Classification of a Newly Devised Orbital Model: Constructing a Simple Mathematical Model to Calculate Distances to Celestial Bodies and Testing the Model against the Possibly Extant Triple Star System G41-14ABC

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The purpose of this project was to confirm whether triple star system G41-14ABC is indeed a triple star system using trigonometric parallax and mathematical models. My hypothesis was that if G41-14ABC is truly a triple star system, then, if the trigonometric parallaxes of each of the three stars in the star system are calculated, the parallaxes should all be within a one percent difference. The independent variable in this experiment was measured to be the time observed, the dependent variable was the right ascensions of the targets, and the control was the same procedure performed on a different star system. Data taken from images was analyzed using Astrometrica. A plot of the right ascension versus time was created and analyzed. The plot differed from what was expected. The expected graph was a sine wave with a period of one year but rather a low correlation graph was generated. To confirm that the method used was valid, a mathematical model of the distances between the Sun, the Earth, and the targets was created. The spherical coordinates of the Sun and the targets were converted into Cartesian coordinates. With the Cartesian coordinates calculated, a baseline distance was calculated using cross products. Graphs of expected and observed right ascension of targets versus time was created and although the graphs were consistent, more data will need to be analyzed to officially determine whether or not the model that was used in this research can concretely identify triple star systems and to confirm the hypothesis.

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