Abstract Submitted
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Laboratory Spectra of Carbon-Atmosphere White Dwarfs with Implications for Type Ia Supernovae[1] BART DUNLAP, MIKE MONTGOMERY, PATRICIA CHO, DON WINGET, University of Texas at Austin, MARC SCHAEUBLE, TAISUKE NAGAYAMA, THOMAS GOMEZ, Sandia National Labs — White dwarf stars with carbon-dominated atmospheres (the hot DQs) likely form from the merger of two white dwarfs. In some cases, such mergers end explosively as type Ia supernovae, which are important as cosmological distance probes, but the conditions for detonation are unclear. A better understanding of the hot DQs, therefore, has potential to clarify a key process relevant to cosmology. In particular, existing astronomical spectra of the hot DQ stars could be used to derive a mass distribution, which might reveal a cutoff mass beyond which mergers explode. These spectra could also enable mass-radius determinations, which might indicate core compositions resulting from nuclear burning in a merger. These goals hinge on the ability of spectral models to deliver accurate surface gravities. However, these models have not been vetted against laboratory data, and the input C II line broadening remains uncertain. We have, therefore, begun a series of experiments on the Z machine at Sandia National Laboratories to test these models and have successfully measured carbon plasma in emission and absorption at the temperatures and densities of hot DQ photospheres. We will present the early results of this work and discuss future directions.

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