

N16a **Line-depth Ratios of Red Giants in APOGEE *H*-band Spectra: the Metallicity Effect**

Mingjie Jian, Noriyuki Matsunaga (UTokyo), Kei Fukue (Kyoto Sangyo Univ)

Effective temperature ( $T_{\text{eff}}$ ) is of vital importance to determination of stellar parameters. Achievable accuracies of some methods are the order of 100 K, which is not high enough to trace small temperature variation such during the period of pulsation. With the Line-Depth Ratio method making use of high-resolution spectroscopic data, previous studies using optical spectra found that the accuracy can be as high as 5–10 K.

Ratio of carefully selected line depths are sensitive to  $T_{\text{eff}}$  of stars, and can also avoid some effect of continuum. With relation between line-depth ratio (LDR) and  $T_{\text{eff}}$  established, temperature can be determined precisely within tens of Kelvin. However, there can be residual metallicity effects on the LDRs, although not established before, which could diminish the accuracy of LDR- $T_{\text{eff}}$  relation. Here we quantify the metallicity effect to this relation using APOGEE *H*-band spectra as well as derived stellar parameters from APOGEE survey. Metallicity effect is confirmed, and neglecting this will introduce some amount of error ( 400K/dex). By comparing observed spectra with synthetic one, saturation of spectral line is found to be the reason causing this effect. Thus metallicity terms should be taken into account in order to achieve high accuracy.