THE COMPLEX PULSATIONAL PATTERN OF THE δ-SCUTI STAR HD 2724

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HD 2724 is a F2 III star whose basic physical parameters, derived through Strömgren photometry (Hauck & Mermilliod 1990, A&AS, 86, 107) are T_{eff} = 7200° K, M = 2.2 $M_\odot$, $\log g$ = 3.42 and R = 4.8 $R_\odot$. It was discovered as a δ Scuti by Reipurth (1981, IBVS No. 2015) and subsequently observed by Lampens (1992, A&AS, 95, 471), which proposed a tentative variability model with 4 periodic components. In the present work, we combine photometric and spectroscopic observations, both performed at the ESO observatory (La Silla, Chile), to study the pulsational pattern of this object.

Vanicek's (1971, Ap&SS, 12, 10) analysis of our light curves (885 *uvby* measurements shared over 11 almost consecutive nights) allows us to get a frequency spectrum, consisting of 10 modes which range from 4.43 to 8.06 d^{-1}. Moreover, Lampens (1992, A&AS, 95, 471) analyzed her data resorting to Stellingwerf's (1978, ApJ, 224, 953) method combined with a series of dangerous prewhitenings.

Our spectroscopic data (154 spectrograms in 5 consecutive nights with a resolution of 60 000) assign to the examined lines a rotational broadening $v \sin i$ = 80 km/sec. Through the moment analysis (Balona 1987, MNRAS, 224, 41) and the two-dimensional Fourier analysis (Kennelly et al. 1992, ApJ, 400, L71) of the line profiles, we are also able to set up a preliminary pulsational model of this object: most modes show a non-radial nature with low $\mid m \mid$ values and the inclination angle i can be estimate at about 70°.

Transcending the interest of the present results, our work shows the potential of photometry and spectroscopy as a synergic approach to understanding dynamical processes like stellar pulsations. On the other hand, we can stress the importance of adequate data bases and suitable analysis techniques to the attainment of reliable results. Teslting & Schrijvers (1995, IAU Symp. 176, Stellar Surface Structure, p. 35), e.g., recently showed the danger involved in a mechanical application of the two-dimensional Fourier analysis to Doppler imaging.

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NLTE ANALYSIS OF LITHIUM IN Li K GIANTS

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We performed a non LTE (NLTE) analysis of ^{7}Li lines in Li K giant stars. In particular, the star HD 19745 presents very strong lithium lines and a higher lithium abundance compared to the interestellar lithium abundance (de la Reza & da Silva 1995). A new scenario appeared to explain the existence of lithium in these evolved stars (de la Reza, Drake, & da Silva 1996; this conference). In this model all K giants undergo, during the first red giant branch (RGB), a cyclic period which is short compared to the RGB time in which production and depletion of ^{7}Li takes place. This lithium enrichment also produces a mass loss eruption with formation of detached circumstellar shells.

We propose here to test this model by means of calculations of lithium stellar abundances for K giants in different parts of the cycle. In fact, at the beginning of the cycle, due to the prompt lithium enrichment, the star must be Li rich and, due to the continuing of depletion, the Li abundances must decrease to the end of the cycle where the star becomes a normal Li poor K giant. We begin our calculations with the star HD 19745 using the three Li I lines (6708, 6104 and 8123 Å). We introduce a chromosphere in order to calculate the importante UV radiation that controls the Li ionizations.

As a result we obtain for HD 19745 a lithium abundance ϵ(Li) = 4.25, smaller than the photospheric NLTE Li abundance of de la Reza & da Silva (1995). This is due to the chromospheric effect, an almost 100 K cooler effective temperature and a larger log g value. In any case, the resulting abundance remains much larger than the lithium cosmic abundance.

de la Reza, R., & da Silva, L. 1995, ApJ 439, 917
de la Reza, R., Drake, N.A., & da Silva, L. 1996, ApJ, 456, 115

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