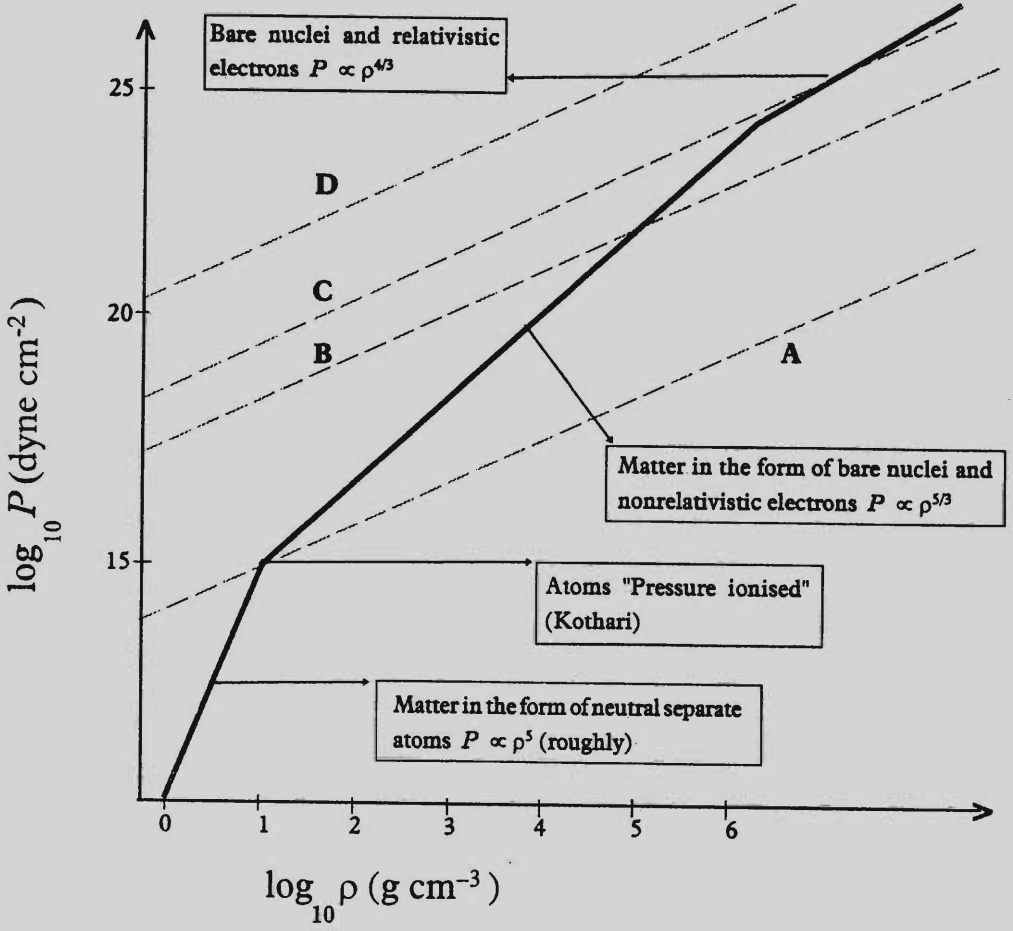

The solid line shows schematically the pressure-density relationship for cold matter. The dashed lines show the pressure P_g needed to balance gravity in a body of mass M and radius R as a function of its density ρ. Intersection with the solid line is the condition for equilibrium $P_g \propto (\frac{GM^2}{R^2}) / R^2 = \frac{GM^2}{R^4}$. Since $\rho \propto M/R^3$, $P_g \propto \rho^{4/3}$.

P_g vs ρ is shown for four cases

(A) Jupiter; (B) A white dwarf of mass < 1.4 solar masses; (C) A white dwarf of mass nearly 1.4 solar masses. Notice that the equilibrium occurs at a very high density, i.e. very small radius; (D) A cold body of mass >1.4 solar masses. No equilibrium is possible at any radius.

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