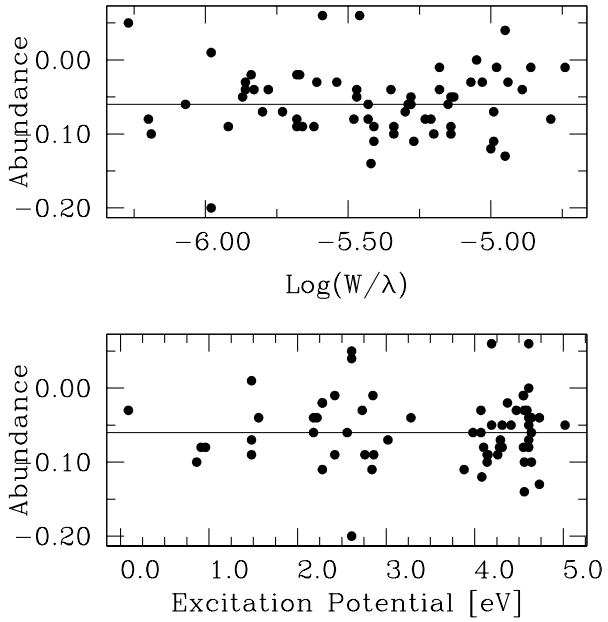

Fig. 2. Plots of abundance vs. excitation potential and abundance vs. $\log_{10}(W/\lambda)$ (logarithm of the reduced equivalent width) for HD 106252.

(2007) and Sozzetti et al. (2009) using essentially the same method are systematically lower (∼0.10 dex) than those derived by Ammler-von Eiff et al. (2009). The authors also mention differences in temperature (∼100 K) and gravity (∼0.15 dex) due to possible systematic differences between the works, and they note that the origin of the abundance discrepancies is usually unidentified.

We compare the parameters derived using FUNDPAR and those from the literature (Gonzalez 1997, 1998; Gonzalez et al. 1999; Santos et al. 2000; Gonzalez & Laws 2000; Gonzalez et al. 2001; Laws & Gonzalez 2001; Laws et al. 2003). We select these works in particular because they present the Fe equivalent widths: we use the same values with FUNDPAR. In the Table 4 we show the $T_{\rm eff}$, $\log g$, [FeI/H] and ξ obtained. Some stars in the table are listed twice (they are identified with a subscript) because we have different equivalent width sources in the literature. The sources of the equivalent widths are listed in the Table 4 as R1,...,R8.

We show in Figure 2 an example of plots of abundance vs. excitation potential and abundance vs. $\log_{10}(W/\lambda)$ (logarithm of the reduced equivalent width) for HD 106252. In Figure 3 we present the difference between FUNDPAR parameters and literature values (y axis, Δ=FUNDPAR-literature) vs. literature values (x axis). The empty point in Figure 3 corresponds to the star HD 38529, and shows that the slopes, metallicities and χ^2 values for this object should be taken with caution. The derived parameters of this star are based only on 3 FeII lines (and 24 FeI lines). In the literature, some values of $T_{\rm eff}$, $\log g$ and ξ have been rounded to within 50 K or 10 K, 0.05 dex and 0.1 km s^{-1}, respectively (see, for example, Gonzalez 1997, 1998; Gonzalez et al. 1999). There is a good agreement between FUNDPAR parameters and previous values from the literature, within the errors, which is expected since FUNDPAR uses a very similar method. However, Figure 3 shows that there is a dispersion in the values of the parameters (particularly $\log g$ and ξ) and probably a systematic trend for the metallicity (∼0.01 dex below literature values, see next discussion). The values of $\Delta T_{\rm eff}$ and $\Delta \log g$ also seem to slightly decrease with $T_{\rm eff}$ and $\log g$, respectively. The medians of the differences for the fundamental parameters compared to literature values are 24 K, 0.06 dex, 0.03 dex and 0.08 km s^{-1}, corresponding to $T_{\rm eff}$, $\log g$, [Fe/H] and ξ, respectively. The largest differences in the parameters amount to 118 K (16 Cyg B), 0.30 dex (HD 27442), 0.16 dex (16 Cyg B) and 0.31 km s^{-1} (47 Uma), corresponding to $T_{\rm eff}$, $\log g$, [Fe/H] and ξ, respectively.

Now we discuss the possible origin of the dispersions and probable trends observed in Figure 3. We tested FUNDPAR significantly modifying the values of the weights w_1,...,w_4 in the function χ^2 and verified that the difference in [Fe/H] compared with literature values and the dispersion of the other parameters change very slightly. Then the weights w_1,...,w_4 do not seem to be the cause. We use a method similar to that of the literature; however it is not totally identical. FUNDPAR uses Kurucz model atmospheres (Castelli & Kurucz 2003) different from those used in the literature (most of them date from before the creation of the ODFNEW models). The code uses model atmospheres derived by ATLAS with ODFNEW opacities and solar abundances from Grevesse & Sauval (1998) instead of Anders & Grevesse (1989). The new models present differences compared to older Kurucz models (Kurucz 1990), such as the solar abundances, the replacement of TiO and H_20 molecular lines, some HI quasi-molecular absorptions, etc. which are taken into account in the NEWODF opacities. Preliminary improvements are the $U-B$ and $u-b$ color indices for $T_{\rm eff} < 6750$ K, all color indices for cooler stars, and the better modeling for the upper layers of cool and giant stars (Castelli & Kurucz 2003). In this example, the model atmospheres are computed with con-