and as a contribution to the BEL gas. Analysis of UM 232, a BAL QSO for which Barlow et al. (1989) observed Si IV and Al III absorption with favorable parameters for determining Al/Si, gives N(Al)/N(Si) $\approx$ 0.9, roughly ten times the solar value. QSO observations contain other hints of high Al in the BAL and BEL gas, although major systematic uncertainties exist. This work is described in greater detail by Shields (1997).

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GAMMA-RAY BURSTS

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After almost 30 years of study, gamma-ray bursts remain unexplained. They occur about once per day, typically last from under a second to hundreds of seconds, and emit most of their energy in the 100 keV to 1 MeV energy range. A wide range of temporal behavior is seen, from single smooth pulses to complex structures with dozens of peaks. The Burst and Transient Source Experiment (BATSE) has observed over 1800 bursts in six years of operation. BATSE discovered that the burst directions are distributed isotropically, and that the intensity distribution exhibits a deficit of weak bursts relative to the $-3/2$ power law expected for a homogeneous distribution of sources. These results are not compatible with a galactic disk source distribution, but are consistent with a cosmological interpretation with the faintest sources at redshifts of $z \sim 1$. Alternatively, an extended galactic halo populated with high-velocity neutron stars has been suggested as the source of the bursts. The main difficulty with this model is that a number of parameters must be fine-tuned to reproduce the isotropy and inhomogeneity. In particular, the very low upper limits to any anisotropy are problematic for any galactic model. Recently, X-ray and optical counterparts have been identified for a few bursts, leading to some optimism for significant progress in finally unraveling the gamma-ray burst mystery.

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MILLIMETER-WAVE OBSERVATIONS OF GAMMA-RAY BURSTERS

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The Satellite per Astronomia X (*BeppoSAX*) is successfully producing small error boxes to gamma-ray bursts, permitting rapid follow-up multiwavelength searches for fading and quiescent counterparts. For GRB 970228, this led to the discovery of the first fading X-ray and optical counterpart to a burster. In our talk, we presented our observations approximately one week after GRB 970228 and one month after GRB 970111 using the Berkeley-Illinois-Maryland Association array (BIMA) at 3.5 mm. Although we did not detect any fading sources, we showed that future searches in the millimeter region are promising, based on completely different models. Provided the millimeter observation is done sufficiently soon after the burst, the millimeter flux can be significantly brighter than at the longer radio wavelengths. Full details will appear elsewhere (Smith, I. A., Gruendl, R. A., Liang, E. P., & Lo, K. Y. 1997, ApJ Letters, in press).

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LIST OF ABSTRACTS OF ORAL PRESENTATIONS