

Une seule particule dans une boîte

$$L \times L \times L = V$$

Vitesse = u

Composants de la vitesse: $u_x = u_y = u_z$

F_x = (force sur les parois normales à la direction x)

= $d(mu_x)/dt$ = (changement de la quantité de mouvement par collision avec les parois) \times (nombre de collisions par seconde)

$$= (2mu_x) \cdot (u_x/L)$$

$$P_x = \frac{F_x}{A_x} = \left(\frac{2mu_x^2}{L} \right) / 2L^2 = mu_x^2/V$$

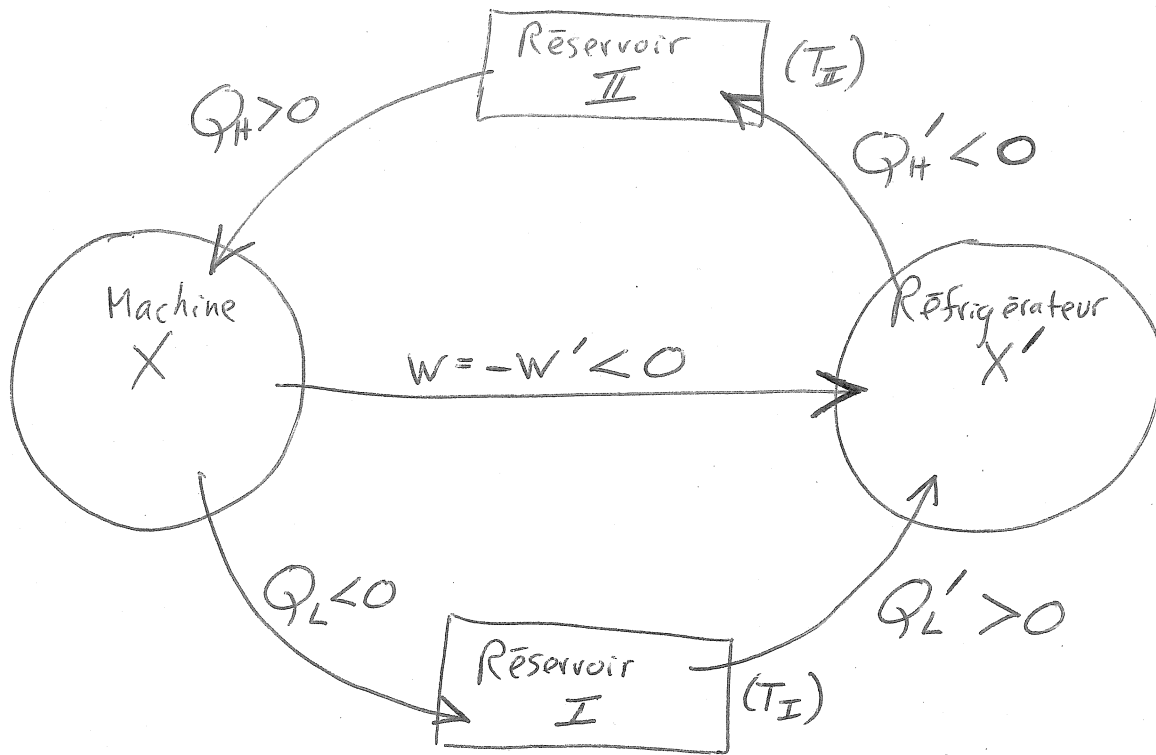
Mettons: $kT \equiv mu_x^2$ où: k = constante de Boltzmann

$$P_x = kT/V = (\text{pression d'une seule particule})$$

Nombre de particules = $n \cdot N_{\text{Avogadro}}$

$$P = \frac{kT}{V} (N_{\text{Avogadro}} \cdot n)$$

$$PV = nRT \quad \underline{\text{où}}: R \equiv k \cdot N_{\text{Avogadro}}$$



$$(T_{II} > T_I)$$

Pour chaque cycle:

$$\begin{cases} \Delta U = 0 & W = -(Q_H + Q_L) \\ \Delta U' = 0 & W' = -(Q_H' + Q_L') \end{cases}$$

Supposons que $\left(\frac{Q_H}{T_{II}} + \frac{Q_L}{T_I}\right) = \Delta S = 0$

Mais $\left(\frac{Q_H'}{T_{II}} + \frac{Q_L'}{T_I}\right) \neq 0$

Donc: $Q_L \left(\frac{-T_H}{T_L} + 1\right) \neq Q_L' \left(\frac{-T_H}{T_L} + 1\right)$
 $Q_L \neq Q_L'$

