W SERPENTIS: THE SECONDARY UNVEILED

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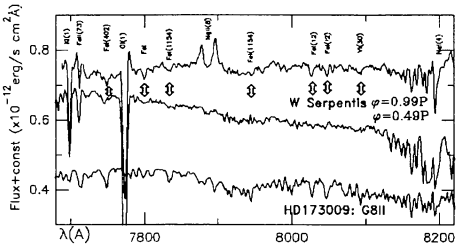
W Serpentis is a very peculiar interacting eclipsing binary system with a period of 14.2 days. The binary components could not be identified spectroscopically because they are seen immersed in an optically thick plasma emanating from one of the stars, which is in the stage of rapid mass-loss. Here I report spectral observations covering for the first time a complete orbital cycle of W Ser. 650 CCD spectra were obtained with the Cassegrain spectrograph attached to the 2.15-m telescope at CASLEO, San Juan, Argentina. The spectral range covered was $\lambda\lambda 3800 - 10200$Å with a resolution varying between $0.5 - 1$ Å px^{-1}.

In the infrared spectral region, I have identified absorption lines of neutral metallic ions, mainly of Fe I, which show radial velocity variations as expected from the movement of the previously unseen *cool* component, i.e., receding during the orbital phases after the primary minimum. The figure below shows the infrared region of the spectrum of W Ser during 2 different orbital phases, together with the spectrum of HD 173009 of spectral type G8 II.

The low ionization absorption lines seen in the spectrum of W Ser, arising from non-metastable levels, are probably produced in the photospheric layers of the binary component which is undergoing the rapid mass-loss stage. From spectral cross-correlation analysis, the spectrum of this component has been classified as G8-K0 III. The absorption lines of the G8-K0 III star also show intensity variations with the orbital phase. Near the primary minimum ($\phi = 0.0$), these absorptions (marked with arrows in the figure) reach a maximum strength; whereas during the phases near $\phi = 0.5$ these lines weaken, suggesting a *spectroscopic eclipse*. The mass function obtained for the G8-K0 III component of W Ser is $f(M) = 2 \pm 0.2$.



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SYNTHETIC SPECTRA FOR POPULATION SYNTHESIS

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In the last years we have been applying efforts to build an atomic plus molecular lines database suitable for both high and low resolution spectroscopy. We have determined oscillator strengths line-by-line through a comparison between observed spectra for the Sun and Arcturus, and synthetic spectra, where the line list consists of identified lines. A code for spectrum synthesis in LTE developed by M. Spite for atomic lines and complemented for molecular lines is used. We now have a database in the range $\lambda\lambda 4000$–9000 Å, which is being extended towards the ultraviolet and infrared.

Composite spectra for single-aged populations can be built by summing up synthetic spectra corresponding to different evolutionary stages. Theoretical isochrones can be used for metal-poor single-aged populations, and for metal-rich populations, we use counts on our recent color-magnitude diagrams data for metal-rich globular clusters of the Galactic bulge (e.g., Ortolani, S., Barbuy, B., Bica, E., 1990, A&A 236, 362).

We have already computed synthetic spectra for individual stars and composite systems for the study of strong features, such as Mg_2, Fe5270, Fe5335, NaI8190, Ca II triplet among others. From such studies relations between the intensity of features and temperature, gravity, metallicity and α-elements/Fe ratio are derived for composite systems.

Such calculations are applied to study the stellar populations and α-elements/Fe ratios of globular clusters and E-galaxies. One important result already obtained is an excess of α-elements in E-galaxies (see, Barbuy, B., Freitas Pacheco, J.A., Idiart, T., 1996, in IAU 171, New Light on Galaxy Evolution, Kluwer, in press).

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POLARIMETRIC STUDY OF THE OPEN CLUSTER TR 27

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We performed a multicolor polarimetric study (in the *UBVRI* filters) in the direction to the young open cluster Tr 27, which is suffering from a severe

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