International Conference on Recent Issues in Nuclear and Particle Physics (RINP2)

Contribution ID: **8** Type: **not specified**

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ABSTRACT
White dwarfs are remnant of sun like stars which now a day is used as an astrophysical observatory. When nuclear fuel undergoing hydrogen fusion in the stellar core gets exhausted, the remnant of the core is supported with pressure provided by a gas of degenerate electrons. This degenerate pressure balances the self gravitation of the star and stops further collapsing. There may be a mixture of non relativistic and relativistic electrons. In this work we have attempted to find a transition density of the remnant core by merging the non relativistic and relativistic limit. Here we have employed an empirical relation showing variation of star density with corresponding radius. Using hydrostatic equilibrium equation of star along with our empirical relation and transition density as mentioned before, limiting mass of a white dwarf to retain permanently is calculated with different composition of the white dwarf. If the white dwarf is composed with helium core only, transition density comes out to be 2.556×〖10〗ˆ9 Kg/mˆ3 and the corresponding limiting mass of the white dwarf comes out to be 1.558 solar mass with radius being 8979.4 Km. Almost 90 years back S.Chandrasekhar established a mass limit of white dwarf as 1.4 solar mass to retain its stability. But he had not mentioned the actual composition of a white dwarf in his work. This mass limit is expected to be changed with different composition of the core remnant of white dwarf. This limit should also depends on whether degenerate electrons are relativistic or non relativistic. We have also calculated the same for a white dwarf to be composed with carbon and other heavy elements. If the temperature of the core is sufficiently high then further fusion reaction like triple alpha may produce carbon and oxygen. For a white dwarf composed with carbon and other heavy elements the limiting mass of the white dwarf is calculated as 0.693 solar mass. This approximates the result obtained by Oppenheimer and Volkov to find the maximum mass of a neutron star as 0.7 solar mass to retain permanently. Actually neutron star might be formed only when the core remnant contains heavy element above carbon. The result obtained by Oppenheimer and Volkov might be the lowest mass limit of a neutron star. So, the result of this work can be correlated easily both with Chandrasekhar and Oppenheimer prediction of mass limit of white dwarf and neutron star respectively.

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