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THREE MASSIVE ZAMS O-TYPE ECLIPSING BINARIES

E. Fernández Lajús,[1] N. I. Morrell,[2] and V. S. Niemela[1]

We determine in this work the fundamental properties of three eclipsing massive O-type binaries, namely FO 15, CPD-59 2603 and CPD-59 2635, which are members of the young open cluster Trumpler 16 in the Carina Nebula. FO 15 was recently discovered by Niemela et al (2006) to be an O5.5 Vz + O9.5 V short period binary system. CPD-59 2603 is a hierarchical triple system (Rauw et al. 2001, hereafter R01), made up of an O-type eclipsing binary (O7 V+O9.5 V) and a B0.2 IV type star. CPD-59 2635 was found by Albacete Colombo et al. (2001, hereafter AC01) to be an O-type spectroscopic binary system (O8 V + O9.5 V) with 'Struve-Sahade' effect. These binaries show the signature of the Vz luminosity class of very young stars recently arrived to the Zero Age Main Sequence (ZAMS), namely HeIIλ4686 absorption stronger than other HeII lines.

New well defined V light-curves of these three systems have been obtained by Fernández Lajús (2006), discovering also that CPD-59 2635 is an eclipsing binary. For this purpose, CCD images of FO15, CPD-59 2603 and CPD-59 2635 were obtained using the 1 m Swope telescope at Las Campanas Observatory, Chile, and the 0.6 m Hogg and 2.15 m Sahade telescopes at Complejo Astronómico El Leoncito, Argentina.

With the photometric data and the radial velocities published by Niemela et al. (2006), R01 and AC01, we determined the absolute physical parameters of these binary systems, by means of the Wilson & Devinney code (W-D, Wilson & Devinney 1971; Wilson 1990; Wilson & Van Hamme 2004). We find all three systems to be detached. The $T_{\rm eff}$ of the primary components were fixed from the table of stellar parameters for galactic O-type stars given by Martins et al. (2005, hereafter MSH05). The $T_{\rm eff}$ of the secondary components were left as free parameters and adjusted with the models. A third light contribution was necessarily included for CPD-59 2603, which is a triple system (R01) and bright spots were considered only for CPD-59 2635. The results for the best fits are listed in Fernández Lajús (2006).

We found that the values of the stellar masses for the components of FO 15 and CPD-59 2603 are in fair agreement with those tabulated by MSH05 for "normal" O-type stars in our Galaxy. However, the masses of the components of CPD-59 2635 are about 3 $M_{\odot}$ lower than those corresponding for the ST O8 V y O 9.5V, as given by MSH05. Perhaps this is correlated with the variations of the ST of the components (cf. AC01).

The stellar mean radii of these systems are about 30% smaller than those tabulated for the corresponding ST by MSH05. As a consequence, the absolute magnitudes of the stars are about 1 mag. lower than expected for MS O stars. These values of absolute magnitudes are in good agreement with those corresponding to very young O stars just arrived to the ZAMS (Hanson et al. 1997).

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[1]Facultad de Ciencias Astronómicas y Geofísicas, Universidad Nacional de La Plata, Paseo del Bosque S/N, 1900, La Plata, Buenos Aires, Argentina (eflajus@fcaglp.unlp.edu.ar).
[2]Las Campanas Observatory, Observatories of the Carnegie Institution of Washington, Casilla 601, La Serena, Chile.