SPECTRAL LINE VARIABILITY OF THE SOUTHERN STAR T CHAMAELEONTIS

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The star T Chamaeleontis was classified as an RW Aur variable by Hoffmeister in 1965 on the basis of its photometric behavior, characterized by large and erratic variations on a time scale of days. However, any conclusive spectroscopic proof of the pre-main sequence nature of the star has been lacking.

T Cha has been classified recently by us as a weak-line YY Orionis star because of the unusual occurence of an inverse P Cygni profile at the Hα Balmer line and of the rather weak equivalent width (below 10 A) of the line. The pre-main sequence nature of the star has been established on the basis of low and high resolution spectroscopic and photometric observations. These observations also revealed very strong variability of the Hα line on a time scale of one day or less. This line has been observed to vary from one night to the next from a pure emission to an inverse P Cygni profile (or YY Orionis profile, indicative of mass infall onto the star). Actually, this is the first case in which an inverse P Cygni is observed at Hα, since in YY Orionis stars —a subgroup of the T Tauri stars— this kind of profile is only seen at the higher Balmer lines.

During the period 1993 March 26 to April 1 we have obtained a new sequence of thirteen spectra of T Cha using the 1.5-m telescope at ESO equipped with a Boller & Chivens spectrograph. In this contribution we focus on the spectacular variability observed in the Hα line which, to our knowledge, has never been observed before in any pre-main sequence star. From one night to the next, the line changes from a double peak to an absorption, then to a very strong emission (resembling that of a classical T Tauri star) and back again to a weak emission with a double peak and, finally, to a deep absorption. In addition, we show that there are also strong variations in the strength of the veiling of the photospheric spectrum and discuss different possibilities for the origin of the spectral variability.

We present evidence that the variability could be due to variable circumstellar extinction arising from a disk (seen almost edge-on) in which instabilities cause the residual matter to be accreted onto the star.

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PHOTOMETRY AND PERIOD BEHAVIOR OF SELECT W UMA TYPE STARS

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As stated by Binnendijk (1970, Vistas Astr., 12, 217) the W Ursae Majoris systems are eclipsing variable stars whose light curves have maxima which are strongly curved and minima which are nearly equal in depth. These systems are also spectroscopic double stars and the spectra usually contain absorption lines from both components. According to Applegate (1992, ApJ, 385, 621) eclipsing variables are excellent laboratories for studying a wide variety of processes since they offer probes of tidal dissipation, mass transfer or loss, angular momentum transfer or loss, magnetic activity and stellar evolution and their usefulness extends far beyond their textbook role in the determination of stellar mass and radii. Before 1950 most light curves were photographically observed, and hence the orbital elements were very unreliable. However, current accurate photoelectric photometry enables high precision measurements that can reveal orbital period changes on the order of one part in 10 because deviations from an assumed ephemeris can build up over many orbits and many systems have observational records spanning decades or more. In the present work, accurate photometry of several W UMa type stars which was acquired at two different Mexican observatories: OAN and José Arbol y Bonilla is presented. Attempts to determine the long term variation of the period is being made for those stars for which a sufficient number of observations have been accumulated over the past half century so that the behavior of the period can be studied over that length of time. For others, multicolor photoelectric photometry is presented.

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