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Decoding Stellar Chemistry: The Impact of Non-Iron Metals on Exoplanet Formation and Characteristics

Stellar metallicity plays a key role in shaping the formation and evolution of planetary systems, but most studies have concentrated on overall [Fe/H] rather than the influence of individual elements. In this work, we explore how the abundances of metals beyond iron—specifically carbon, lithium, titanium, magnesium, nitrogen, and oxygen—in exoplanet host stars relate to planetary characteristics such as mass, radius, and orbital parameters. Using available spectroscopic data combined with exoplanet catalogs, we assemble a sample of host stars with measured abundances of these elements. Our analysis framework aims to investigate possible correlations between specific elemental enrichment and trends in planetary properties. Although this study is ongoing, the approach presented here is designed to provide new insight into the role of detailed stellar composition in planet formation and system architecture.

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