X-ray Binary Report 7 Aug. 1978

REPORT ON AN INTERNATIONAL COLLABORATIVE PROGRAM FOR OBSERVING X-RAY BINARIES AND OTHER GALACTIC X-RAY SOURCES

During the periods 28 April - 13 May and 9 - 24 July 1978, NASA assigned all of the U. S. observing time on the IUE satellite (16 hours per day) to guest investigator programs for observing galactic x-ray sources. During the first 7 days of each of these periods, ESA and SRC assigned all of the European and British observing time on the IUE satellite (8 hours per day) to similar guest investigator programs. These observing programs were coordinated, together with shorter x-ray observing programs on the SAS, HEAO, and Copernicus satellites and ground-based programs at several observatories in both hemispheres, to provide extended wavelength coverage of a large number of galactic x-ray sources, including observations well distributed with regard to binary orbital phase for those sources having well-defined periods.

Our scheduling of IUE observations paid special attention to obtaining good phase coverage of the following objects:

HZ Herculis (Hercules X-1)
HD 226868 (Cygnus X-1)
HD 77581 (Vela X-1)
V818 Scorpii (Scorpio X-1)
HD 153919 (3U 1700-37)

In addition, the individual IUE guest investigators observed the following objects, with varying degrees of completeness of phase coverage:

HD 152667 (OAO 1653-40)
AM Herculis (3U 1809+50)
Sk-160 (SMC X-1)
LMC X-4
X Persei (3U 0352+30)
SS Cygni (HEAO x-ray source)
VW Cephei
44 i Bootis

A special intensive program for observations of HD 153919 was conducted 10-14 July 1978, involving nearly continuous coverage with the IUE satellite (1150-3000 Angstroms), SAS-3 and Copernicus satellites (x-ray), and the Anglo-Australian Observatory (optical spectroscopy).

As of the time of preparation of this report (August 1978), we have only just begun the scientific analysis of the data obtained during these observing periods. It would therefore be premature to comment on the scientific content of these data. One paper (Dupree et al., Nature, in press, 1978; also available as Center for Astrophysics preprint No. 1004) describes IUE observations of 3 of these x-ray binaries obtained in February/March 1978. Quoting from the abstract to that paper:

> "The first ultraviolet spectroscopic measurements of binary x-ray sources show highly variable emission from a photoionized plasma in the object HZ Her, and give evidence for localized circumsystem material in the binary source Cygnus X-1. In addition, a substantial stellar wind is found in one of the brightest identified X-ray sources HD 153919. This system may be surrounded by an extensive H II region unusual in its content of high excitation ion species."

During the four weeks that the IUE satellite was assigned to ultraviolet spectroscopy of x-ray sources, we used it to obtain ultraviolet spectra of other types of galactic x-ray sources not specifically identified as binary stars. Of special interest was our observation of ultraviolet-bright point sources (presumed because of the nature of their spectra to be stars or compact groups of stars) at the centers of the following globular clusters:

NGC 1851
NGC 6341
NGC 6624
NGC 108
NGC 7078
NGC 6752

In the case of NGC 6752, we observed two such sources on opposite sides of the center, separated from each other by 10 arcsec. Preliminary results from these observations were presented in a paper by Hartmann et al. at the 152nd meeting of the American Astronomical Society (late-paper abstract will appear in a future issue of Bull. Amer. Astron. Soc., 1978 or 1979).

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