$u_m = m \quad u_v = \sqrt{u_E / u_m}$

$u_T = u_E / k_B$

$\vec{v} = (v_0, 0, 0)$

$$E = \sum_i \frac{1}{2} m v_i^2 = \frac{Nm}{2} v_0^2 = E_0$$

$$v_0 = \sqrt{\frac{2E_0}{Nm}}$$

$$v_0^* = \frac{v_0}{u_v} = \sqrt{\frac{2E_0}{Nm u_v^2}} = \sqrt{\frac{2E_0}{N \cancel{m} u / \cancel{u_m} E}} = \sqrt{\frac{2E_0^*}{N}}$$

$$p^* = \frac{p}{u_p} = \frac{\cancel{m} v}{\cancel{u_m} u_v} = v^*$$

$$E_i = \frac{p_i^2}{2m}$$

$$\frac{E_i}{v_E} = E_i^* = \frac{p_i^2}{2 v_E v_m}$$

$$v_p = v_m \sqrt{\frac{v_E}{v_m}}$$

$$v_p^2 = v_m \frac{v_E}{v_m} = v_m v_E$$

$$E_i^* = p_i^2 / 2$$

$$E_i' = \frac{(\vec{p}_i + d\vec{p}_i)^2}{2} \qquad E_i = \frac{\vec{p}_i^{\,2}}{2}$$

$$dE_i = E_i' - E_i = \frac{p_i^2 + 2\vec{p}_i \cdot d\vec{p}_i + dp_i^2 - p_i^2}{2}$$