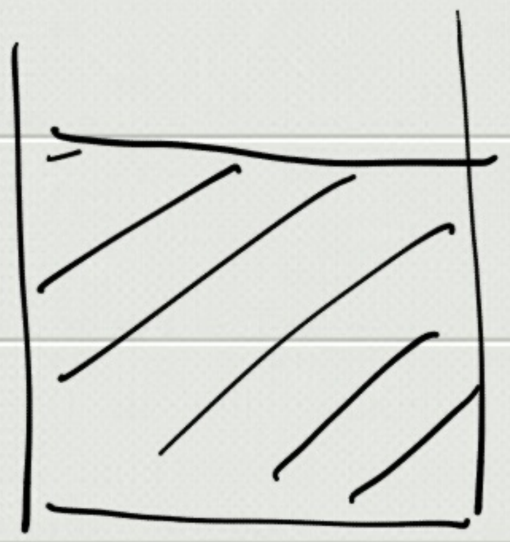
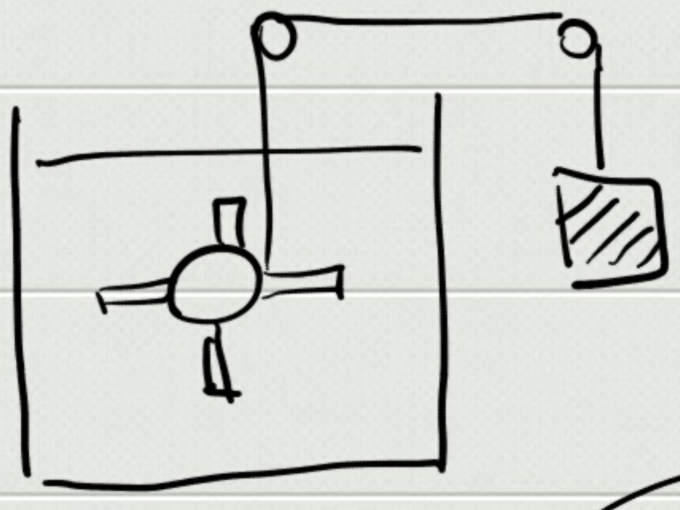
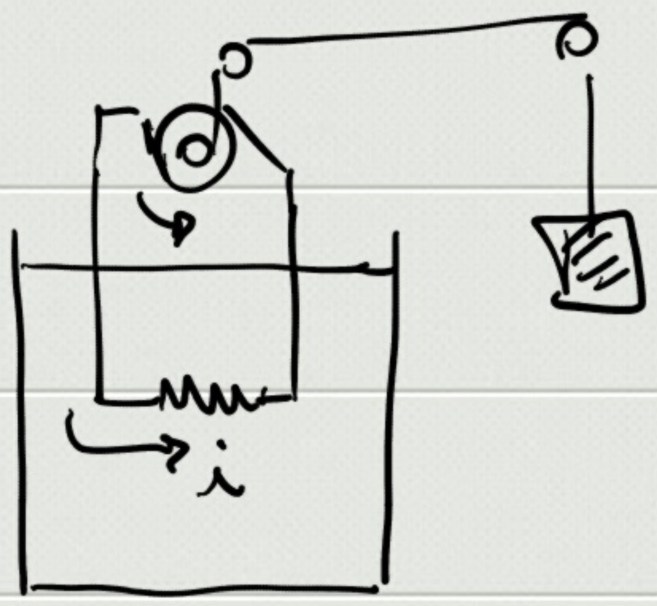
$i \to f$ $\qquad W_{i\to f} = \int_i^f p(V,T)\, dV \qquad (\Rightarrow \delta W)$

(transf. quasi-statica)

