[tex62] Ideal gas atoms escaping from a container I

A large vessel of volume $V$ contains $N$ atoms of a classical ideal gas in thermal equilibrium at temperature $T$.

(a) Find the rate $dN/dt$ at which the number of particles in the vessel decreases as atoms escape into the vacuum through a tiny hole of area $A$ in a wall.

(b) Find the rate $dE/dt$ at which energy is exported by the escaping atoms.

(c) If the wall with the hole is perpendicular to the $z$-axis, find the distribution $f_{esc}(v_x, v_y, v_z)$ for the atoms that have escaped.

Solution: