

ANALYSIS OF VERY RICH K GIANT STARS

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The detection of a strong resonance line of Li I at 6708Å in the spectra of some apparently normal K giant stars, has roused what we can call the “K Giant Lithium Problem”. In fact, according to the standard stellar evolution theory this element must be strongly depleted in the atmospheres of these stars. No satisfactory explanation of this peculiarity has been given to the present time. Anyway, to understand the involved mechanisms it is important to obtain the best possible values of the corresponding Li abundances. Our method use the secondary Li line at 6104Å which is very sensitive to abundances, specially when these are high. This is not the case of the strong and saturated resonance line. The weaker 6104 line is formed deeper in the stellar atmosphere than the resonance line, being less affected by non LTE effects. In this work we present partial results obtained with LTE theory (a general non LTE approach will be publish elsewhere) for the following stars: HD 787, HD 39853 and HD 19745. The first two are known bright K giant stars having respectively medium and high intensity 6104 lines. The last star is a member of a group of weak K giant stars recently discovered at the LNA (Brazil) in a search based on IRAS point sources. This star has the strongest 6104 line detected up to now in those kind of stars. The observations of the 6104 line were performed with the 1.4m Coude Auxiliary Telescope at ESO with a spectral resolution of 0.062Å. Each program star was observed at least twice and the S/N ratios of the combined spectra exceed 200. Other spectral ranges were observed to determine the Fe, O, C and N abundances. With the main parameters (Teff, log g, V turb.) for stars: HD 787 (3970, 1.7, 1.7); HD 39853 (3900, 1.2, 1.0); HD 19745 (4990, 2.1, 1.7); we obtain the following LTE abundances for Li by means of the 6104 line only (in the scale log H=12): HD 787, logLi=2.20; HD 39853, logLi=2.90; HD 19745, logLi=4.08. Concerning these three objects, HD 39853 is the only high velocity object and HD 19745 is the only IRAS source. The main conclusion is that the richest Li star HD 19745 seems to have a Li abundance larger than that of the mean interstellar medium (logLi=3.30). The explanation of this fact constitute a challenge to the classical theory of evolution of these objects. In fact, this apparently low mass star has not sufficient core mass to generate an extra quantity of ^3He which could explain a large ^7Li enrichment, by means of the ^7Be mechanism.