

Exploring Gamma-Ray Burst Astrophysics via a Correlated Broad-Band and Multi-Messenger Paradigm

Michael Stamatikos

NASA Goddard Space Flight Center

I will present a synergistic methodology whose primary objective encompasses probing discrete gamma-ray burst (GRB) high-energy particle astrophysics via a broad-band, multi-messenger paradigm. The interface between leptonic and electromagnetic emission will be explored using the theoretical interpretation and correlative observations of high energy telescopes such as (i) Swift's Burst Alert Telescope (BAT), (ii) the Gamma-Ray Large Area Space Telescope (GLAST) Burst Monitor (GBM) and (iii) the Antarctic Muon and Neutrino Detector Array (AMANDA)/IceCube. Preliminary multi-wavelength analysis results will include temporal studies of Swift GRBs in the context of the lag-luminosity relation, and simulations of joint photon energy spectra using BAT and GBM. Probes for multi-messenger leptonic emission signatures via neutrino astronomy will include modeling the correlated (TeV-PeV) muon neutrino flux in the context of canonical fireball phenomenology. Implications for intrinsic GRB astrophysics and cosmology will be discussed.