no clear identifications. A comparison of the radio and X-ray flux densities of all 71 sources shows very little correlation, but we note that the strongest SNRs at both radio and X-ray frequencies are young SNRs from Population I. Six new SNR candidates are proposed. From the brightness of the SNRs we estimate the SNR birth rate to be one every (100 ± 20) years and the star formation rate to be (0.7 ± 0.2) \( M_{\odot} \text{yr}^{-1} \).

77.03D

Dark Matter in the Pair NGC 3384-NGC 3379

Benoit Tremblay (Rutgers U.)

I use the velocity fields obtained by Fabry-Perot observations of planetary nebulae in the pair NGC 3379-NGC 3384 to estimate the gravitational potential of each galaxy and the amount of dark matter present in this system.

77.04

Dense Gas in the Milky Way

T.T. Helfer (UC Berkeley), L. Blitz (U Maryland)

We summarize the properties of the emission from the 3 mm transitions of HCN, CS, and CO on size scales of \( \approx 100 \) pc in the Milky Way. This study combines new observations of individual GMCs and the Milky Way plane with published studies of the central 500 pc of the Galaxy to present a view of the Milky Way that can serve as a basis for comparison with other galaxies. The fraction of emission from dense gas tracers is a strong function of location in the Milky Way: in the bulge, \( \frac{I_{\text{HCN}}}{I_{\text{CO}}} = 0.081 \pm 0.004 \), in the plane, \( \frac{I_{\text{HCN}}}{I_{\text{CO}}} = 0.026 \pm 0.008 \) on average, and over the full extent of nearby GMCs, \( I_{\text{HCN}}/I_{\text{CO}} = 0.014 \pm 0.020 \). (Formal uncertainties are quoted; these underestimate the uncertainties due to absolute calibration errors.) The same sort of trend is seen in \( I_{\text{CS}}/I_{\text{CO}} \). The low intensities of the HCN and CS emission in the plane suggest that these lines are produced by gas at moderate densities; they are thus not like the emission produced by the dense, pc-scale star forming cores in nearby GMCs. The difference between the bulge and disk ratios in the Milky Way is likely to be caused by a combination of higher kinetic temperatures as well as higher average densities in the bulge of the Milky Way.

77.05

Observations of Tidal Disruption of the Carina Dwarf Spheroidal Galaxy

J. R. Kuhn, H. A. Smith, S. L. Hawley (Michigan State U.)

New observations of the Carina dwarf spheroidal galaxy have been obtained at angular distances as far as 12 degrees from its center. Along the Carina major axis we detect RR Lyrae at Carina's MW distance, but well beyond its classical tidal radius. Color-magnitude observations show the existence of a surface density of Carina-population stars which is a few percent of the central density as far as 3.5 kpc from the Carina center along its major axis. These measurements support the model of Carina as a tidally disrupting galaxy with no excess dark matter.

Session 78: Unique Objects and Gamma Bursts

Oral Session, 10:15-11:45am
96/06/13, Historical Society

78.01

Two statistical tests on BATSE 3B sample

M. Borund, W. Klažniak (University of Wisconsin-Madison)

Models in which GRB sources are distributed in a disk or in intersecting planes are inconsistent at the 7\( \sigma \) level with the mean value of \( C_{\text{min}}/C_{\text{max}} \) determined for 657 BATSE GRBs. This conclusion does not depend on the position of GRBs in the sky.

We have also analyzed the directional data on 1122 BATSE GRBs to test earlier claims of departure from a random distribution in galactic longitude. Using the Kolmogorov-Smirnov test, we found no evidence for any departure from isotropy.

78.02

A High Time and Energy Resolution Study of Gamma-Ray Burst Spectra

L. Ford, D. Band (UCSD/CASS)

Using a new analysis method, we search for narrow energy band, short-lived flares in gamma-ray bursts. Gamma-ray burst spectra are observed to be non-thermal but if the sources are located at cosmological distances, basic fireball models predict thermal spectra. These models are still viable if there are several thermal regions which become optically thin at different times and apparent temperatures giving rise to an apparently non-thermal spectrum. We use time-tagged count data from the BATSE Spectroscopy Detectors to determine the probability that any pair of counts came from the same energy band. If burst spectra are composed of many short duration black bodies, the average correlation between counts should be larger when the counts are separated by small time intervals. We discuss how the correlation between counts is calculated and apply this method to many short gamma-ray bursts.

78.03D

A New 3-D Model for the Homunculus of \( \eta \) Carinae

D. Dowling, D. Currie, D. Shaya (U Md.), J. Hester, P. Scowen (U.A.), and the WFCPC IDT

Using a sequence of Hubble Space Telescope images (1990-1995), we have measured the astrometric (plane-of-the-sky) expansion of the dust cloud (the homunculus) surrounding the super-luminous, eruptive star eta Carinae. The measured expansion rate is 0.666 \( \text{arcsec yr}^{-1} \) in excellent agreement with the 1843 peak in the star's "Great Eruption of 1838-1860." Doppler velocities for the expanding gas cloud were obtained from the ground-based spectra of Hillier and Allen [1992, 1993] for each point in the gas cloud. We combine the Doppler velocities with the astrometric velocities to create a new model (the hourglass) for the shape of the expanding gas cloud. Three tests are employed to compare our new model to two recently published models (the double-sphere and bipolar-caps). Only the hourglass model is consistent with all the available data.

78.04

ROSAT and ASCA Observations of the X-Ray Lobes of W50 Associated with the Semi-Relativistic Two-Sided Jets Source: SS433

S.Safi-Harb, H. Ogelman (UW Madison)

We report the observations of the X-ray lobes of W50 associated with the compact source SS433 known by its semi-relativistic two-sided jets. The eastern and western lobes were observed with the Position Sensitive Proportional Counter (PSPC) on board ROSAT. The lobes are symmetrically displaced east and west of SS433, starting at \( \sim 15^\circ \), elongated along the axis of the jets, with an enhanced emission at \( \sim 35^\circ \), and extending out to \( \sim 40^\circ \). With ROSAT, we were able to detect diffuse emission from the eastern lobe even further out to \( \sim 1^\circ \). This emission is coincident with the brightest radio filament which is thought to be the radio 'hot spot' associated with the relativistic jets from SS433 interacting with the ambient medium. The spectrum from this region is soft, and is either described by a power law with a steep photon index (\( \Gamma \approx 4 \)), or a thermal bremsstrahlung with a temperature \( K_T \approx 0.5 \text{ keV} \). We also report the ASCA observations of the eastern lobe which was detected from \( \sim 15^\circ \) to \( \sim 40^\circ \). We combine the ASCA data with the ROSAT data to get a wide coverage of the spectra in the 0.1 - 10 keV energy range. The spectra show softening with increasing distance from SS433. Both thermal bremsstrahlung spectra with high temperatures (\( \sim 5 \text{ - } 30 \text{ keV} \)) as well as power law spectra with hard photon index (\( \Gamma \leq 1.4 \leq 2 \)) give adequate fits. The fits are made better by adding