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Lithium abundances in Bulge-like SMR stars

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Abstract. We analyze a sample of 21 super-metal-rich (SMR) stars, using high-resolution échelle spectra obtained with the FEROS Spectrograph at the 1.5m ESO telescope. The metallicities are in the range 0.15 < [Fe/H] < 0.5, 3 of them in common with Pompéia *et al.* (2002). Geneva photometry, astrometric data from *Hipparcos*, and radial velocities from CORAVEL are available for these stars. The peculiar kinematics suggests the thin disk close to the bulge as the probable birthplace of these stars (Grenon 1999). From *Hipparcos* data, it appears that the turnoff of this population indicates an age of 10-11 Gyr (Grenon 1999). Detailed analysis of the sample stars is carried out. Lithium abundances of these stars were derived, and their behaviour with effective temperature is shown.

Keywords. Stars: abundances, formation - Galaxy: formation

1. Introduction

Grenon (1989, 1999) selected a sample of about 6000 dwarf stars from the NLTT catalogue (see Grenon 1999), and studied them by means of Geneva photometry, radial velocity and Hipparcos astrometry. A sub-sample of super-metal-rich (SMR) stars was revealed (Grenon 1972, 1989, 1990, 1998, 2000). Optical spectra were obtained for 21 among the most metal-rich dwarfs of the sample, with the FEROS Spectrograph at the 1.52m telescope at ESO, La Silla. The total wavelength coverage is 3560–9200 Å with a resolving power R = 48,000.

The surface gravities $\log g$ were derived using *Hipparcos* parallaxes π with bolometric correction relations given in Alonso *et al.* (1995). The parameters $[T_{eff}, v_t]$ were obtained by fixing trigonometric surface gravities and imposing excitation equilibrium for Fe I lines and ionization equilibrium for Fe I and Fe II. Independence between equivalent widths and the abundances of Fe I lines was imposed to determine v_t. Derivations of metallicity were carried out through the Meudon code ABON2, and the code by the Uppsala group BSYN/EQWI. We are going through iterative checks, by computing FeI and FeII in the Sun, with both codes, and then for the stars, using the same tailored MARCS models. The codes are found to generate similar results, although some minor differences, which are not expected to affect the present results, are still being explored. The comparison, and more abundance results will be presented by Trevisan *et al.* (2009, in prep.). Lithium abundances were derived from the LiI 6707.8 Å line for the sample stars, by fitting the synthetic to the observed spectra. The spectrum synthesis code is described in Cayrel *et al.* (1991) and Barbuy *et al.* (2003). Photospheric 1D models for the sample were extracted from the MARCS grid (Gustafsson *et al.* 2008).

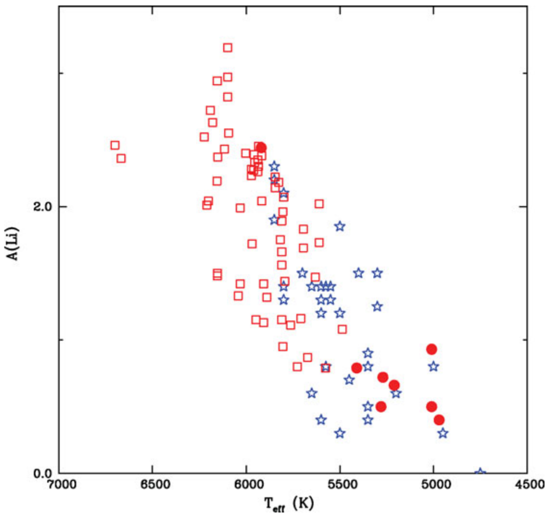

Figure 1. Log (Li/H) vs. effective temperature for the sample stars (red filled circles), compared with data for another sub-sample of bulgelike SMR stars by Pompéia *et al.* (2002) (open stars), and the metal-rich open cluster M67 (open squares, with results from Jones *et al.* (1999).

Comparisons are presented in Fig. 1 with the results by Pompéia *et al.* (2002), obtained for another sub-sample of bulgelike dwarfs, therefore compatible in terms of age and kinematics with the present sample, and with M67, a metal-rich open cluster of 4.5 Gyr, with data from Jones *et al.* (1999). Jones *et al.* had also shown that older stars deplete their Li with time, and it is more efficient in the cooler stars.

In conclusion, lithium abundances in our sample of very metal-rich stars are somewhat higher than in M67, and those found by Pompéia *et al.* (2002) for similar stars. One star HD 90054 shows a high Li abundance, compatible with being the hottest star of the sample.

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