A NEW TEST CASE FOR NORMAL GIANT EVOLUTION: TZ FORNACIS

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For normal giants, the only binary system known until recently with completely determined masses was Capella (αAur, G0 III+G5III). Being non-eclipsing, its masses are, however, so uncertain (20% and 8%, respectively) that the properties of the corresponding range of theoretical models are considerably more uncertain than the observationally determined temperatures and luminosities. The discovery of the eclipsing nature of TZ For = HD 20301 (Olsen, 1977) thus provides a unique opportunity to obtain absolute parameters of much higher precision.

Through concerted efforts by many observers from ESO, Marseille, Aarhus, and our own institutes, uvby light curves and radial velocity curves have been obtained with the Danish 50 cm and 1.5 m telescopes at ESO, the latter equipped with the photoelectric radial velocity scanner CORAVEL. Analysis of these, not yet quite complete data yield the following preliminary parameters for TZ For:

Star	Mass($M_\odot$)	Radius($R_\odot$)	T_e(K)	M_{bol}	vsin i(km s^{-1})
G5III	2.11 ± 0.11	8.9:	4850	0.8:	6:
F7III	1.97 ± 0.05	3.5:	6200	1.7:	25:
Orbital radius: 120 $R_\odot$(circular)					

Both stars are evolved well away from the main sequence. The combined uvby indices are consistent with a roughly solar metal abundance. Note that apparently the rotation of the larger, cooler primary is synchronized with the orbital motion, while the smaller, hotter secondary rotates at about ten times the synchronous rate.

The above preliminary parameters for the components of TZ For are well matched by Hejlesen's (1980, and unpublished) evolutionary tracks (Fig.1) for a single age (1.2×10^9 years) for both stars, assuming the composition (X,Z)=(0.80, 0.02) which is found to fit most main-sequence systems of similar age (Andersen et al.,this symp.). A full discussion, for which some further observations are necessary, is in preparation.

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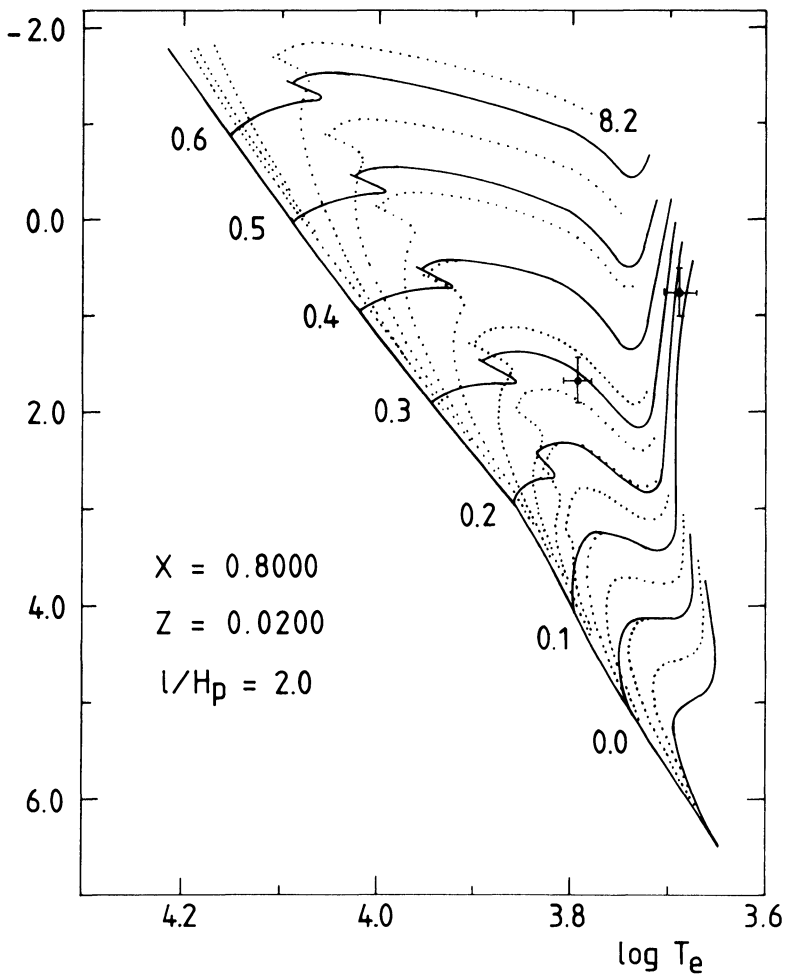

Fig.1. The components of TZ For in the theoretical HR diagram by Hejlesen. Full lines are evolution tracks (with log M), dotted lines are isochrones (log age steps of 0.2).

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REFERENCES

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