THE SUBDWARF ECLIPSING BINARY LB3459 (AA Dor)

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A review was presented of the currently available observational data on this evolved system, namely, uvby photometry (Kilkenny et al. 1978; paper II) radial velocities (Kilkenny et al. 1981; paper III) and a non-LTE atmosphere analysis of the primary component (Kudritski et al. 1981). Kudritski et al. conclude that $T(pr) = 40000 \pm 2500^{\circ}K$ and $\log g = 5.3 \pm 0.2$ and from the spectroscopic data and light curve analysis (papers II, III) derive masses and radii for the primary and secondary components of $M(pr) \simeq 0.25\ M_{\odot}$, $M(sec) \simeq 0.04\ M_{\odot}$, $R(pr) \simeq 0.16R_{\odot}$, $R(sec) \simeq 0.09R_{\odot}$ respectively. Thus the primary component is a normal sdO star whilst the secondary component is a most enigmatic object, perhaps a normal composition degenerate dwarf but of too low a mass to be on the main sequence, perhaps an evolved degenerate object but then the radius is too large. The published evolutionary models for this system (Paczynski 1980; Conti et al 1981) do not adequately describe its current status.

An estimate of the secondary component's temperature is clearly an important datum but with a contribution in V light of 0.01 of the total light of the system it is difficult to determine. Indeed the uvby light curves do not contain any significant information about the intrinsic luminosity of the secondary, the only contribution from the secondary being that of reflection of the primary component's light. Accordingly, in an attempt to obtain further information about the secondary component, David Kilkenny has obtained VRI observations on two nights in 1980/81. The complete light curves have been solved simultaneously using the LIGHT program (Hill 1979) to yield a value of $T(sec) = 8500 \pm 1500^{\circ}K$ provided that, in order to explain the reflection effect, the bolometric albedo is greater than unity and is of the order of 2-3. The source of this additional energy is unknown (perhaps X-ray heating?). Certainly, it cannot be due to any extra reflection of primary component radiation from an ionised hydrogen cloud surrounding the system since, not only would the required electron density be so great that absorption effects would dominate, but also the amount of reflected light increases with increasing wavelength and hence cannot be due to

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Thomson scattering. Additionally, the existence of the reflection effect demonstrates that the secondary component is rotating approximately synchronously and therefore cannot be rotationally flattened(which would thereby suggest an apparently larger radius as derived from primary eclipse).

The VRI observations obtained on these separate nights display some differences which seem to indicate that the secondary component is intrinsically variable. Further VRI and perhaps JHK observations are planned for the next observing season. A full version of this paper, including the observational data, is being submitted to Mon. Not. R. Astr. Soc.

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