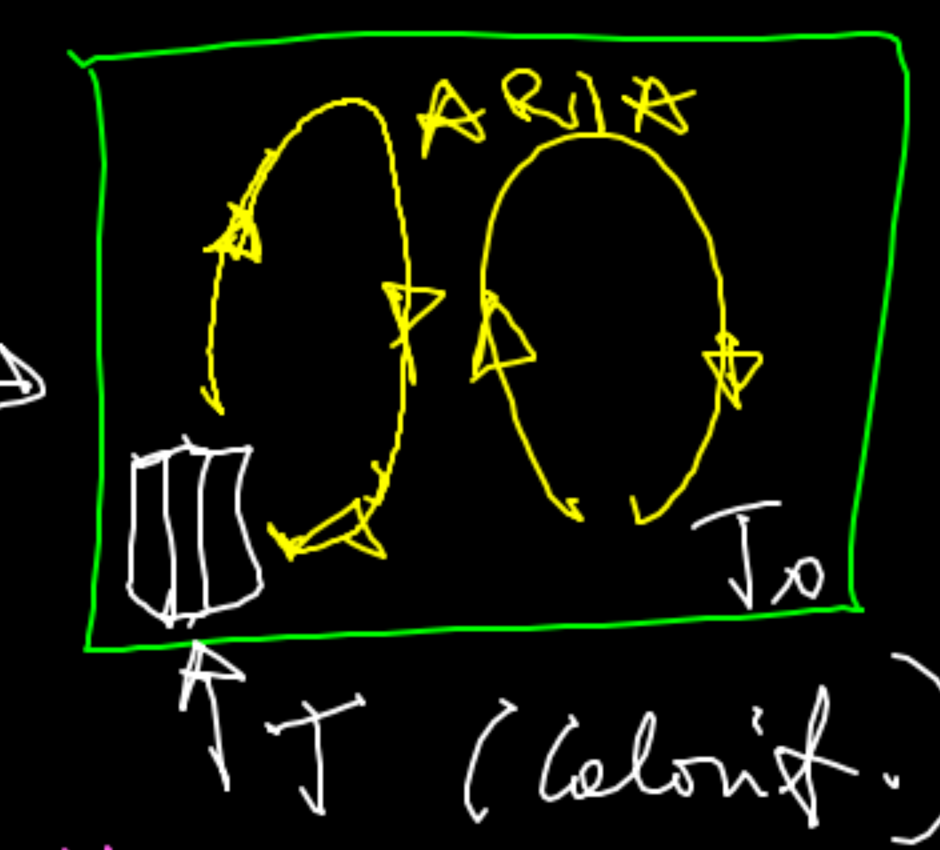
TRASMISSIONE DEL CALORE

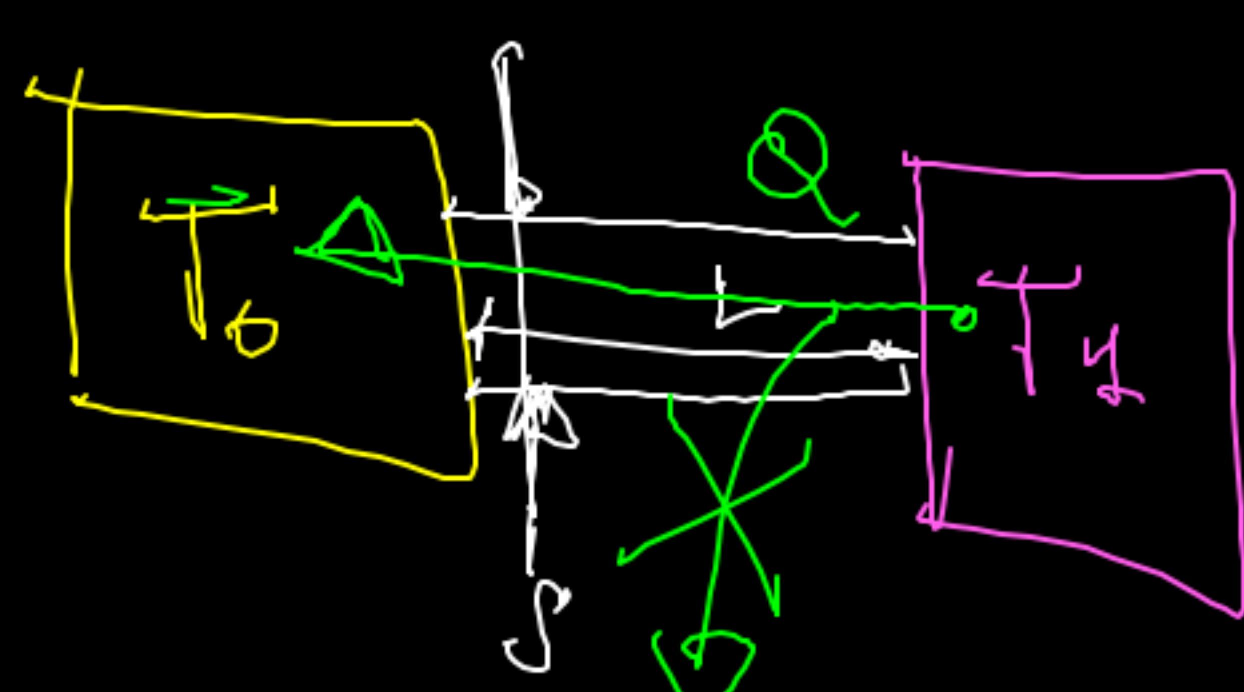
- CONDUZIONE → contatto o urti tra molecole

