COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1211

Konkoly Observatory
Budapest
1976 December 1

A TENTATIVE SPECTROSCOPIC ORBIT OF ϑ^1 Ori A *

Three out of four spectrograms of ϑ^1 Ori A = HD 37020 taken by M. de Groot (ESO) at the 1.5 m telescope at 12.3 Å/mm dispersion show the Balmer absorption lines clearly blue-shifted against the nebular emission lines. Two of the spectra, 524 d apart, suggest a new period of 130.864 d, i.e. one third of the "fundamental" period of 392.594 d (Lohsen 1976 IBVS 1129). The former period has to be halved according to observations by M. Baldwin (1976 IAU Circ.3004). Fig.1 shows our observed radial velocities together with older ones, using the period 65.43233 d and the primary minimum of 1977 JAN 01, 02^h2 = JD 2443 144.600 as phase zero.

The curve represents an estimated orbit based on $e = 0.60$, $\omega = 180^\circ$, $K_1 = 33.3$ km/s, and $\gamma = 13.3$ km/s + V_{neb}. Together with a photometrically estimated relative tangential velocity of 140 km/s ($=K_1+K_2$ if $\omega=180^\circ$) at primary minimum in the transit case this implies the masses to be

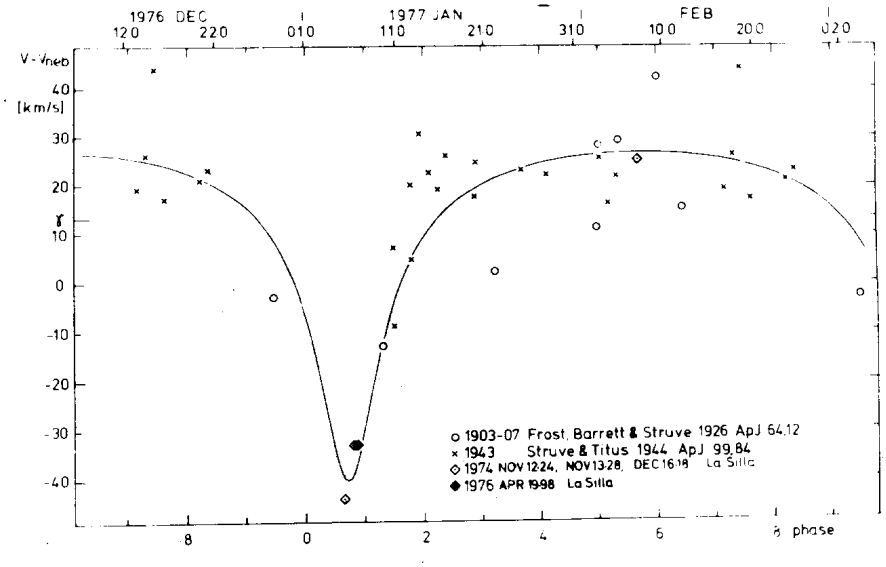
$$M_1 = 1.036.10^{-7}(K_1+K_2)^2 K_2 P(1-e^2)^{3/2} = 7.3\ M_\odot$$

and $M_2 = M_1 K_1/K_2 = M_1/3.2 = 2.3\ M_\odot$.

The low mass ratio explains why the colours of the system do not change significantly during primary minimum and makes it improbable to detect the companion spectroscopically. Better light and RV curves, however, would supply us with a rigid mass-radius relation for both components. The radius may be obtained by photometric comparison with BM Ori, where it can be measured directly (Popper and Plavec 1976 ApJ 205, 462).

* Based on observations made at the European Southern Observatory.

An interesting implication of this orbit of θ^1 Ori A is that it reduces significantly the kinetic energy of the Trapezium system in Parenago's calculation (1954 Trudy Sternberg Inst. Vol.25) and together with the absence of measurable relative tangential motions (Allen and Poveda 1974 Rev. Mexicana Astr. Ap. 1, 101) makes the system stable within the observational errors.



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