

Long Duration Gamma-Ray Flares & Solar Energetic Particles —Is there a Connection?

Tuesday 24 April 2018 16:05 (30 minutes)

Fermi/LAT observations of Long Duration Gamma-Ray Flares (LDGRFs,) first identified with Compton Gamma-Ray Observatory (CGRO) and the Solar Maximum Mission (SMM), have transformed our picture of these unusually energetic phenomena at the Sun from a once rare occurrence to detections of dozens over the last solar cycle. The extreme energies and long temporal durations of many of these events poses challenges in terms of finding a consistent theory of prolonged acceleration. The highest energy emission has generally been attributed to pion production from the interaction of high-energy protons with the ambient matter, suggesting that particle acceleration occurs over large volumes extending high in the corona, either from stochastic acceleration within large coronal loops or from back precipitation from CME-driven shocks. It is possible to test these models by making direct comparisons between the accelerated ion population at the flare derived from the observations of Fermi/LAT with PAMELA measurements of solar energetic particles (thought to be accelerated by CME-driven shocks). Fortuitously, SEP observations from PAMELA extend beyond the energy range necessary to overcome the pion production threshold for interacting ions at the Sun. For over a dozen SEP events, we compare the two populations (SEPs in space and the interacting population at the Sun) and discuss the implications in terms of particle acceleration and transport models.

Authors: DE NOLFO, G.A. (NASA/GSFC, Greenbelt, MD, USA); BOEZIO, M. (INFN, Sezione di Trieste, I-34149, Trieste, Italy); BRUNO, Alessandro (NASA/GSFC); CHRISTIAN, E.C. (NASA/GSFC, Greenbelt, MD, USA); MARTUCCI, M. (Istituto Nazionale di Fisica Nucleare, Laboratori Nazionali di Frascati and Universita' di Roma Tor Vergata, Roma, Italy); MERGÉ, M. (Istituto Nazionale di Fisica Nucleare, Laboratori Nazionali di Frascati and Universita' di Roma Tor Vergata, Roma, Italy); MUNINI, R. (INFN, Sezione di Trieste, I-34149, Trieste, Italy); RICCI, M. (Istituto Nazionale di Fisica Nucleare, Laboratori Nazionali di Frascati, Frascati, Italy); RYAN, J.M. (Space Science Center, University of New Hampshire, Durham, NH, United States); SHARE, G. (University of Maryland, Department of Physics, College Park, MD, United States); STOCHAJ, S. (New Mexico State University, Las Cruces, NM, United States); ON BEHALF OF THE PAMELA COLLABORATION

Presenter: DE NOLFO, G.A. (NASA/GSFC, Greenbelt, MD, USA)

Session Classification: Late Tuesday Afternoon