

ON THE GRAVITY OF THE SUBGIANT 31 AQUILAE

Lício da Silva

CNPq-Observatório Nacional, Brasil

ABSTRACT. The analysis of 31 Aql made by Hearnshaw found a disagreement between the spectroscopic and the trigonometric gravities. A possible solution for this problem is that the star is a pole-on binary system.

31 Aql is a high-velocity field G star that was analysed in detail three times by Hearnshaw (1971, 1975, 1976). According to him, it is a metal rich star, as old as NGC 188. In all of his analyses, Hearnshaw found a disagreement between the gravity values determined from the trigonometric parallax (trigonometric gravity) and from the ionization equilibrium, i.e., from the simultaneous solution of the Fe I and Fe II spectra (spectroscopic gravity). In his last analysis, from $\Theta_{\text{eff}} = 0.88$, he found two different values for $\log g$: 4.60 (spectroscopic gravity) and 4.15 (trigonometric gravity). Hearnshaw found no explanation for the disagreement between the spectroscopic and the trigonometric gravities.

A possible explanation for that disagreement is that 31 Aql is a spectroscopic binary system seen poles on. To verify this hypothesis, we have plotted the Fe I and Fe II differential curves of growth for 31 Aql, using the $\log W_{\lambda}/\lambda$ values given by Hearnshaw and the technique described by us before (da Silva 1975).

From the composed spectrum, by hypothesis, and using the value of $\Theta_{\text{eff}} = 0.88$, determined by Hearnshaw, we have a very good agreement for the spectroscopic and trigonometric gravities, giving us $\log g = 4.3$ dex (for the companion we used $\Theta_{\text{eff}} = 1.01$ and $\log g = 4.5$). From these values of effective temperature and gravity, we obtain $[\text{Fe}/\text{H}] \approx 0.3$, for the two stars.

Therefore, the very good agreement between the spectroscopic and trigonometric gravities for a "composed" spectrum suggest that 31 Aql may be a pole-on binary system, but does not prove it. To verify this hypothesis we must make complementary observations.

REFERENCES

- da Silva, L. 1975, *Astron. and Astrophys.*, 41, 287.
 Hearnshaw, J.B. 1971, *Astrophys. J.*, 168, 109.
 Hearnshaw, J.B. 1975, *Astron. and Astrophys.*, 38, 271.
 Hearnshaw, J.B. 1976, *Astron. and Astrophys.*, 51, 85.

Lício da Silva: CNPq-Observatório Nacional, Rua General Bruce 586, CEP 20921, Rio de Janeiro RJ, Brasil.

Materia Difusa Diffuse Matter

