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PRELIMINARY ORBITAL ELEMENTS OF HD 184035

The star HD 184035 (HR 7422) was discovered by Waelkens and Rufener (1983) to be an eclipsing binary.

They also presented the V photoelectric observations and the following light elements:

$$\text{Min } 1 = \text{JDe } 2444833.830 + 4^{\text{d}}.62988 \cdot E$$

HD 184035 is a known single lined spectroscopic binary (Buscombe, Morris 1961) with an estimated orbital period in agreement with the photometric period. In this paper photoelectric observations are processed yielding the first set of orbital elements.

Because of the small number of observations, this solution is regarded as preliminary. For the analysis of the light curve the frequency domain approach was chosen (Kopal 1979). The solution was obtained in a completely automatized manner by relevant computer programs (Gaspani 1984), fitting both minima. My computation indicates that the primary minimum is a transit, the orbital elements are given in Table I.

Table I
Orbital elements

$$\begin{aligned} \text{Min } 1 &= \text{transit} \\ u_1 &= 0.50 \text{ (assumed)} \\ u_2 &= 0.50 \text{ (assumed)} \\ r_1 &= 0.214 \pm 0.006 \\ r_2 &= 0.082 \pm 0.004 \\ i &= 82^{\circ}.6 \pm 0^{\circ}.8 \\ L_1 &= 0.898 \\ L_2 &= 0.102 \end{aligned}$$

Since the relative radii of both components are small, a detached configuration was assumed for the system. In order to combine photometric and spectroscopic elements an estimate of the mass ratio is required. Since the spectroscopic mass ratio is unknown an estimate for $q = (m_2/m_1)$ was obtained

by the ratio of the fractional luminosity and making the assumption that both components are on the main sequence (Houck 1978). The following statistical relation, fitting the main sequence data:

$$\log(m_2/m_1) \approx 0.30 \log(L_2/L_1)$$

yields $q \approx 0.52$. The combination by the mass function given by Buscombe and Morris yields the following values for masses and radii of the two components of HD 184035:

$$\begin{aligned} m_1 &\approx 2.8 M_{\odot} \\ m_2 &\approx 1.5 M_{\odot} \\ R_1 &\approx 4.0 R_{\odot} \\ R_2 &\approx 1.8 R_{\odot} \end{aligned}$$

This work is regarded as preliminary because new spectroscopic and photometric observations are needed in order to carry out a more detailed analysis of this binary system.

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