P324a   Emission spectroscopy of the hot Jupiter KELT-2A b

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Exoplanetary atmospheric observations can reveal planetary formation locations (e.g., Oberg et al. 2010). Here, we present the high-resolution emission spectroscopy of the hot Jupiter KELT-2A b using IGRINS-2/Gemini-N. We process the time-series spectra following standard procedures using singular value deconvolution (e.g., de Kok et al. 2013). Through cross correlation analysis, we tentatively detect the planetary signal at $4.5\,\sigma$ with shifted K_{p} and v_{sys}, but still stretched to the expected values in the pre-eclipse phase. We confirm through injection recovery tests that the data has sufficient signal to detect the planetary signal. Atmospheric retrieval constrains non-inverted temeprature structure, $\log(H_2O) = -3.71^{+0.39}_{-0.25}$, $\log(^{12}CO) = -2.80^{+0.61}_{-0.47}$, and $\log(^{12}CO/^{13}CO) = 0.73^{+0.64}_{-0.53}$, corresponding to $^{12}C/^{13}C = 5.4^{+18}_{-3.8}$. This indicates ^{13}C enrichment compared to the local ISM value ($\sim$69), a super-stellar C/O ratio (C/O $= 0.91^{+0.05}_{-0.08}$), and stellar-to-super-stellar metallicity ($[(C + O)/H] = 0.52^{+0.59}_{-0.42}$).

The elevated metallicity and super-stellar C/O ratio can be explained by pebble drift and volatile sublimation across the CO snowline (e.g., Schneider and Bitsch 2021). The observed ^{13}C enrichment may suggest a similar formation environment (e.g., Yoshida et al. 2022, Lee et al. 2024, Bergin et al. 2024).