

Abstract Submitted
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Investigation of Carbon Abundance in the Crab Nebula¹ ANDREA KATZ, TIMOTHY SATTERFIELD, GORDON MACALPINE, Trinity University — As part of a larger program to map elemental distributions in the Crab Nebula supernova remnant, we have carefully investigated the [CI] 9850 emission line as a means for measuring the gaseous carbon mass fraction. Knowledge of the amount of carbon is necessary for understanding the progress of nucleosynthesis in the gas. Whereas this near-infrared line is very weak and not used for abundance determinations in most astronomical nebulae, it is “anomalously” strong in the Crab Nebula. In order to determine whether or not [CI] 9850 is a reliable indicator of carbon abundance, we employed a numerical photoionization code to examine the dependence of [CI] 9850 emission on various factors, including carbon, helium, nitrogen, and oxygen abundances. We also varied the ionization parameter and hydrogen density to gain insight regarding the huge difference in strength of this line in other types of objects. Our calculations show that [CI] 9850 is a robust indicator of carbon abundance in the Crab Nebula, where it is visible because of a high helium mass fraction and a low ionization parameter, which are not found in other nebulae.

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Dennis Ugolini
Trinity University

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