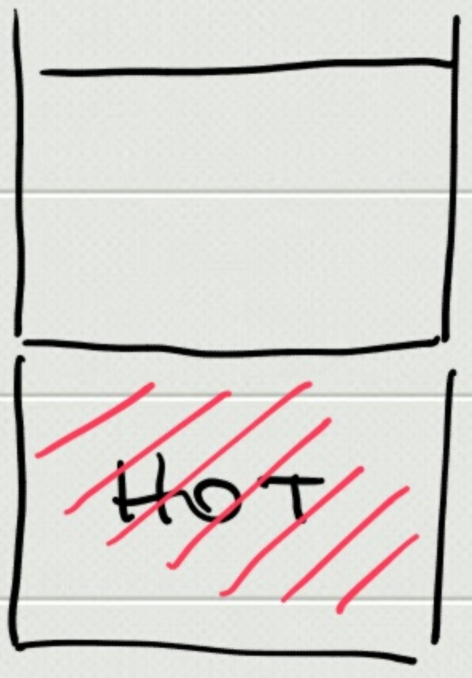


$T_i \to T_f$

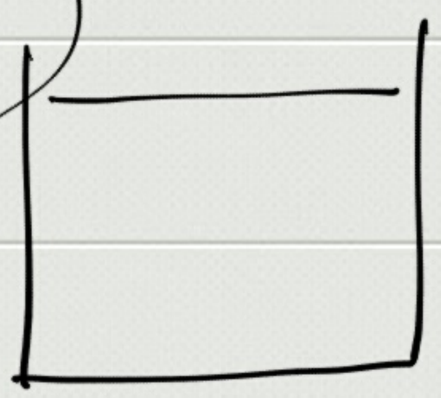




lavoro



$T_i \to T_f$

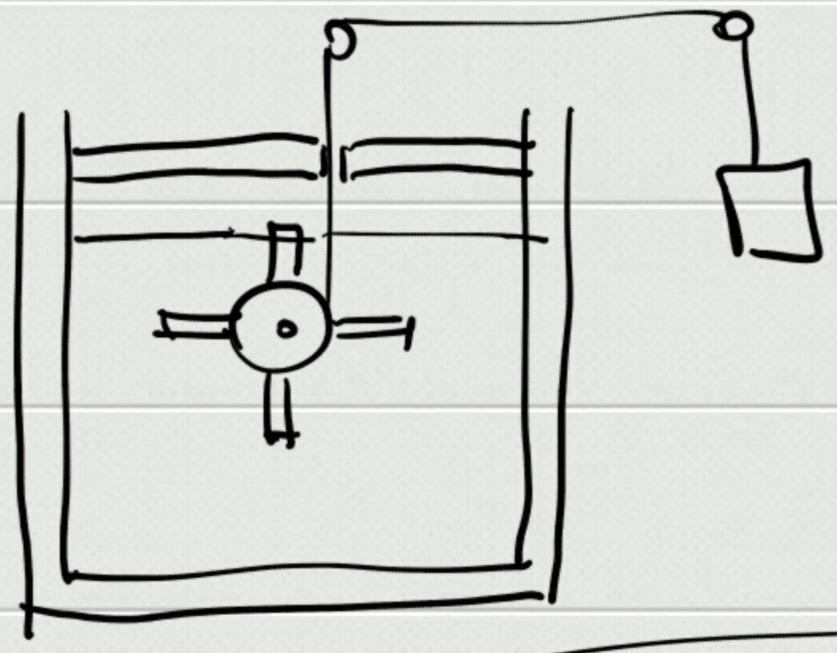


"Calorico" $\Rightarrow$ Calore

puramente termici

(no lavoro)

Joule



esp. adiabatico

$T_i \to T_f$ $\qquad$ $\boxed{W_{adiab} = \text{costante}}$

forze cons.

