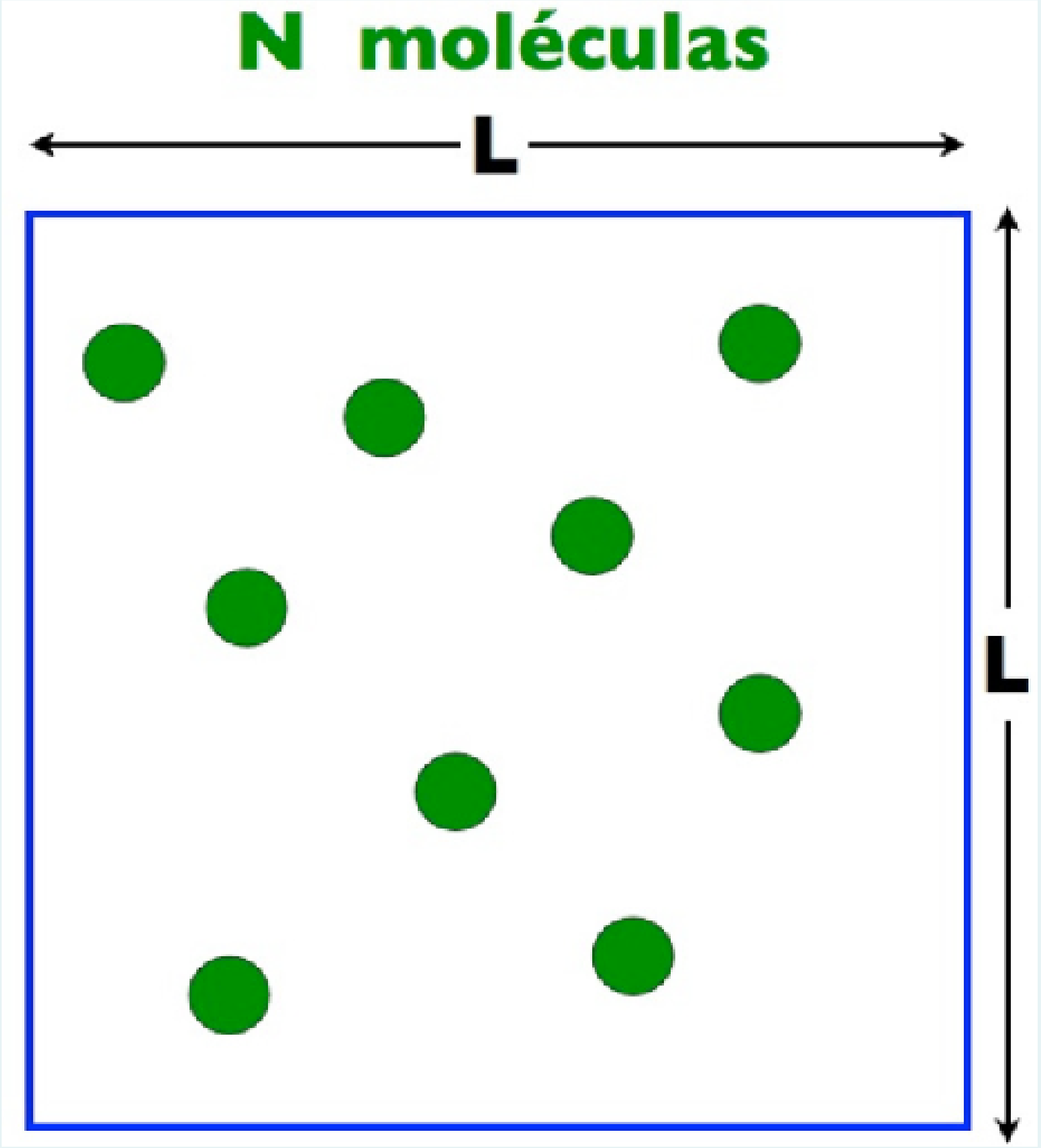
Considere un gas ideal bidimensional de N partículas indistinguibles que se mueven dentro de un cuadrado de lado L, como muestra la figura.



