the impulsive flare phase, so that high-energy SEP events should be detected.

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