

## Chemical composition of 15 photometric analogues of the sun

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### Abstract

The results of a spectroscopic analysis of 15 stars that are photometric analogues of the Sun are reported. The effective temperatures and surface gravities in the stellar atmospheres are derived from published photometric indices and the HIPPARCOS parallaxes. The abundances of 33 elements ranging from lithium to europium are analyzed based on high-dispersion spectra taken with the new Coudé echelle spectrometer of the Terskol Observatory in the northern Caucasus. The main parameters of most of the stars agree with the data of an [Fe/H] catalog published in 2001. Our study of the chemical compositions of the sample stars indicates that photometric analogues of the Sun can be divided into three groups according to their elemental abundances: six stars have solar chemical composition, four have abundance excesses, and five have some abundance deficiencies. The sample contains two metal-deficient subgiants (HD 133002 and HD 225239). Our results demonstrate that photometric similarity is not a sufficient criterion to consider a star as solar analogue. When several criteria, including chemical composition, are simultaneously taken into account, only four stars from the sample can be considered true solar analogues: HD 10307, HD 34411, HD 146233 (18 Sco), and HD 186427 (16 Cyg B). These results confirm the previously published suggestion that 18 Sco is the most probable twin of the Sun: essentially all the parameters of the two stars coincide within the errors. © 2004 MAIK "Nauka/Interperiodica".

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