**Investigating The Nature of Late-Time GeV Emission in GRBs Through Joint Fermi/Swift Observations**

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**Introduction:** We present a systematic investigation into the nature of the delayed and long-lived high-energy emission observed from gamma-ray bursts by the Fermi-LAT. The origin of this emission has been much debated within the GRB community, and has led to speculation that bursts detected by the Fermi-LAT may represent a unique population of GRBs, either probing a particular type of environment, the result of a unique set of afterglow conditions, or due to progenitors that produce a rare class of hyper-energetic GRBs. Using afterglow observations by Swift-XRT, we find that the Fermi-LAT detected population exhibit X-ray afterglows that are among the brightest and hardest detected by Swift. Joint spectral fits of simultaneous XRT and LAT observations reveals that a majority of these bright LAT detected bursts require a break in their broadband spectrum between the XRT and LAT energy ranges at very late times. Such a break is expected to persist at high energies in the afterglow spectrum if the GRB blast wave is propagating into a wind-like circumburst medium. This effectively allows the afterglow to remain bright at gamma-ray wavelengths to very late times, enabling their detection by the Fermi-LAT. Therefore, we propose that a majority of GRBs detected at late times by Fermi-LAT are preferentially selecting environments in which their progenitor underwent significant mass loss prior to the core collapse that triggered the GRB.