OFFICIAL ABSTRACT and CERTIFICATION

Category

Mathematics

A Mathematically driven physical analysis and confirmation study of exoplanet HD 189733 b and others in close-by star systems using principles of Machine Learning/Linear Algebra, Bayesian Statistical tests, and Computational Python Programming

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In this study, we examined the orbital periods and photometry of one exoplanet in the HD star system: 189733 b. We constructed a high caliber exoplanet transit detection tracker that acts as a means to analyze the data constituted of the Raw Science images that we obtained from a DSLR camera. We used the Lightkurve and BATMAN Python programming library to convert our data to light curves. The transit data was taken from multiple high precision research studies, such as the NASA exoplanet database, which were then converted to a graph portraying the dip in the host star's luminosity with respect to time. Linear Algebra-based Machine learning models were developed alongside Chi-square tests to examine the likelihood that observation was due to mere chance. We hypothesized that the creation of a DSLR camera exoplanet detector would produce results that support other results. The results of our studies were statistically significant and supported our hypothesis.

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check ALL that apply):
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