Analysis of Elemental Abundances in Transition Disk Post-AGB Binary Systems for Planet Formation

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Post-Asymptotic Giant Branch (post-AGB) binary star systems are surrounded by large disks of dust and gas (termed transition disk) that exhibit conditions reminiscent of young protoplanetary systems (planetary 'embryos') conducive to planet formation. This work aims to analyse if properties such as elemental abundances of the post-AGB star may correlate with planet occurrence established by previous photometric analysis. The spectroscopic data for the sample of all known galactic transition disk post-AGB binaries was assembled by data-mining various abundance studies. The stars categorised to contain planets were compared to the signatures of planet-containing stars within surveys conducted by the Kepler space telescope. Planet-containing galactic post-AGB binaries were found to exhibit higher median elemental abundances but lower metallicities ([Fe/H]) than the analysed population of galactic post-AGB binaries, contrasting with the well-established Planet-Metallicity Correlation - where higher metallicities correlated with planet formation. Furthermore, elevated abundances of elements such as carbon, silicon, sulphur, and manganese have also been observed within the planet-containing sample.