- CONVEZIONE →

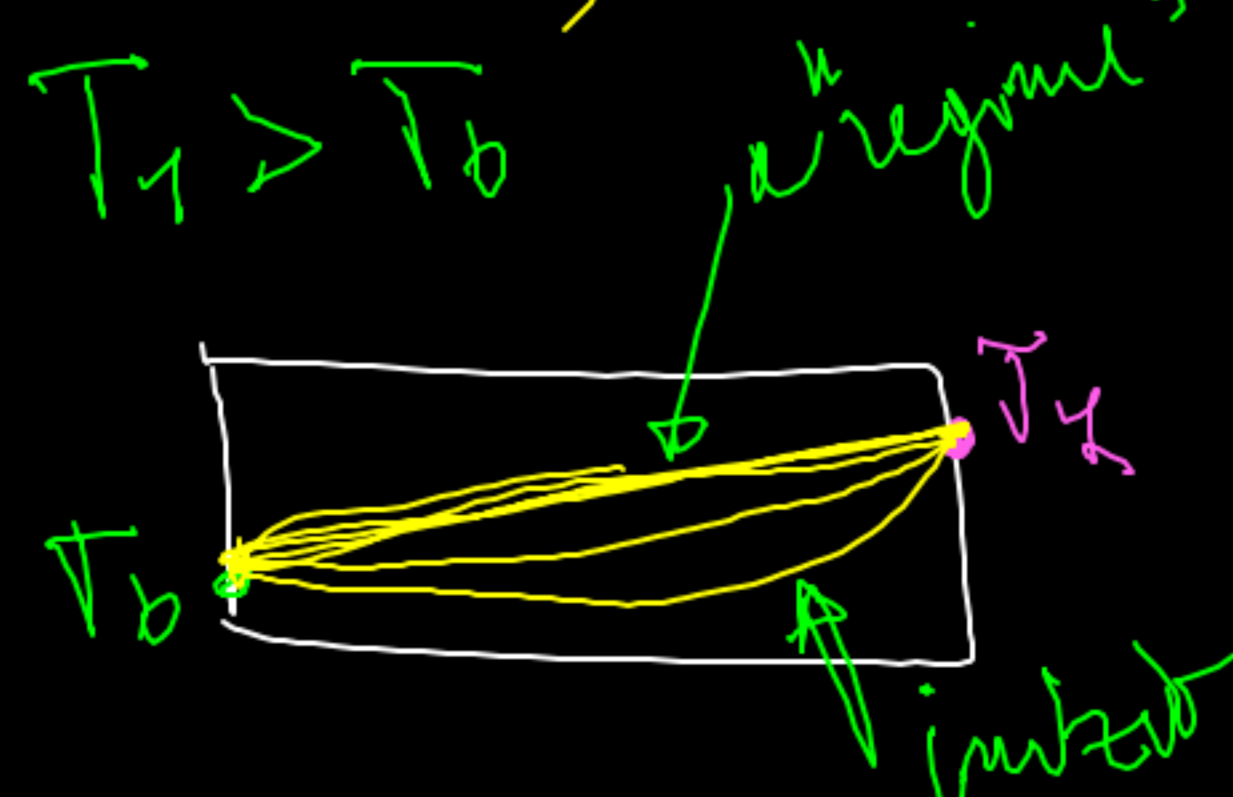


- IRRAGGIAMENTO →

CONDUZIONE (MODELLO)



