EXOSAT Observations of the X-ray Transient V0332+53

Stella, L.; White, N.E.; Davelaar, J.; Parmar, A.N.; Blissett, R.J.; van der Klis, M.

Publication date
1984

Published in
Bulletin - American Astronomical Society

13.03
EXOSAT Observations of the X-ray Transient V0332+53

L. Stella (ESA/ESOC), N.E. White (ESA/ESTEC), J. Davelaar, A.N. Parmar, R.J. Blissett (ESA/ESOC), M. van der Klis (University of Amsterdam)

The X-ray transient V0332+53 was first observed in 1973 June by Terrell et al. B.A.A.S., 14, 619 (1982) using the X-ray sky survey instrument on the Vela 5B satellite. V0332+53 was observed to be again active in 1983 November at a level of 50 μJy by the Tenma X-ray satellite (Tanaka et al. IAU Circ. 3891 ,1983). These pointed observations also revealed distinctive erratic flickering activity reminiscent of variability seen from Cyg X-1. We report the result of subsequent observations of V0332+53 by the European Space Agency X-ray Observatory EXOSAT in the period November 1983 - January 1984 that (1) positioned the X-ray source to sufficient accuracy for an optical identification to be made (Davelaar et al., IAU Circ. 3853 ,1983), (2) discovered coherent low amplitude 4.4 s pulsations (Stella and White, IAU Circ. 3902 ,1983) (3) characterised the rapid aperiodic variability in terms of a shot noise model and (4) suggest the X-ray pulsar is in a 34 day eccentric orbit (White et al., IAU Circ. 3912 ,1984). This combination of coherent 4.4 sec pulsations together with short term shot noise-like variations, appears to be qualitatively different from previously reported intensity variations in X-ray sources. The consequences of discovering "Cyg X-1 like" rapid fluctuations from an X-ray pulsar are discussed.

13.04
Hard Transients from the HEAO-1 A2 Short Transient Survey: Are They Flares from dMe Stars ?

A. Connors (NASA/GSFC and U. of Md.), P. J. Serlemitsos, and J. H. Swank (NASA/GSFC)

A survey of HEAO-1 A2 source-free scanning data has uncovered 5 new short transients with durations between 60 and 2000 seconds. Their peak fluxes ranged from 2×10^{-10} ergs/cm -sec to 6×10^{-10} ergs/cm -sec (2-20 keV). Spectral data show three to have thermal bremsstrahlung temperatures on the order of 2 keV, one with kT of about 8 keV, and the brightest to have a markedly harder spectrum with kT greater than 10 keV.

Previous HEAO-1 transients with spectra, durations, and peak-to-quiescent-flux ratios similar to these events have been attributed to dMe stars. For example, the 25 October 77 event attributed to AT Mic had kT on the order of 2 keV and peak flux of about 5×10^{-10} ergs/cm -sec (2-20 keV), while H0449-55, with peak flux of roughly 5×10^{-9} ergs/cm -sec and kT about 13 keV could have come from either of two 10th magnitude dMe stars. We suggest the 5 most recent HEAO-1 A2 transients are also from dMe or dKe stars. If this identification is correct, it indicates that dMe stars are capable of a wide range of flares, which may be much harder and brighter than has been customarily assumed.

13.05
VLA Observations of Unidentified HEAO-1 X-Ray Sources

J.T. Schmelz, E.D. Feigelson (Penn State) and D.A. Schwartz (CFA)

We have employed a new method to uncover candidates for unidentified X-ray sources. The C-configuration VLA was used at 20 cm to search for radio emission from 69 X-ray sources detected in the HEAO-1 all sky survey. Approximate pointing positions were obtained by superimposing the large error boxes from the NRL experiment and the grid of small diamonds from the Scanning Modulation Collimator (MC). Radio maps were made of the 30' primary beam from the 225 VLA snapshots. Approximately 3000 radio sources were detected with fluxes as small as 1-3 mJy. A search was made for optical objects associated with ∿250 of these which were either in or near an MC diamond. A preliminary list of radio/optical candidates includes several BL Lac objects, Seyfert galaxies, emission line galaxies, and RS CVn binary systems.

13.06
Survey for the Cataloged Stars within 25 Parsecs of the Sun that were not Targeted in the Einstein Data Bank

H. M. Johnson (Lockheed)

I have proposed to search the Einstein Data Bank for all of the specified stars in order to obtain the X-ray luminosity or the upper limit on L_x for undetected stars. HRI results are summarized in the table, where the conversion from HRI cts/s to L_x assumes coronal $T = 6 \times 10^6$ K (Cash, Charles, and Johnson 1980). The target star is also listed in two binaries because the HRI image blends the target and the nontarget companion. O-C is the observed source coordinate less the cataloged coordinate (epoch of observation, 1950 equinox).

Gliese-Woolley	Sp. Type	α O-C	δ O-C	log L_x (ergs/s)	Note
34A	G0 V	-0^{s}62	+4$''$9	28.3	A:target
B	dM0	+0.57	-2.3		ADS 671B
216A	F6 V	+0.04	+0.3	28.1	HD 38393
324A	G8 V	-0.26	+3.1	27.8	metallic
B	M5	...	...	<27.5	LTT 12311
338A	dM0	+1.65	+0.2	28.5	A:target
B	dM0	-0.48	-0.4		SB
566B	K5 V	...	...	<27.6	CaII em
570B	M2 V	-0.02	-4.5	27.4	HD 131976
9549	m	...	...	<28.4	Gl 615.2 C
669A	dM1e	-1.10	-3.0	29.0	Ross 868
B	dM5e	-0.10	-3.0		V639 Her
695A	G5 IV	-0.47	-0.7	28.6	μ Her
B	dM4	...	...	<28.0	CaII em
C	M4	...	...		
9637	K1 II	...	...	<28.8:	SB

A similar search for the much larger number of nontargeted stars in IPC fields is in progress. This work has been initiated under the Lockheed Independent Research Program.

13.07
Possible 6.7 MeV Emission Line from SS 433

W. A. Wheaton, J. C. Ling, W. A. Mahoney, A. S. Jacobson (JPL/Caltech), and R. C. Lamb (Iowa State Univ.)

Further study of data from the HEAO-3 High Resolution Gamma-Ray Spectrometer indicates that the possible 6.7 MeV emission line flare from the vicinity of SS 433, previously preliminarily reported by us (Lamb 1984), is of marginal significance. A line of about this energy had been predicted by Boyd et al. (1984) resulting from resonant proton capture by ^{14}N at high temperature. The total counting rate (source + background) in the line region is so low that the Gaussian statistics do not apply. The data for 1979 October 20, the date of a radio and x-ray flare from SS 433, allow the acceptance of the null hypothesis (no line) with a probability estimated to be of order 10%. If the line is real, the average flux on 1979 October 20 in the energy range from 6689 to 6701 keV was approximately 8×10^{-4} photons/cm^2-s. The 90% confidence upper limit to the same flux is 2.2×10^{-3} photons/cm^2-s. We will present results for the 6.7 MeV region for SS 433 obtained from