SYNTHETIC Mg_1, Mg_2 and Mgb INDICES

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A detailed study of strong spectral features is an important link between stellar spectroscopy and low-resolution spectroscopy or photometry of galaxies. The magnesium triplet at λ 517 nm is among the strongest features in the spectra of normal galaxies. A question arises regarding its use as a metallicity indicator for composite systems (e.g., Faber, 1973), given that it is also used as a gravity indicator for individual stars (Clark & McClure, 1979), indicating that the Mg feature shows a bi-parametric behaviour as a function of metallicity and gravity.

We have generated synthetic spectra in the wavelength region $\lambda\lambda$ 490-530 nm, for a grid of stellar parameters, in order to study the behaviour of the Mgb ($\lambda\lambda$ 516.2-519.3 nm), Mg_1 ($\lambda\lambda$ 507.1-513.4 nm), Mg_2 ($\lambda\lambda$ 515.6-519.7 nm), cf. Burstein et al. (1984) and the DDO "51" ($\lambda\lambda$ 490-530 nm) bandpasses, as a function of the stellar parameters effective temperature T_{eff}, gravity log g and metallicity [M/H].

Our calculations show that the Mgb and Mg_2 are practically insensitive to gravity, being very sensitive to metallicity, constituting therefore adequate metallicity indicators. Mg_1 and the DDO 51 filter on the other hand are sensitive to gravity, these indices showing a bi-parametric behaviour as a function of metallicity and gravity. The dependence of the indices as a function of temperature show otherwise a smooth increase for decreasing temperatures.

We conclude that the Mg_2 appears to be a trustful metallicity indicator, but the dependence of Mg_2 intensity as a function of metallicity for the metal-rich populations shows a non-linear behaviour.

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