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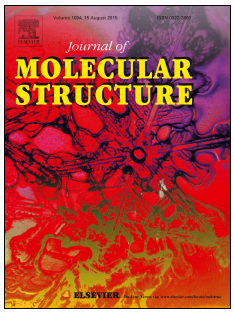

High-resolution infrared spectroscopy of field Red Horizontal Branch stars

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High-Resolution Infrared Spectroscopy of Field Red Horizontal Branch Stars

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Abstract

We obtained the surface abundances of more than 20 elements from H- and K-band observations of three Red Horizontal Branch (RHB) stars. High-resolution (R $\simeq$ 45,000) infrared spectra were obtained using IGRINS (the Immersion Grating Infrared Spectrograph) on the 2.7m Smith telescope at McDonald Observatory. IGRINS has the capacity of making simultaneous observations with a wavelength coverage of essentially the entire H- and K-bands (1.5 to 2.4 microns). High S/N (> 200) IGRINS data serve as a laboratory of molecular bands. A large number of OH, CO and CN molecular bands provided us invaluable information on the abundances of C, N and O, which can be altered as stars evolve from birth to death. OH bands confirmed and greatly strengthened the oxygen abundances previously measured from visible [O I] lines. Carbon and nitrogen abundances were determined from CO and CN molecular bands, respectively. IGRINS also made it possible to achieve more robust abundances of light elements such as Na, Mg, Al, and Si than obtained from their visible counterparts, and allowed S, P and K abundance determination mostly for the first time. Most importantly, we were able to detect ^{12}C/^{13}C isotopic ratios from the CO (2-0) and CO (3-1) band-heads present in the K-band, which give us

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