COMPTEL Observations of GRB 930309

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74.04

EGRET Observations of Gamma-Ray Bursts

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The intense gamma-ray burst of January 31, 1993 was detected by the Energetic Gamma-Ray Experiment Telescope (EGRET) on the Compton Observatory. Sixteen gamma-rays above 30 MeV were imaged in the telescope. Two of these gamma-rays have energies of approximately 1 GeV, and the 5 bin spectrum of the 16 events is fit by a power law of photon spectral index -2.0 ± 0.4. These gamma-rays were detected over a 25 second time interval. This observation increases by an order of magnitude the energy of gamma-rays detected in a gamma-ray burst and places severe constraints on the many theoretical models of gamma-ray bursts.

74.05

Search for Ultra-High-Energy Radiation from γ-ray Bursts

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Using data from the CYGNUS extensive air shower array, we have searched for evidence of emission of ultra-high-energy radiation coincident with γ-ray bursts observed by the BATSE instrument on the Compton Gamma-Ray Observatory. No statistically significant excess was found for any point in the sky within 4σ of BATSE's best location coordinates for any of the 56 bursts examined. Furthermore, no events were seen in the 1.5° radius circular bin surrounding γ-ray burst GRB 920720, whose location was determined accurately by the Compton/Ulysses/PVO Interplanetary Network of satellites. Flux upper limits depend greatly on the actual zenith angle of the burst. Typical fluence upper limits above 100 TeV are $\sim 10^{-6}$ erg cm^{-2}. The fluence upper limit for GRB 920720 is 2×10^{-6} erg cm^{-2}.

74.06

COMPTEL Observations of GRB 930309

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The Imaging Compton Telescope (COMPTEL) on the *Compton Gamma-Ray Observatory* (CGRO) images gamma radiation in the 0.75-30 MeV energy range. On 1993 March 9 at 0307:58 UT COMPTEL detected emission from the intense gamma-ray burst GRB 930309. The event was of approximately 20 s duration in the COMPTEL data. The imaging analysis is preliminary and because of limited counts, the error in position is larger than the nominal COMPTEL resolution of 1°. The most likely position of the burst is (2000) R.A. 21h32m31s, dec. 54°39′00″. The four corners of the one sigma error box are (2000) 21h40m00s, 55°25′12″; 21h38m07s, 53°15′36″; 21h27m07s, 53°19′48″; 21h27m22s, 55°30′00″. Because of the proximity of the sun in early March, the field was poorly observable with optical instruments. Only radio observatories who expressed interest were notified as part of the COMPTEL/NMSU Rapid Burst Response Campaign. However, a possible radio counterpart was detected by Westerbork Observatory at RA(2000) = 21h32m39s, Dec(2000)= 54°38′34″. Radio observations of the GRB error box began on 12 March 1993 (at 49cm), with subsequent observations on 16 March (49cm) and 18 March (6cm). The source was initially observed to have a flux of (76 ± 3.6) mJy at 49cm. Three days later the flux had declined to (66 ± 2.9) mJy. The observation at 6cm gives an upper limit on the flux of 1 mJy, indicating that the source has an unusually steep spectral slope. Monitoring at 49cm is still in progress.

74.07

Cosmological Distance Scale to Gamma-Ray Bursts

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The source counts or the so-called log N – log S relations are the primary data that constrain the spatial distribution of sources with unknown distances, such as gamma-ray bursts. In order to test galactic, halo, and cosmological models for gamma-ray bursts we compare theoretical characteristics of the log N – log S relations to those obtained from data gathered by the BATSE instrument on board the Compton Observatory (GRO) and other instruments. We use a new and statistically correct method, that takes proper account of the variable nature of the triggering threshold, to analyze the data. Constraints on models obtained by this comparison will be presented. This work is supported by NASA grants NAGW 2290, NAG5 2036, and NAG5 1578.

74.08

Search for Gamma-Ray Burst Spectral Features in the Compton GRO BATSE Data

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This paper is a status report on the continuing search for spectral features using the spectroscopy detectors (SD's) of the BATSE experiment on the Compton Gamma-Ray Observatory. More than 100 of the brightest gamma-ray bursts detected by BATSE during the 1991 April to 1993 May period were examined. Particular emphasis was placed on the search for cyclotron-line like features in the 20-100 keV interval. We will compare our results to prior reported Ginga cyclotron line detections. Finally, we will evaluate the relative Ginga and BATSE sensitivities and discuss the statistical implications of the two sets of results.

74.09

BATSE Observations of Gamma Ray Burst Spectral Evolution

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The spectra provided by the Burst and Transient Source Experiment (BATSE) on the Compton Gamma Ray Observatory (GRO) show significant spectral evolution across gamma ray bursts. The spectral hardness is characterized by the parameters of model fits over two energy decades. In general, we find hard-to-soft evolution both across bursts, and within the individual spikes which make up many bursts. We will discuss the importance of temporal resolution. While there is little theoretical guidance for interpreting the observed phenomena, we speculate on the physical implications of our observations.