



## On the highest photon energy of Terrestrial Gamma-ray Flashes

Martino Marisaldi (1,2), Fabio Fuschino (1), Marco Tavani (3), Stefano Dietrich (4), Colin Price (5), Andrea Argan (3), Claudio Labanti (1), Marcello Galli (6), Francesco Longo (7), Ettore Del Monte (3), Guido Barbiellini (7), Andrea Giuliani (8), Andrea Bulgarelli (1), Fulvio Gianotti (1), Massimo Trifoglio (1), Alessio Trois (9), Carlotta Pittori (10), Francesco Verrecchia (10), and Paolo Giommi (10)

(1) INAF-IASF Bologna, Italy (marisaldi@iasfbo.inaf.it), (2) Birkeland Centre for Space Science, University of Bergen, Norway, (3) INAF-IAPS Roma, Italy, (4) CNR-ISAC Roma, Italy, (5) Department of Geophysics and Planetary Sciences, Tel Aviv University, Israel, (6) ENEA Bologna, Italy, (7) Dipartimento di Fisica Università di Trieste and INFN Trieste, Italy, (8) INAF-IASF Milano, Italy, (9) INAF Osservatorio Astronomico di Cagliari, Italy, (10) ASI Science Data Center, Roma, Italy

TGFs are known to include photons of energy up to several tens of MeV. Results by the AGILE satellite have shown that the cumulative spectrum of TGFs is significantly above background up to about 100 MeV and that the spectral shape deviates from a cutoff power law at high energy suggesting a production mechanism different from canonical Relativistic Runaway Electron Avalanche (RREA). Subsequent analysis of AGILE data have shown that about 15% of TGFs exhibit photon energies above 30 MeV and that these events have different properties than lower energy TGFs. From the theoretical point of view, it has been shown that a production model based on electron acceleration in strong electric fields at lightning leader tips may account for the high energies observed by AGILE. In this presentation we report on the detection of high-energy photons in TGFs for five years of AGILE observation. Possible sources of error such as energy calibration, background and cosmic rays contamination are discussed as well.