

**[tex66] Interaction pressure produced by Gaussian interparticle potential**

Consider a dilute gas of density  $n$ , where the particles interact via a Gaussian central-force potential,  $\phi(r) = \phi_0 e^{-r^2/a^2}$ , with  $\phi_0 = 1\text{eV} = 1.6 \times 10^{-19}\text{J}$ ,  $a = 2 \times 10^{-10}\text{m}$ .

(a) Calculate the interaction pressure  $p_{int}$  under the assumption that the particles are distributed randomly in space. Express the result as a function of  $\phi_0, n, a$ .

(b) Compare the interaction pressure  $p_{int}$  with the kinematic pressure  $p_{kin}$  for a dilute gas at  $T = 293\text{K}$  and  $n = 2.7 \times 10^{25}\text{m}^{-3}$ .

**Solution:** [Garrod, p. 353]