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Hot and Massive White Dwarfs: importance of general relativity and nuclear reactions in their structure and stability

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The structure and stability of hot and massive white dwarfs against radial oscillations, pycnonuclear reactions, and inverse β -decay are investigated. We find that the temperature produces important effects on the equilibrium and radial stability of white dwarfs. The stable equilibrium configuration results are compared with those for white dwarfs estimated from the Extreme Ultraviolet Explorer survey and the Sloan Digital Sky Survey. We derive masses, radii, and central temperatures for the most massive white dwarfs according to the surface gravity and effective temperature reported by the surveys. We note that these massive stars are in the mass region where general relativity effects are important, and also near the threshold of instabilities due to radial oscillations, pycnonuclear reactions, and inverse β -decay. Regarding the radial stability of these stars as a function of the temperature, we find that it decreases with the increment of central temperature.

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