$$W_{A\to B} = \int_A^B \bar{F}\, d\bar{s} = -(E_{p,B} - E_{pA}) = -\Delta E_p$$

$$\boxed{W_{adiab,\, i\to f} = -\Delta U = -(U_f - U_i)}$$

$$\boxed{U = \text{energia interna}}$$

Processi puramente termici

$$\boxed{\Delta U = Q_{pur.\,term.}}$$

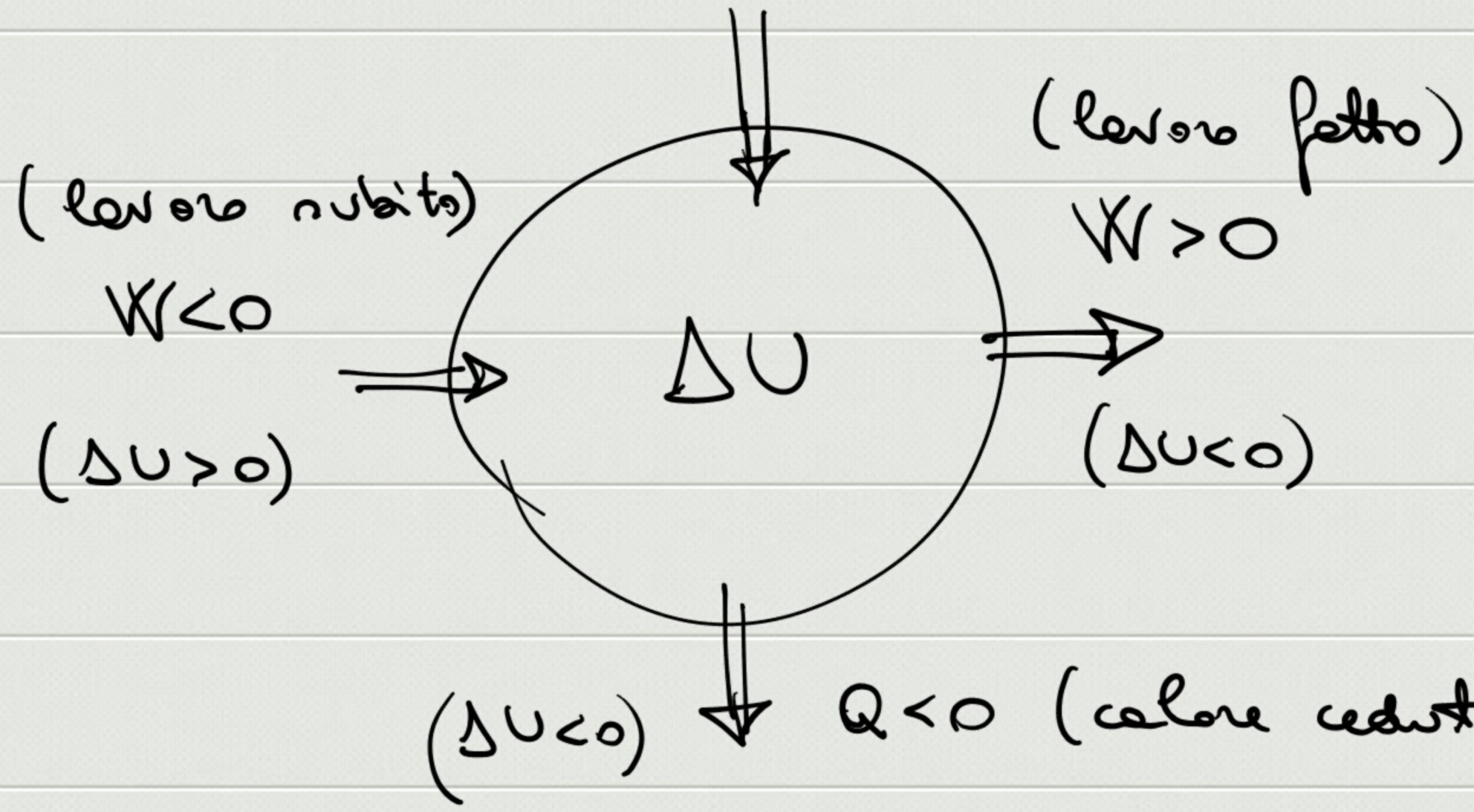
W_{adiab} equivalente $Q_{pur.\,termico}$

$$Q \sim W \Rightarrow Q = -W$$

equivalenza calore - lavoro

$$\Delta U = Q - W$$

$(\Delta U > 0)$ $Q > 0$ (calore assorbito)



$$Q = \Delta U + W$$

1° principio della termodinamica

$U = U$ (coord. termodinamiche)

$U \rightarrow$ funzione di "stato"

$\boxed{Q = \Delta U + W}$: bilancio energetico

Q : calore è scambio di energia

$Q_{i \to f} = \int_i^f \delta Q$: dipende dalla trasformazione

Eq. 1° principe TD différentielle :

$$\delta Q = dU + \delta W$$