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ON THE GRAVITY OF THE SUBGIANT 31 AQUILAE

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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 FeI and Fe II spectra (spectroscopic gravity). In his last analysis, from Θ_{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 Θ_{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 Θ_{eff} = 1.01 and log g = 4.5). From these values of effective temperature and gravity, we obtain [Fe/H] ≅ 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.

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