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Charged polarized white dwarfs with finite temperature as a possible source of type Ia supernovae

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In this work, we investigate the structure of polarized charged white dwarfs (WDs) with finite temperature as a possible type Ia supernovae source. The WD is considered with an isothermal core and an envelope where there is a temperature distribution that depends on the density. Regarding the hot fluid, we assume that it is composed of nucleons and electrons with temperature contributions. The structure of the polarized charged white dwarfs is obtained by solving the Einstein-Maxwell equations with charge densities represented by two Gaussians, forming an electric dipole layer at the stellar surface. We obtain larger and more massive white dwarfs when polarized charge and the Gaussians distance are increased. We found that to appreciate effects in the white dwarf's structure, the electric polarized charge must be in the order of 5.0×10^{20}[C]. We obtain a maximum white dwarf mass of around $2M_{\odot}$ for a polarized charge of 1.5×10^{21}[C]. These results could indicate polarized charged white dwarfs as possible progenitors of superluminous type Ia supernovae. Furthermore, we show that the curves we obtain are very similar to the ones of strongly magnetized white dwarfs obtained recently.

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