

FINAL  
71-89-CR  
OCIT

**Final Technical Report for NASA Grant 5-1297**

--  
**Far-Ultraviolet Observations of Cataclysmic Variables  
and Related Objects**

Grant Period: 10/15/89 - 10/31/96

Grantee Institution:

The University of Arizona

Tucson, AZ 85721

**Richard A. Wade, Principal Investigator**

Present Address:

Department of Astronomy & Astrophysics

525 Davey Lab

Pennsylvania State University

University Park PA 16802

**August 6, 1997**

This grant funded the initial phases of a study whose aim was to assemble and reduce the VOYAGER spacecraft observations of cataclysmic variables made with the UV Spectrometers (UVS), and to collate and present the VOYAGER spectra along with IUE spectra of the same targets. The far-ultraviolet spectral region accessible to the UVS is expected to be sensitive to the hotter, inner regions of the accretion disks in cataclysmic variables. Although other more recent space-borne experiments (ORFEUS, HUT) have collected spectra of superior quality and resolution, the VOYAGER UVS archive contains a unique, long-term set of observations including Targets of Opportunity, and the ability of VOYAGER to observe a target for days or weeks at a time is still unsurpassed.

The most difficult aspect of the project turned out to be the reduction of the UVS data, which are obtained in a limit-cycle drift mode for which the aspect must be constructed after the fact. The project has relied on the experience and expertise of co-investigator Dr. Ronald Polidan (GSFC) for advice and guidance in this phase of the project. Unfortunately, the reduction software was rewritten and ported to a new platform by the UVS team shortly after the project began and, following a delay to acquire appropriate computing hardware, it took an extensive period of testing and debugging (led by Polidan and Dr. G. Sonneborn at Goddard) to become familiar with and trusting of the new code. In the meantime, the P.I. (Wade) relocated from Arizona to Pennsylvania State University. The grant period was prolonged repeatedly (at no cost to NASA) in the expectation that analysis of the data could eventually resume. In fact progress during the later years was made in defining criteria for deciding which UVS spectra were sufficiently interesting to warrant full reduction efforts, and in generating code to extract the appropriate diagnostics from the data (bypassing the UVS team code for this purpose, in view of the sheer volume of data to be assessed).

This effort continues at Penn State, where the P.I. has been supervising an honors undergraduate student, Mr. Kevin McGouldrick, in retrieving and assessing data from the UVS archive (5/96-present). It is expected that a catalogue of VOYAGER observations of cataclysmic variables through mid-1997, with tie-in reference to the IUE archive and relevant literature, will be prepared for publication shortly. Thus while the main aim of the subject grant was not achieved within the lifetime of the grant, the effort invested will pay off in the form of an index of the UVS observations accompanied by a quality evaluation and other supporting apparatus. (The Penn State phase of this project has been supported in part by an IUE grant and through the NSF REU Site program.)

One refereed publication was supported in part by this grant, as indicated in the bibliography. It exploits the very low HI column to VW Hydri to set important limits on the EUV flux from that dwarf nova, and hence on the temperature and luminosity of the boundary layer.

## Bibliography

Mauche, C. W., Wade, R. A., Polidan, R. S., van der Woerd, H., and Paerels, F. B. S., "On the X-ray Emitting Boundary Layer of the Dwarf Nova VW Hydri", 1991, ApJ 373, 659.