$T_1 > T_0$

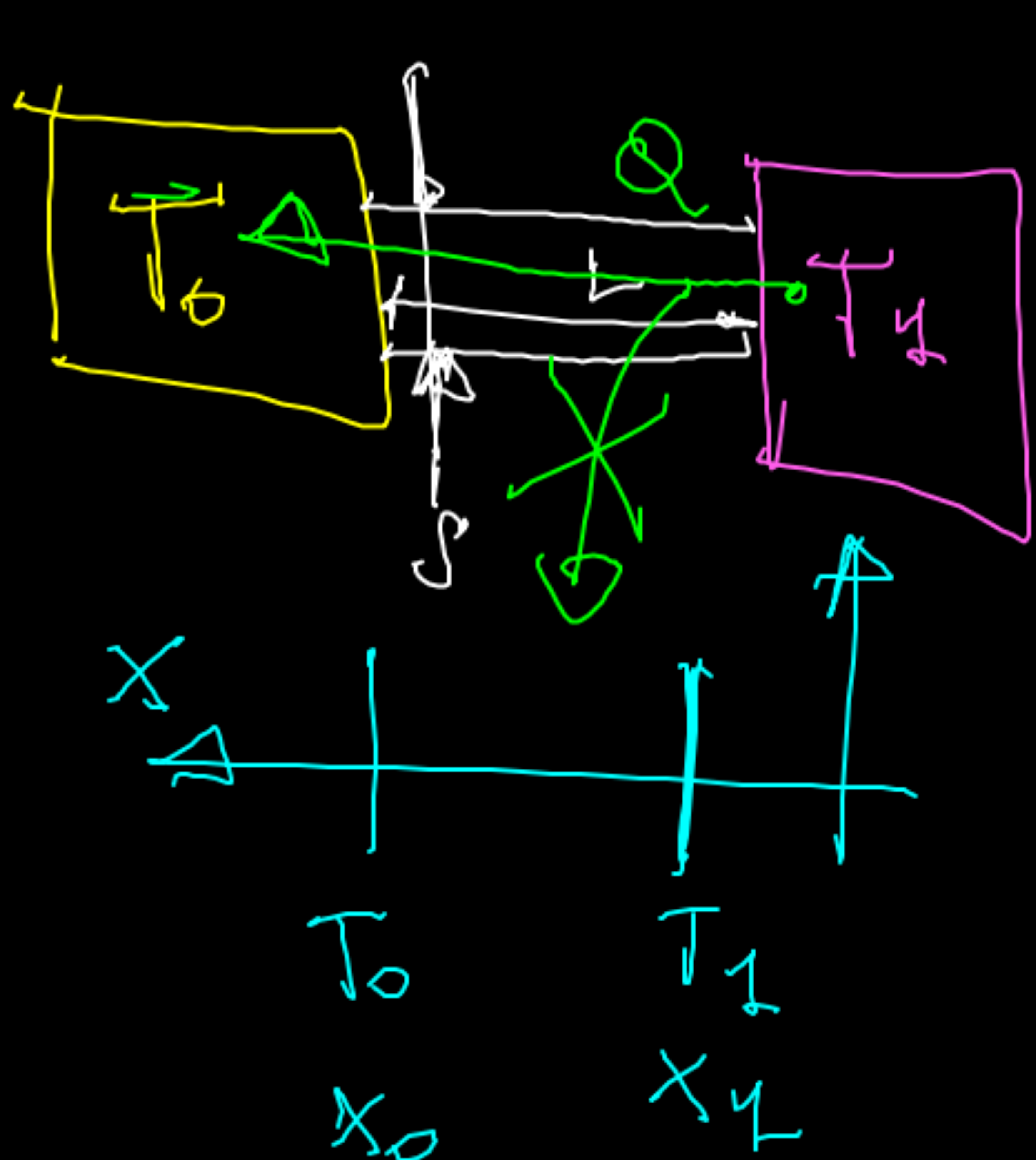


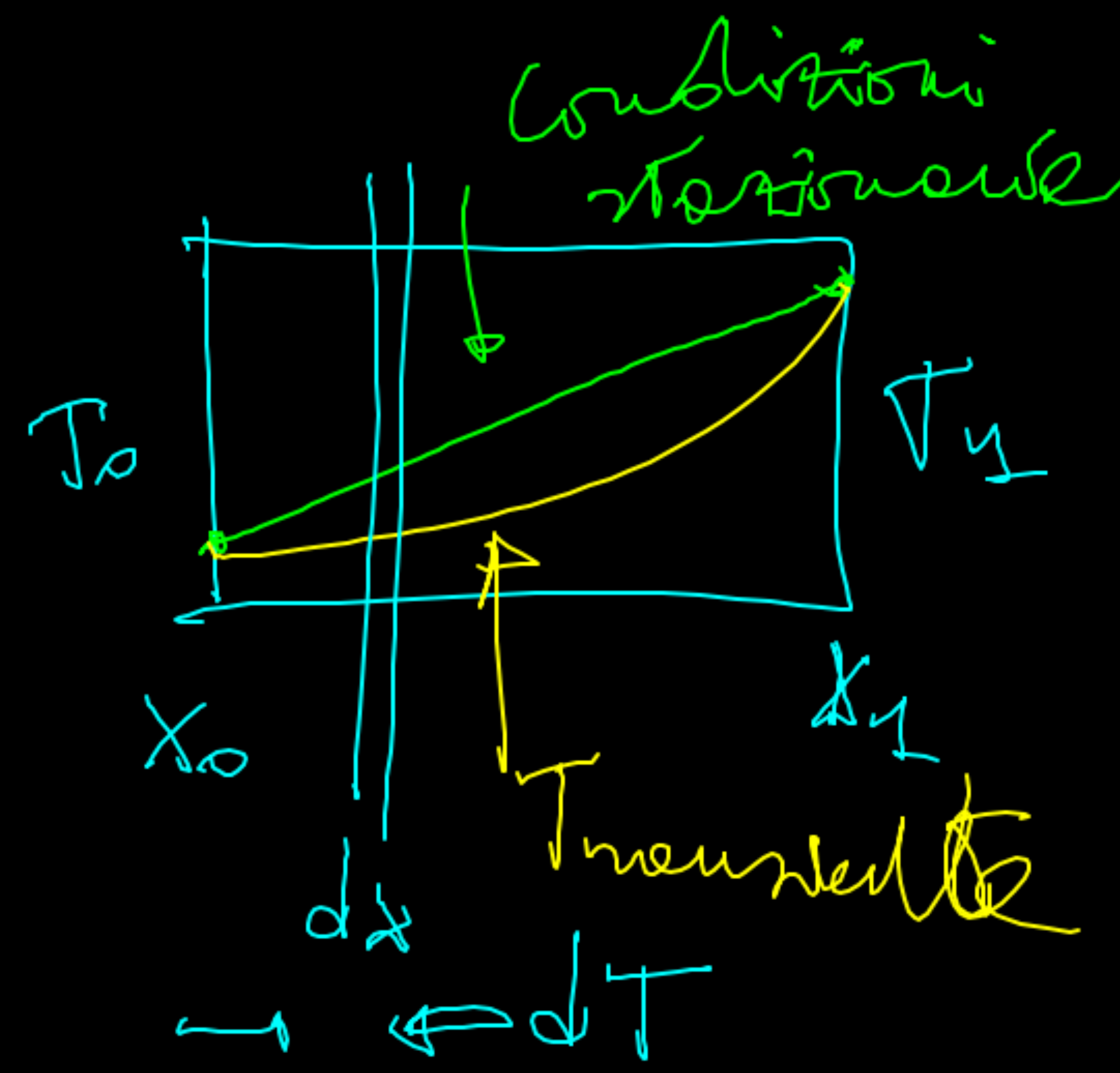
$$\Phi = \frac{Q}{\Delta t} = k \frac{S \Delta T}{L}$$

$\frac{J}{s} = W$ (Watt)

