

From Interstellar Ices to Polycyclic Aromatic Hydrocarbons

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The survey of near-infrared diffuse interstellar bands

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Diffuse interstellar bands (DIBs) are ubiquitous absorption lines in the spectra of reddened stars, which originate from foreground interstellar clouds. Although the carriers of any DIBs have not been successfully identified yet, they are considered to arise from the gas-phase large-sized molecules, such as polycyclic aromatic hydrocarbons (PAHs), carbon-chain molecules, and fullerenes. We are conducting the first comprehensive survey of near-infrared (NIR) DIBs with the newly developed NIR high-resolution ($R=28,000$) spectrograph WINERED, which offers a high sensitivity in the wavelength coverage of 0.91-1.36 micron. Using the DIBs in the NIR wavelength range, it will become possible to investigate the behavior of the DIB carrier molecules in various environments, which will contribute to the identification of the DIB carriers. In our first results (Hamano et al., 2015), we successfully identified 15 new NIR DIBs in 0.91-1.36 micron, where only five fairly strong DIBs had been identified previously (Fig.1). We found that all of the NIR DIBs are moderately correlated with the reddening of the stars, but their correlation coefficients seem to be systematically lower than those of some representative optical DIBs, suggesting that the EWs of the NIR DIBs are affected by other physical parameters of intervening gas clouds, such as UV field, than the column density. In this conference, we will present some results of the NIR DIB survey.

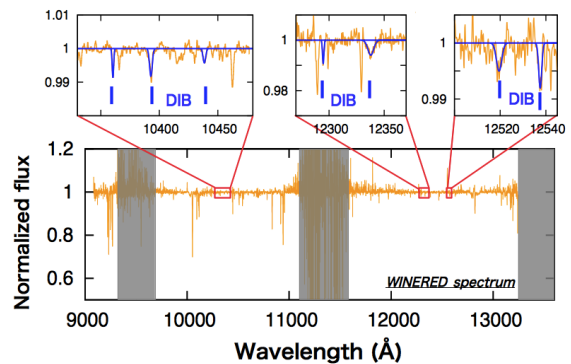


Figure 1: Some NIR DIBs found with WINERED.

REFERENCES

Hamano, S., Kobayashi, N., Kondo, S., et al. (2015) The Astrophysical Journal, 800, id. 137, 17 pp