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ABSTRACT ONLY

DETAILED DIFFERENTIAL CHEMICAL ANALYSIS OF A POOR METAL STAR: NEW EVIDENCES ABOUT PLANET FORMATION

M. G. C. C. Carlos[1], A.C. Milone [1] and J. Meléndez[2]

The present project emphasizes on the study of metal-poor stars, with and without planets, to investigate the existence (or not) of a connection between anomalies in the chemical composition and the presence of planets by inspecting the high resolution spectra (R = 65 000), in order to derive chemical abundances with high precision using the differential technique. In this method, measurements of equivalent widths of the target star are compared to a standard star with predetermined photospheric parameters that are similar to those of the target star (effective temperature, surface gravity and metallicity). Therefore, we have compared the star HD111232 (standard) with HD020794, such that the first holds a hot Jupiter-type planet and around the second one there are three super-Earths. These solar-type stars are moderately metal-poor and had their spectra collected with the MIKE spectrograph at the 6.5m Magellan telescope in the Las Campanas Observatory. Among the main results, we have derived the classical photospheric parameters and chemical abundances of refractory and volatile elements with such a high precision, particularly with errors about 0.01 dex, which is essential for the study of chemical connection between planets and star. We have also added to the differential method the spectral synthesis of molecular bands and atomic lines to recover abundances of volatile elements such as carbon, nitrogen and oxygen. We thus present the parameters effective temperature, surface gravity, metallicity [Fe/H], microturbulence velocity and differential elemental abundances. For some elements, we have performed comparisons of the abundances measured by spectral synthesis with those obtained directly through measurements of equivalent widths. The results for differential abundance obtained from spectral synthesis for carbon is 0.04(7) dex, oxygen is 0.08(7) dex and nitrogen 0.12(14) dex.

[1] Divisão de Astrofísica, Instituto Nacional de Pesquisas Espaciaia, INPE, São José dos Campos, SP Brazil
[2] Universidade de São Paulo, USP Brazil