Φ: corrente termica

k: CONDUC. TERMICA



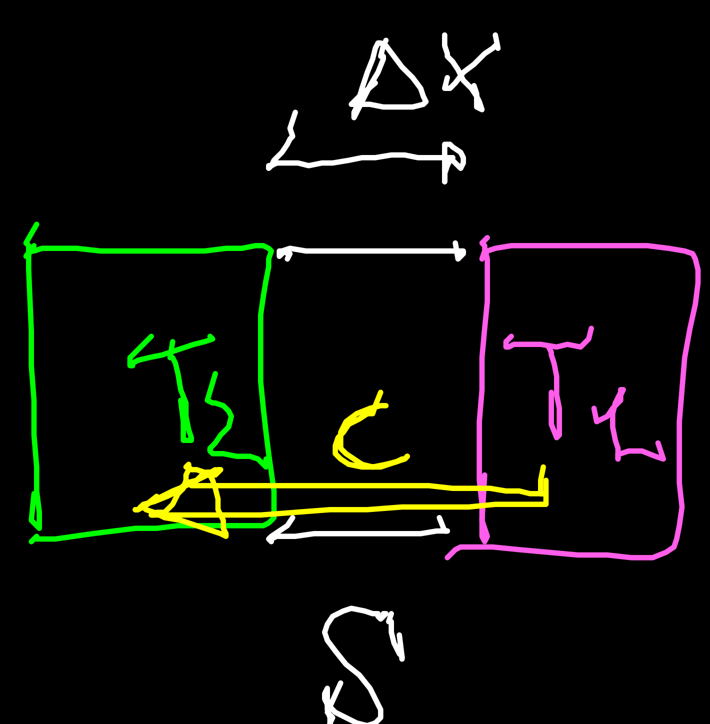


$$C = -KS\frac{dT}{dX}$$

gradiente termico

CONDUZIONE IN COND. STAZ.

$$C = \frac{Q}{\Delta t} = \frac{KS}{\Delta x}\Delta T \qquad \Delta T = \frac{\Delta x}{KS}\, C = \frac{R}{S}\, C$$



