













Pressure: nonrelativistic gas $P = nkT = \frac{kT}{V}$ and $E_{kin} = \frac{3}{2}kT$ $\Rightarrow P = \frac{2}{3}\frac{E_{kin}}{V}$.So the gravitational and kinetic energies arerelated by : $2E_{kin} + E_{grav} = 0$ and the total energy of the system is $E_{tot} = -E_{kin} = \frac{1}{2}E_{grav}$.Fundamentally important result!Means that tightly bound systemsin hydrostatic equilibrium havehigh particle KE, i.e. they're HOT.



