From Li to U: Elemental Tracers of Early Cosmic Evolution
Proceedings IAU Symposium No. 228, 2005
V. Hill, P. Francois & F. Primas, eds.

doi:10.1017/S1743921305005272

Li abundance in young PMS associations: AB Dor

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Abstract. We present stellar parameters and Li abundances for 21 stars of the young (∼50 Myears) AB Dor association, based on high-resolution spectra obtained with FEROS at the ESO 1.52m telescope and the Coudé Spectrograph at the OPD 1.6m telescope. These results are part of an ongoing project for the determination of stellar parameters and abundances for a large sample of T Tauri and post-T Tauri stars in PMS associations identified on the Search for Associations Containing Young Stars survey. The sample consists of G, K and M stars counterparts of ROSAT bright sources.

Since we expect Li depletion for the K and M stars, but small Li depletion for the G stars, we can compare the upper values of Li abundances for these stars with the one of the Galactic disk interstellar mean and at the same time provide constrains for the study of Li depletion on a chemically homogeneous high metallicity sample.

Keywords. Astrochemistry, stars: abundances, stars: pre–main-sequence, stars: atmospheres

1. Introduction

The last decade has shown a great increase in our knowledge of close and young stellar associations. Torres *et al.* (2003) and Zuckerman *et al.* (2004) independently identified AB Dor association, with slightly different values for UVW velocities. (obs: the star AB Dor is only marginally associated in Torres solution, but we have adopted the same name for the association to avoid confusion). Both samples comprehend around 50 stars.

Like Argus A (in Torres *et al.* 2003) the main reasons to claim for this association are the restricted limits of UVW velocities. Half of the sample has Hipparcos parallaxes and the concentration can be seem in all velocity and position (X,Y,Z) diagrams. The mean values of UVW and XYZ found in Torres solution are: U -7.2, V -28, W -13.1, X -1.8 to 24.2, Y -34.9 to 30.4 , Z -32.7 to 16.6.

The age of the association is estimated as 50 Myr, by comparing the observed Mv x B-V diagram with the Siess *et al.* (2000) isochrones.

2. The sample and the observations

In order to evaluate signs of youth in the optical counterparts of X ray sources and determine their radial velocity high-resolution spectra were obtained for 1500 stars with FEROS at the ESO 1.52m telescope and the coudé spectrograph at the 1.6m OPD telescope – from 1999-2005 (SACY survey, Torres *et al.* 03).

For the AB Dor association we have obtained high-resolution spectra of 21 stars (from which 3 were also observed by Zuckerman). The R = 48000 spectra cover from 3800–8500belsec:analysis

A first guess of temperature was derived from line ratios using the Padget (1996) calibration. Then the temperatures were derived from photometric calibrations. We used the $UBVRI_{(JC)}$ + $JHK_{(2Mass)}$ colors and Alonso (1996) and Houdashelt (2000) calibrations. A final check was done using the excitation equilibrium of FeI and FeII lines.

A first guess of log g was derived from the log g x Teff relation of the 50My isochrone of Siess *et al.* (2000) and the final value derived from the FeI and FeII curves of growth (using the code Renoir by M. Spite).

Metallicity was also derived from the FeI and FeII curves of growth. We should note that comparisons with previous literature determinations from photometric calibrations are in most cases incompatible with the spectroscopic values determined in this work.

Li abundances were derived by fitting the synthetic spectra of the Li doublet at 6707.8Å (the 6104Å line is marginaly detectable for most of the stars). The synthetic spectra were computed using the code PFANT (described in Barbuy *et al.* 2003) and Atlas 9 atmospheric models (Kurucz 1992).

3. Results

The analyzed dwarfs have stellar parameters within the ranges: T_{eff} = 4200–5850, log g 3.9–4.5 (mean 4.22), $M/M_{\odot}$ = 0.1–1.3, [Fe/H] = 0.10− −0.15 (mean −0.02). Since they are young stars (50 Myears) close to the Sun, the solar metallicity found for the association is expected. The [Fe/H] differences found from star to star are possibly due to uncertainties in the T_{eff}, log g and distances. The Li x T_eff trend follows the expected path (with cold stars more depleted), however the hottest stars (∼5800 K) also show depletion in respect to the maximum value found logN(Li) = 3 and some stars of same T_{eff} show very different depletion levels (figures and tables are not shown because lack of space).

A complete version of this work is in preparation and will be submitted to A&A.

Acknowledgements

B.V.C. would like to thank for partial funding from project 62.0053/01-1-PADCT III/Milênio.

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