

Abstract Submitted
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Binary Stars in Planetary Nebulae and the Origins of Temperature Fluctuations CRISTIEN ARZATE, Physics Undergraduate Student, Western Michigan University, MANUEL BAUTISTA, Associate Professor of Physics, Western Michigan University, EHAB ELHOUSSENY, Physics Graduate Student, Western Michigan University — Planetary nebulae are aging stars in the process of becoming supergiants surrounded by a sphere of expanding gas plasma. Certain observed planetary nebulae exhibit temperature fluctuations that are unexplained by current models, which assume that the nebulae are in a steady-ionization state by UV radiation from a single central star. We propose that the observed temperature fluctuations are caused by an eclipsing binary star system, such that UV radiation is not constant and the conditions of the plasma are time-dependent. Our model simulates conditions that produce ionization intensities from HII, HeII, NII, OIII, and SIII that vary with time. By comparing the intensities produced by our model to intensities observed astronomically, we expect to resolve the origin of the observed temperature fluctuations.

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