Astronomy Reports 2003 vol.47 N9, pages 750-762

Observational Constraints on Potassium Synthesis during the Formation of Stars of the Galactic Disk

Shimansky V., Bikmaev I., Galeev A., Shimanskaya N., Ivanova D., Sakhibullin N., Musaev F., Galazutdinov G.

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

The non-LTE potassium abundances in the atmospheres of 33 Galactic-disk stars are derived and the parameters of the atmospheres of 23 of the stars are determined. Neglecting departures from LTE results in a systematic overestimation of the potassium abundances and an increase in their dispersion, even for differential analyses relative to the Sun. The non-LTE corrections are significant ((-0.2)-(-0.6) dex) and depend on the surface gravities and effective temperatures of the stars. The mean potassium abundance for a sample of ten stars with [Fe/H] ~ 0.0 is in agreement with the solar and meteoritic abundances (log ε ⊙ (K) = 5.12). As the stellar metallicity increases from [Fe/H] = (-1.0) to (0.2) dex, the [K/Fe] ratio decreases systematically from 0.3 dex to -0.1 dex. The derived dependence [K/Fe]-[Fe/H] is in agreement with the results of published model calculations of the chemical evolution of the Galaxy. This indicates the dominance of explosive oxygen burning in massive type II supernovae during the synthesis of potassium in the Galactic disk. © 2003 MAIK "Nauka/Interperiodica".

http://dx.doi.org/10.1134/1.1611216