Supposons: $|Q_L| < |Q_L'|$

Ensuite $(Q_L + Q_L') > 0$ et $(Q_H + Q_H') < 0$

c.à.d. $|Q_H| < |Q_H'|$

Donc: la chaleur est pompée spontanément du réservoir I jusqu'au réservoir II

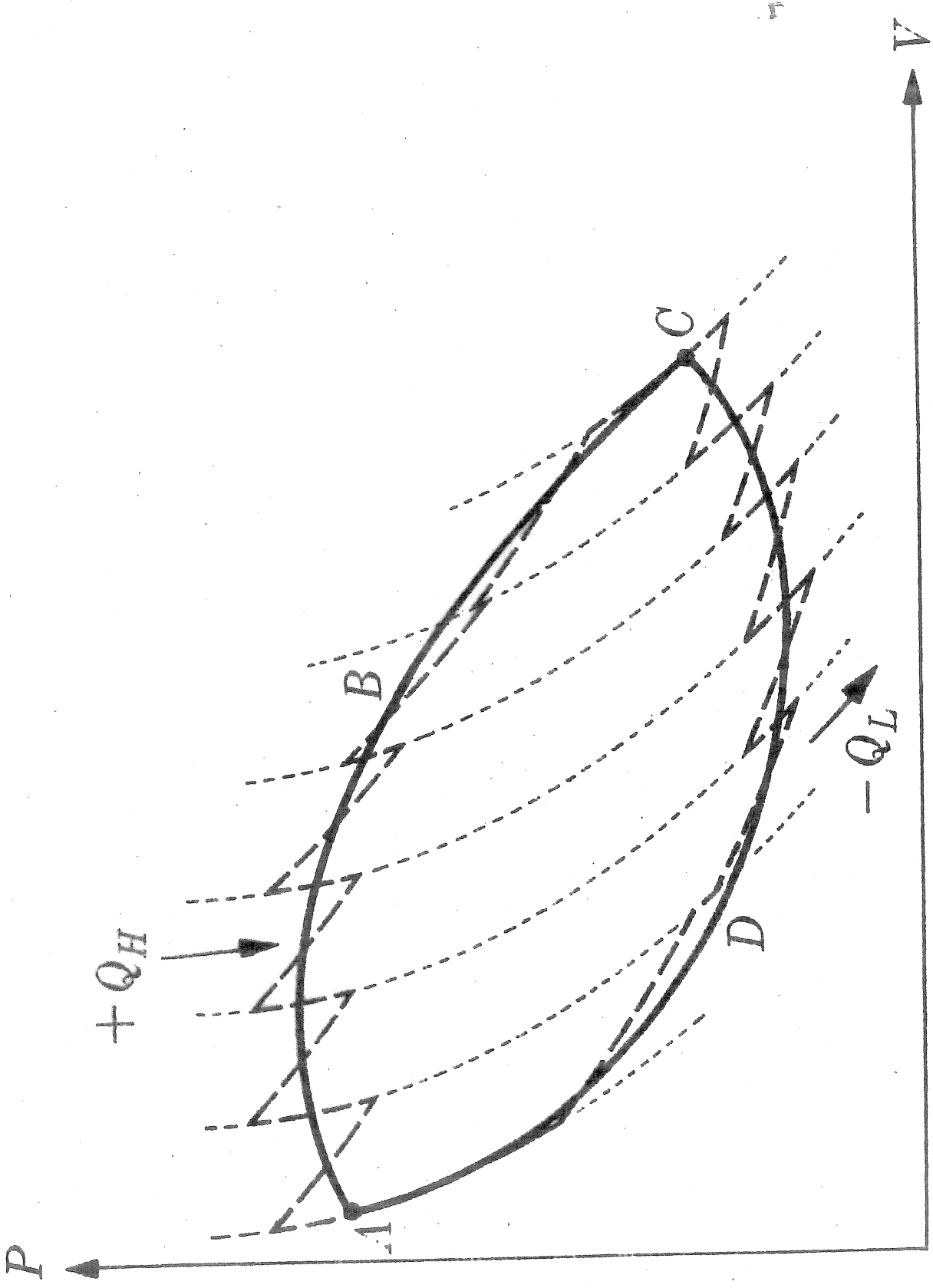


FIGURE 29

**Table of International Temperature Scales
of ITS-27, ITS-48, ITS-68 and ITS-90**

$t_{27}(^{\circ}\text{C})$	$t_{48}(^{\circ}\text{C})$	$t_{68}(^{\circ}\text{C})$	$t_{90}(^{\circ}\text{C})$
600.0	599.9	600.1	599.9
700.0	700.2	700.6	700.8
800.0	800.4	801.1	801.4
900.0	900.4	901.4	901.4
1000.0	1000.2	1001.4	1001.3
1100.0	1099.9	1101.4	1101.4
1200.0	1199.5	1201.2	1200.9
1300.0	1299.0	1300.8	1300.8
1400.0	1398.5	1400.5	1400.5
1500.0	1497.5	1499.7	1499.7
1600.0	1597.0	1599.4	1598.9
1700.0	1696.5	1699.1	1698.6
1800.0	1795.5	1798.3	1797.7
1900.0	1894.5	1897.5	1896.8
2000.0	1993.5	1996.7	1996.0
2100.0	2092.5	2096.0	2095.2
2200.0	2191.5	2195.2	2194.4
2300.0	2290.5	2294.5	2293.6
2400.0	2389.5	2393.7	2392.7

2500.0	2488.0	2492.5	2491.4
2600.0	2586.8	2591.6	2590.4
2700.0	2685.5	2690.5	2689.3
2800.0	2784.0	2789.3	2788.0
2900.0	2882.5	2888.1	2886.7
3000.0	2981.0	2986.9	2985.4

* Data for $t_{27} \leftrightarrow t_{48}$ are from British Journal of Applied Physics, Vol. 1. No. 4, April 1950, P81-86.

Data for $t_{48} \leftrightarrow t_{68}$ are from Metrologia 12, 7-17 (1976).

Data for $t_{68} \leftrightarrow t_{90}$ are from Metrologia 27, 3-10 (1990).