Setting the scene for Gaia and LAMOST
Proceedings IAU Symposium No. 298, 2013
S. Feltzing, G. Zhao, N. A. Walton & P. A. Whitelock, eds.

doi:10.1017/S1743921313007023

Testing SME determination of stellar parameters

T. A. Ryabchikova[1], L. I. Mashonkina[1], A. R. Titarenko[2,1], S. A. Alexeeva[1], Yu. V. Pakhomov[1], N. E. Piskunov[3], T. M. Sitnova[2,1] and B. A. Nizamov[2]

[1]Institute of Astronomy of Russian Academy of Sciences
117019, Pyatnitskaya st, 48, Moscow, Russia
email: ryabchik@inasan.ru

[2]Department of Astronomy, Physics Faculty, M.V. Lomonosov Moscow State University,
119991, GSP-1, Vorobievy Gory, Moscow, Russia

[3]Dept. of Astronomy & Space Physics, Uppsala University,
Box 516, SE-75120 Uppsala, Sweden

Abstract. We present the results of special tests of the automatic procedure for atmospheric parameters determination based on spectroscopy.

Keywords. stars: atmospheres, stars: fundamental parameters, methods: data analysis

1. Results

As a part of comparative abundance analysis of the stars hosting the planets (SHoP) special tests of the automatic procedure for atmospheric parameters determination based on spectroscopy were performed. The procedure employs SME (Spectroscopy Made Easy) spectral package (Valenti & Piskunov 1996). Tests include stars with the accurately known atmospheric parameters: Procyon, Sun and δ Eri (HD23249). The latter star belongs to the group of stars tested for Gaia project. Model parameters were derived by interpolation of MARCS plane-parallel grid of model atmospheres included in SME package. We substantially extended the spectral regions for fitting procedure employed in SME compared to previous studies. Four spectral regions 4485-4590, 5100-5200, 5600-5700 and 6100-6200 Å were fitted. This choice is defined by the presence of spectral features sensitive to different stellar parameters: molecular C_2 and MgH lines in 5100-5200 and 5600-5700 Å regions (C_2 Swan system) are sensitive to temperature; Mg Ib triplet lines at 5167-5183 as well as few Ca I lines in 6100-6200 region are sensitive to gravity; numerous Ti I/Ti II, Fe I/Fe II lines with accurate laboratory data in 4485-4590 and other spectral regions are sensitive to gravity through the ionization balance.

For all three stars the derived effective temperature $T_{\rm eff}$ may be overestimated by 50 K compared to that derived in the recent analyses made by standard spectroscopic or semi-automatic techniques, while $\log g$ agree within the cited errors. The derived parameters and metallicities are supported by the analysis of individual elements/ions C I - Zr I,II that includes NLTE effects for C I, O I, Na I, Mg I and Ca I. For both cool stars, Sun and δ Eri, carbon abundances derived from molecular lines agree within a few percent with the results obtained from 5052 and 5380 Å atomic lines.

References

Valenti, J. A. & Piskunov, N. 1996, *A&AS*, 118, 595