$$\Delta T = T_1 - T_2$$

$$T_1 > T_2$$

$$R = \frac{\Delta x}{K} \Longrightarrow \text{B.T.U.}$$

British Thermal Unit

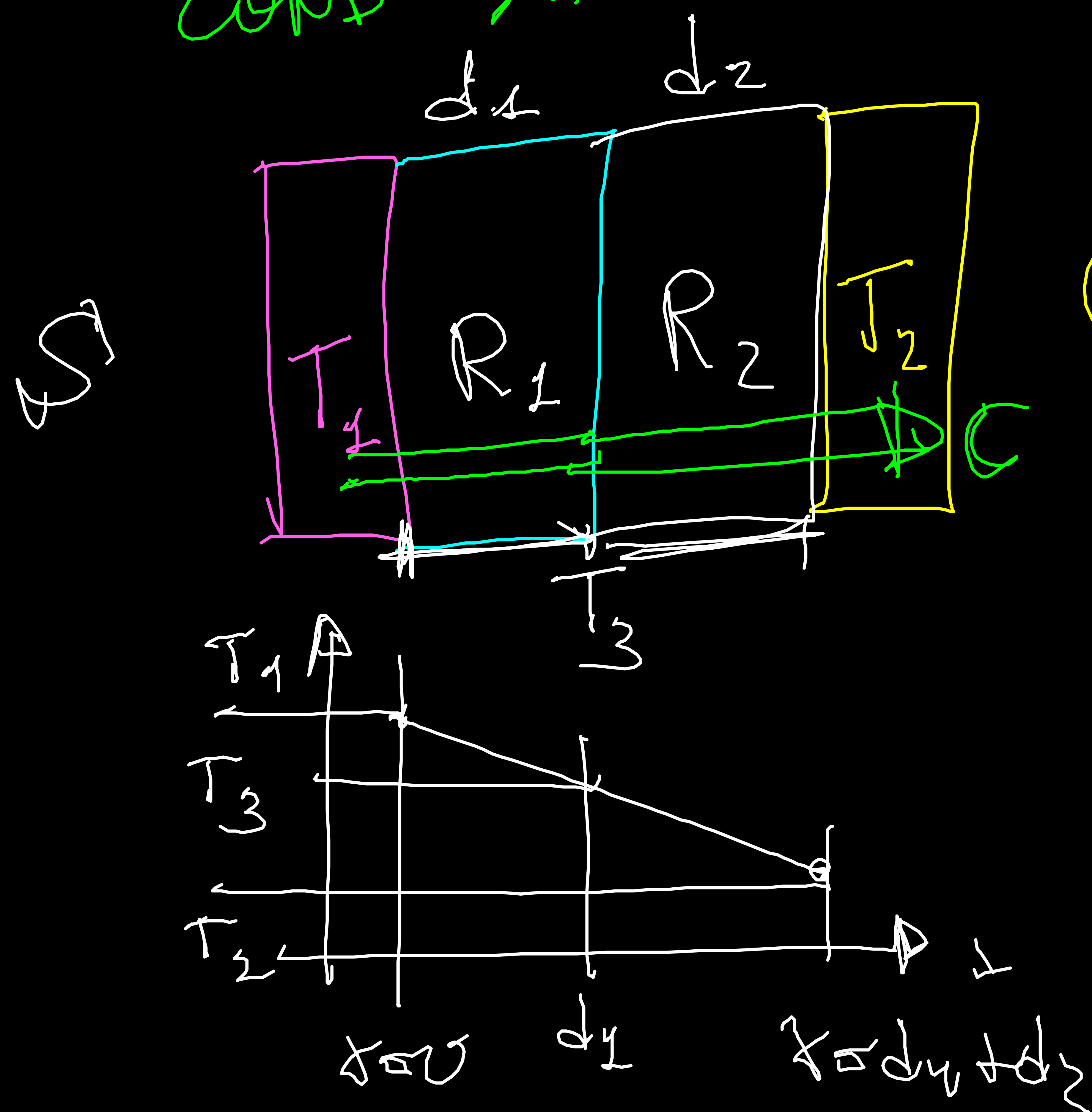
1 BTU = 1055 J

$$[K] = \frac{[W]}{[m][K]}$$

$$[R] = \frac{[m]^2[K]}{[W]}$$

$$R = \frac{[°F][h][ft]^2}{BTU}$$

COND STAZ.



?

$$\frac{RC}{S} = \Delta T = T_1 - T_2$$

$$R_1 = \frac{d_1}{K_1}$$

$$T_1 - T_3 = \frac{R_1}{S} C$$

$+$

$$T_3 - T_2 = \frac{R_2}{S} C \qquad R_2 = \frac{d_2}{K_2}$$

