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Constraining emission models with observations of the highest-energy gamma rays from the exceptional GRB 130427A

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The prompt emission from the very bright and nearby gamma-ray burst GRB 130427A was detected by several orbiting telescopes and prompt optical emission was also detected from the ground. Observations of the afterglow emission from GRB 130427A show detections from radio to gamma-ray wavelengths and include well-sampled early afterglow lightcurves at optical and X-ray wavelengths. Apart from the intensity and proximity of this GRB, it is exceptional due to the extremely long-lived high-energy emission (HE, >100 MeV), which was detectable by the Large Area Telescope (LAT) on the Fermi satellite for nearly a full day after the initial burst. A relatively bright optical flash coupled with the persistent, hard-spectrum, HE emission suggests that the highest-energy gamma rays may have been produced via synchrotron self Compton (SSC) processes. VERITAS, a ground-based imaging atmospheric Cherenkov telescope array began follow-up observations of GRB 130427A at ˜71 ks after the burst. The GRB was not detected with VERITAS, however the very high elevation of observations, coupled with the low redshift of the GRB makes VERITAS a very sensitive probe of the highest-energy emission from GRB 130427A. Results from a joint analysis of LAT and VERITAS data are presented here. These results fully cover the energy range of 100 MeV - 30 TeV and place constraints on the SSC model of high-energy gamma-ray emission from this GRB.

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