e.g., the 10-9, 2.429 μm, observed in other high excitation objects such as Wolf-Rayet stars (Aitken et al., 1982, *Monthly Notices of the Royal Astronomical Society,* **200,** 698) are not present in our spectrum of the nova. On the other hand, the weak feature marginally detected at 1.45 μm could be attributed to OVI, and a NV resonance line is present in the UV spectrum. Tentatively, therefore, we attribute the newly discovered 1.56 μm feature to an unresolved group of recombination lines dominated by He II, OV and NV. One consequence of this interpretation is that, combined with our upper limit on CIV, the required abundance ratio C/(N+O) is lower than solar, in line with current nova theories. It should be mentioned, however, that our spectrum at longer wavelengths clearly shows another broad emission feature at 3.5 μm which has been observed in other novae (e.g., Black and Gallagher, 1976, *Nature* **261,** 296) and has been attributed by Blades and Whittet (1980, *M.N.R.A.S.* **191,** 701) to fluorescent excitation of formaldehyde in dust grain mantles. It may therefore not prove possible to totally exclude a molecular origin for the 1.56 μm feature until higher resolution spectra can be obtained of future nova.

Photometric and Spectroscopic Mass Ratios of W UMa Stars

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Introduction

W UMa binary stars represent a typical case of astronomical objects for which theory and techniques of data reduction are much more developed and up to date than observations. While the analysis of photometric observations by means of synthetic light curve methods (Wilson and Devinney, 1971 *Astrophysical Journal,* **166,** 605) yields good photometric elements, the absence of reliable spectroscopic data makes the determination of the absolute elements of these systems and therefore of their evolutionary status problematic.

W UMa Stars

W UMa stars are the commonest type of binaries near the sun. The typical object of this class is a solar-type contact binary (luminosity class V) with a mass ratio $q = 0.6$, a period of 0.35 day and spectra from A7 to G5. While a first glance produces the idea of an "easy" type of objects (two stars more or less on the main sequence), a more detailed examination of these systems yields a lot of theoretical problems on their evolutionary status and on the physical processes involved in the mass and energy exchange between the two components. According to Binnendijk (1970, *Vistas in Astronomy* **12,** 217) W UMa's can be subdivided into A-type and W-type systems. The classification is performed according to the geometry of the primary eclipse: A-type systems have a transit, whilst W types have an occultation as primary eclipse. In other words, for A-type objects the eclipsed star, at primary minimum, is the larger and more massive companion, and the reversal is true for W-type ones. There are also other physical differences between these subclasses: A-type systems have an earlier spectral type, a higher luminosity, a larger mass, and a smaller mass ratio (Rucinski, 1973, *Acta Astronomica* **23,** 79; 1974, *Acta Astronomica* **24,** 119) than W UMa's of W type. Notwithstanding the numerous works regarding the age of W UMa's, the problem is still open. There are two hypotheses: the first favours the "youth" of W UMa's and their short intrinsic lifetimes (Van't Veer, 1979, *Astronomy and Astrophysics* **80,** 287; 1980, *Acta Astronomica* **30,** 381) whilst the second, because of the presence of some W UMa stars in old clusters (Rucinski, 1980, *Acta Astronomica* **30,** 373), supports high stellar ages.

Determination of mass ratio

Concerning the spectroscopic determination of the mass ratio of these systems there are some problems, mainly due to the shortness of periods and faintness of components: these facts prevent us from obtaining well distributed points on the radial velocity curves and hence reliable mass ratios. The mass ratio can, however, be determined also from the photometry (Wilson, 1978, *Astrophysical Journal* **224,** 885), using light curve synthesis models. However, the reliability of this type of determination is questionable, owing to the problem of the non-uniqueness of the solution. In other words there are well-behaving systems for which the solution is unique whilst other systems may have many local minima on the hypersurface of possible solutions in the space of the parameters, so it can happen that with a differential correction procedure, one obtains a solution in a local minimum and not in the absolute minimum of the hypersurface mentioned above, with obvious consequences on the reliability of the mass-ratio determination (Mancuso, S. Milano L., Russo G., Sollazzo C., 1979, *Astrophys. Sp. Science,* **66,** 475). Taking into account these conclusions on the reliability of the "photometric mass-ratios" we decided to begin a work of mass-ratio determination both by solving with the Wilson and Devinney method the observed light curves (Maceroni, Milano, Russo, Sollazzo, 1981, *Astronomy and Astrophysics Suppl.* **45,** 187) and by observing radial velocity curves.

Observations and Data Reduction

The aim of our observing programme was to get spectra of a sample of W UMa's, with known photoelectric light curves. During December 1981 we got 60 low-resolution spectra (74 Å/mm) for YY Eri, TY Pup and UZ Oct on IIa-O, nitrogen-baked emulsion with the RV Cassegrain spectrograph at the ESO 1.5 m telescope, to measure radial velocities and get reliable absolute elements, using both spectroscopic and photometric observations*. The spectra were digitized with the Perkin-Elmer PDS microdensitometer at Naples Observatory. The

* In the same observing run, a number of spectra were obtained using the three-stage image tube available at the 1.5 m; unfortunately these spectra turned out to be too noisy for our purpose.

reduction of the digitized spectra was performed on the PDP11/34 computer at the same Institute. While the wavelength and intensity calibrations were easily performed on all spectra, the determination of the radial velocities proved to be very tricky because of the low dispersion and the high rotational broadening of the spectral lines. Therefore an 'ad hoc' data processing code is under development, and hence the analysis of the spectra has not yet been completed.

The result of this work will be published, when completed, in the *Astronomy and Astrophysics Supplements.*

List of Preprints Published at ESO Scientific Group

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Fiber Optics at ESO

Part 2: Fiber Optics Multiple Object Spectroscopy at the 3.6 m Telescope

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During a 6-day test period late in November 1982, a prototype optical fiber device (nicknamed "Fiber Optopus") was tested at the 3.6 m telescope Cassegrain focus. The principle of this device, described in more detail in the following paragraphs, is such that the light from up to 50 randomly separated points on the sky (within the Cassegrain focus field of view) can be simultaneously guided via separate flexible optical fibers to the entrance slit of the B&C spectrograph. By making use of a two-dimensional detector such as a CCD the individual spectra, corresponding to each sampled point on the field, can be recorded simultaneously. When fully operational, the Fiber Optopus should enable a very strong reduction in telescope time to be achieved in observing programmes involving low resolution spectral mapping of extended fields. This feature will be of great interest to astronomers wishing to observe clusters of faint objects requiring long integration periods.

Technical Description

The prototype system, represented schematically in fig. 1, depends on the following essential components:

- the Fiber Optopus containing 50 free optical fibers, appropriately terminated in magnetic connectors,
- a starplate for the particular field to be viewed,
- three coherent fiber bundles and a TV camera for guiding,
- the Boller and Chivens spectrograph,
- a two-dimensional detector (CCD).

In addition, auxiliary calibration lamps, power supplies and a handset for the remote control of these functions and of the TV camera are provided. A description of the instrumental components developed specially for multiple object spectroscopy is given below.