$$T_1 - T_2 = \frac{C}{S}(R_1 + R_2)$$

IRRAGGIAMENTO

$W = \left[\frac{J}{s}\right]$

$$P = \sigma \varepsilon S T^4$$

ε emittanza $0 \le \varepsilon \le 1$

σ costante di Stefan-Boltzmann

$$\sigma = 5.67 \times 10^{-8} \ \frac{W}{m^2 K^4}$$

SPETTRO ONDE EM

λ	NOME
400-700 nm	LUCE VISIBILE
> 700 nm	IR → MW - RF
< 400 nm	UV, X, γ

IRRAGGIAMENTO

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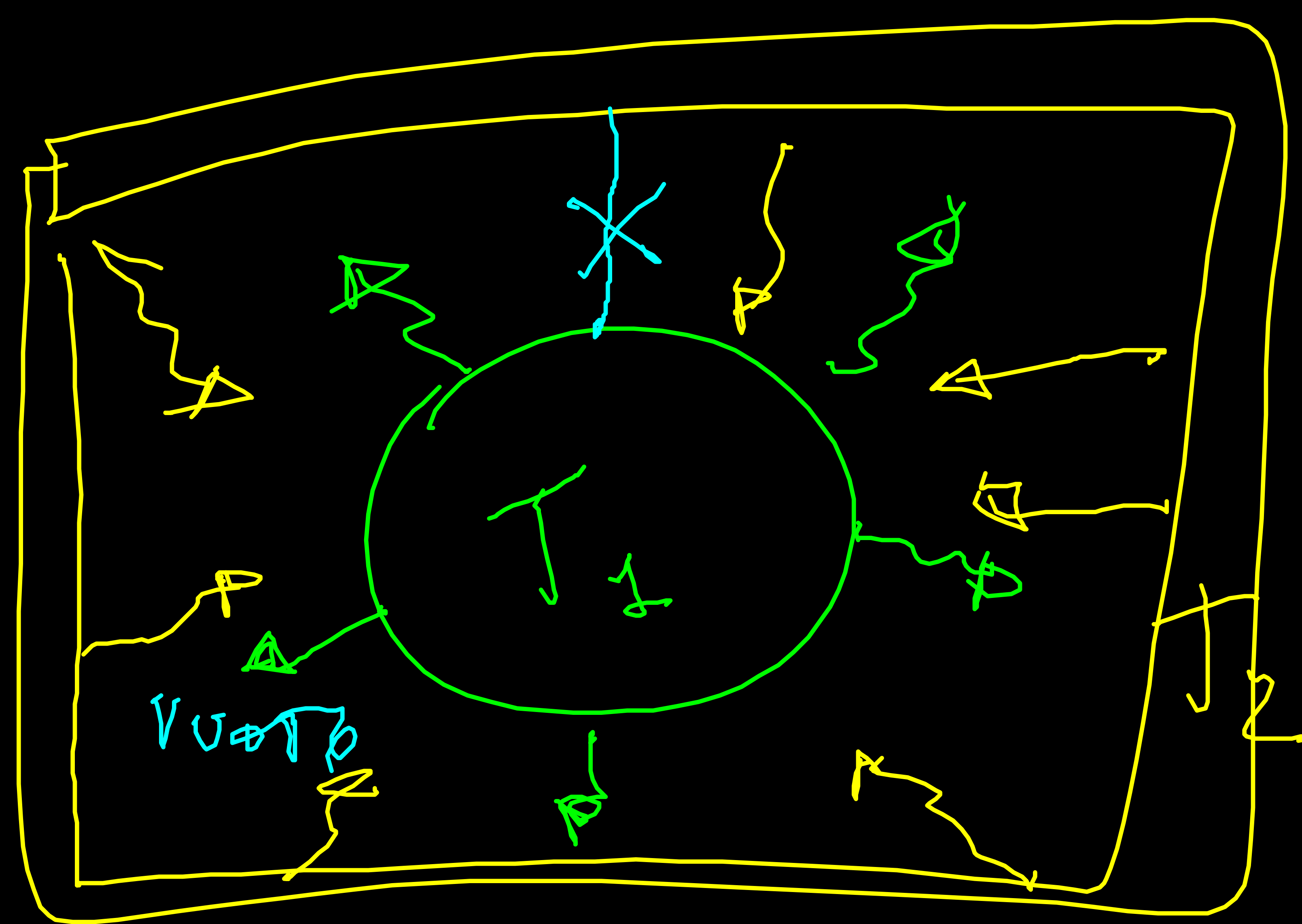


