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Study the effects of anisotropy on the highly magnetized white dwarfs

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The equilibrium configuration of white dwarfs composed of anisotropic fluid distribution in the presence of a strong magnetic field is investigated in this work. By considering a functional form of the anisotropic stress and magnetic field profile, some physical properties of magnetized white dwarfs, such as mass, radius, density, radial and tangential pressures, were derived; their dependency with the anisotropy and central magnetic field is also explored. We show that the orientations of the magnetic field along the radial direction or orthogonal to the radial direction influence the stellar structure and physical properties of white dwarf significantly. Importantly, we show that ignoring anisotropy governed by the fluid due to its high density in the presence of a strong magnetic field would destabilize the star. Through this work, we can explain the highly massive progenitor of peculiar over-luminous SNeIa, and low massive under-luminous SNeIa, which poses a question of considering 1.4 solar mass white dwarf to be related to the standard candle.

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