UV OBSERVATIONS OF SELECTIVE WIND ECLIPSES IN THE WOLF-RAYET STAR γ VELORUM

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1. Introduction

γ Velorum is a well-known WC8+O9I spectroscopic binary system with a period of 78.5002 days. Phase-dependent spectroscopic variations are observed in the ultraviolet and were first attributed to selective eclipsing of the O star light by the dense WC8 wind. Recently, it was suggested that the variations are caused by as a stream of gas moving away from the system at high velocity and arising as a result of the collision between the two stellar winds. In an attempt to shed new light on the problem we have carried out an analysis of *all* IUE high resolution archival spectra of γ Vel, supplemented by 8 *Copernicus* spectra covering the whole orbital period. The study includes all transitions for which variations are found in order to try to obtain a global view of the phenomena taking place.

2. Observations and Results

We have extracted 40 SWP and 30 LWR high resolution, small aperture spectra of γ Vel from the UK RAL archives using the IUEDR STARLINK software package. The 8 *Copernicus* spectra obtained with the U2 phototube have been corrected for charged particle background and for signal pointing errors using the U1 monitoring tube.

Three distinctive types of behaviour are observed. The first, including C IIλ1035,1335, C IIIλ1175,1247,2297, Si IIIλ1206,1295, Si IVλ1125,1722,1727 and S IVλ1062,1072 is qualitatively consistant with atmospheric eclipses of the O star light by the WR wind but the amplitude of the changes suggest the presence of some asymmetric source of emission, visible when the O star is in front and occulted when it is in back. The second type of behaviour is exhibited by the N Vλ1240, Si IVλ1400 and C IVλ1550 resonance doublets. As well as showing a similar behaviour to the first group, these lines develop a high velocity wing on the violet edge of the absorption component at phases when the O star is in front. We interpret this as being caused by a cavity formed in front of the O star as a consequence of the formation of a shock front due to the collision between the two stellar winds. Finally, a broad depression between $\sim$ 1410–1900 Å is associated with a large number of Fe IV transitions between the $3d^4 4s - 3d^4 4p$ levels. Instead of being centered on the rest wavelength as expected for atmospheric eclipses, these lines are blue-shifted by 950 km s^{-1}. The C III] λ1909 transition is the only other line showing a similar behaviour, being blue-shifted by $\sim$ 600 km s^{-1}. The behaviour of this third group of lines suggests an asymmetric opacity distribution.

K. A. van der Hucht and B. Hidayat (eds.),
Wolf-Rayet Stars and Interrelations with Other Massive Stars in Galaxies, 259.