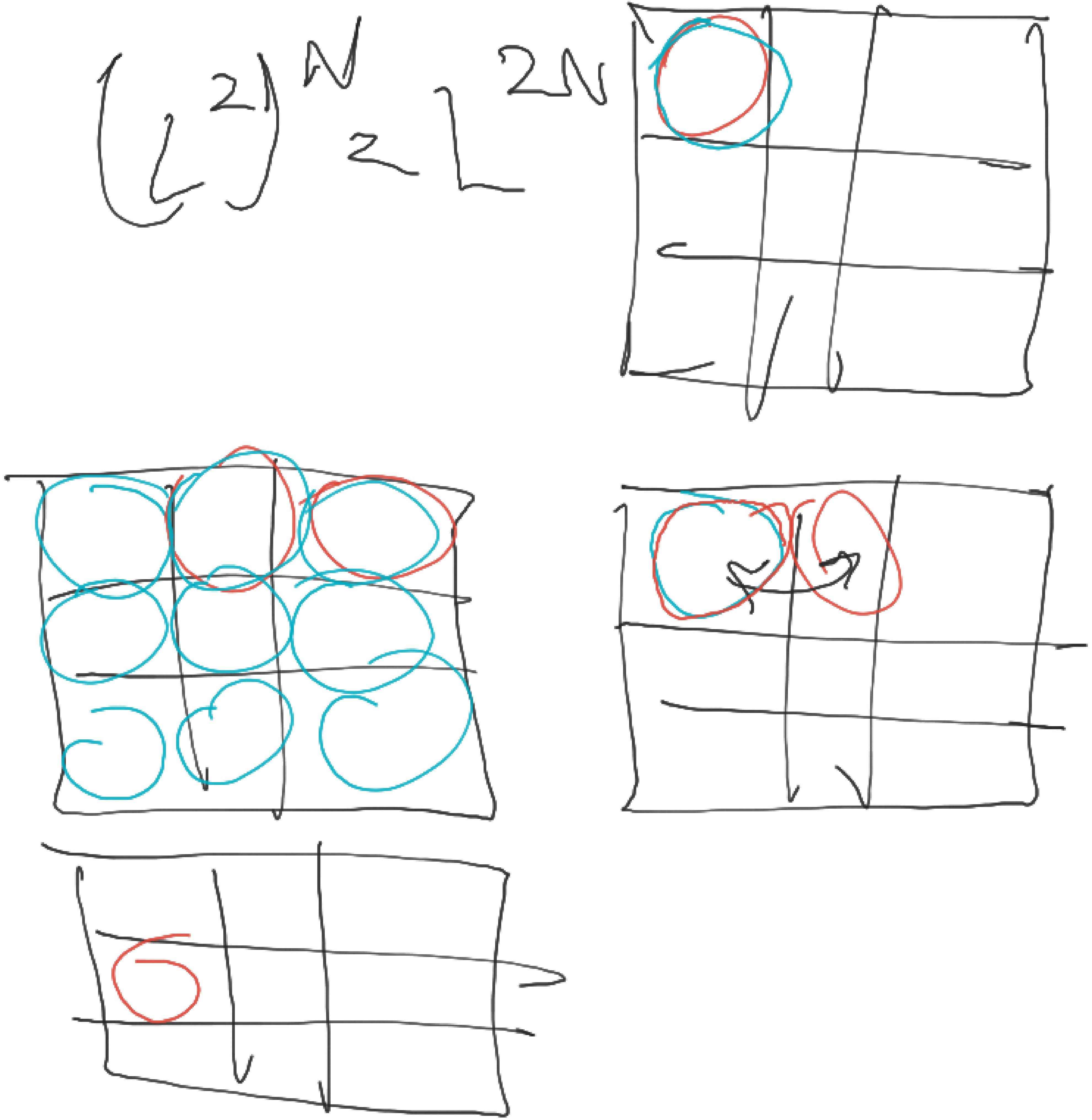
Recordando que el volumen de una esfera de D dimensiones es

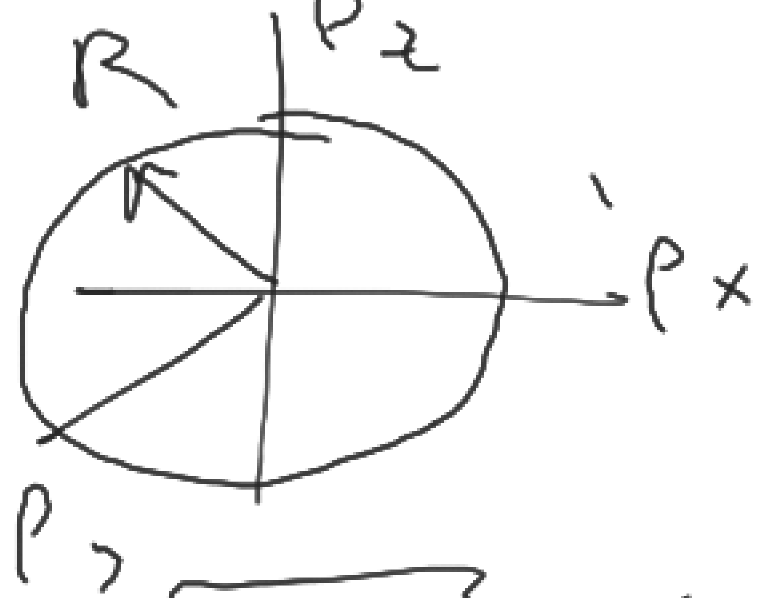
$$V_D(R) = \frac{\pi^{D/2}}{\Gamma\left(\frac{D}{2}+1\right)} R^D$$

El número de estados con energía entre E y E+ Delta E es:

Seleccione una:

$$(L^2)^N = L^{2N}$$





$$L^{2N}$$

$$p^2 = p_x^2 + p_y^2$$

$$R = \sqrt{2mE} \Leftarrow E = \frac{p_x^2}{2m} + \frac{p_y^2}{2m} = \frac{p^2}{2m}$$

$$\Sigma = \frac{\left(L^{2N}\right)\left(V_{D=2N}\left(\left(2mE\right)^{1/2}\right)\right)}{N!}$$

$$\Sigma = \frac{L^{2N} \cdot V_{D=2N}\left((2mE)^{1/2}\right)}{N!}$$

$$\Rightarrow \sum_{\substack{\text{Todas las} \\ \text{energias}} \leq E} = L^{2N}\left(\frac{\pi^N (2mE)^N}{\Gamma(N+1)}\right)$$

$$\Rightarrow \frac{1}{N!}\frac{\partial \Sigma}{\partial E}\frac{\Delta E}{h^{2N}} = \frac{\partial}{\partial E}\left(\frac{L^{2N}(2\pi m)^N E^N \Delta E}{h^{2N}\, N!\, \Gamma(N+1)}\right)_{E, E+\Delta E}$$

$$\Gamma(N+1) = N!$$

$$\Omega = \frac{L^{2N}(2m\pi)^N E^{N-1}}{h^{2N} N!\,(N-1)!}\,\Delta E$$

$$\Omega = \frac{1}{N!}\frac{\partial \Sigma_1}{\partial E}\,\Delta E$$