ε emittanza = assorbanza

$\varepsilon \rightleftarrows$

Corpo "NERO"

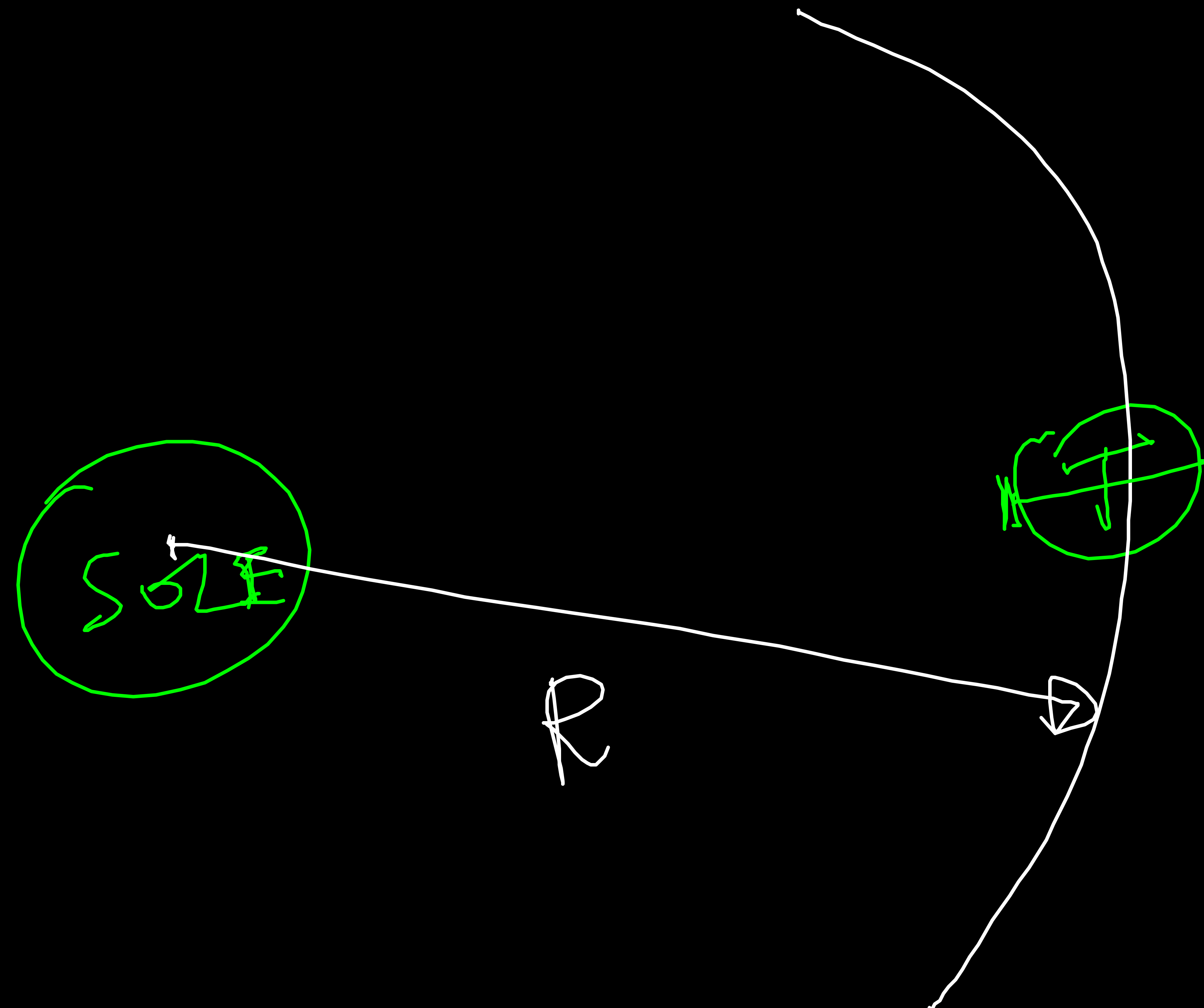
$\varepsilon \simeq 1$

$T_1 \neq T_2$

Sperim.

$T_1 \to T_{eq}$

$T_2 \to T_{eq}$



$$I = \frac{P_{SOLE}}{4\pi R^2} \qquad \frac{W}{m^2}$$

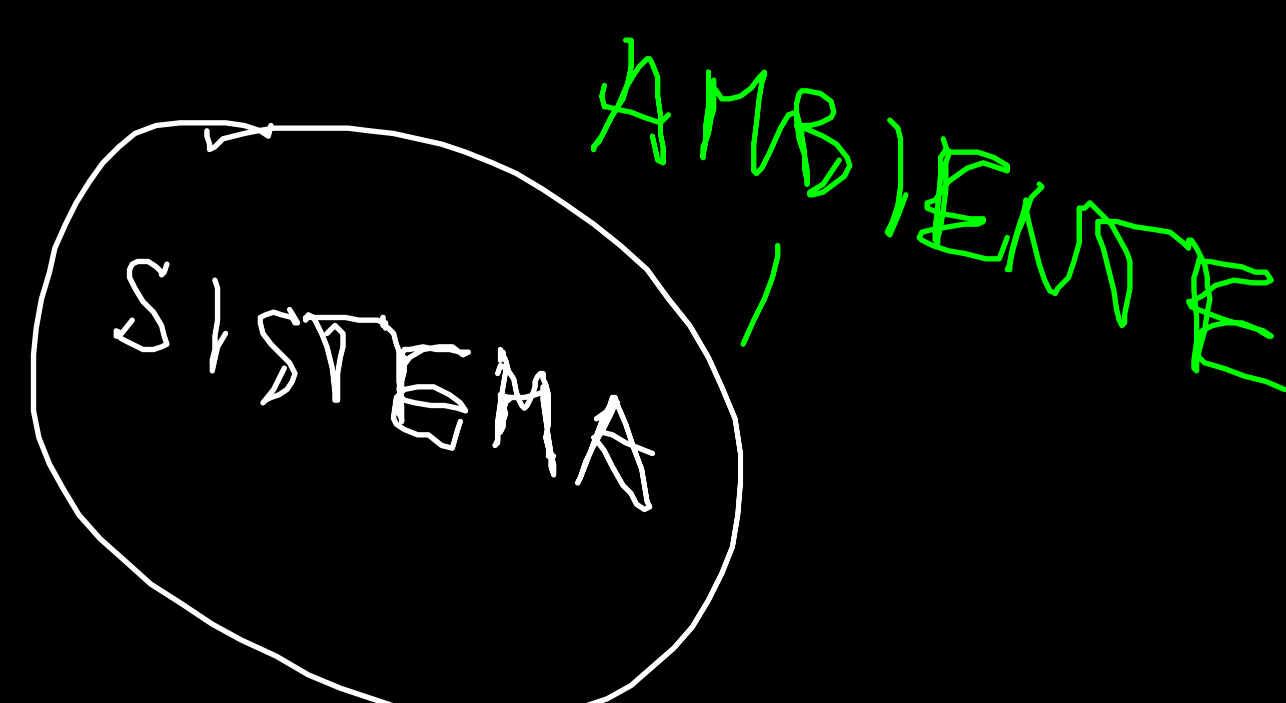
$$P_{SOLE} = 4.5 \times 10^{26}\ W$$

$$I = 1600\ \frac{W}{m^2}$$

EQUILIBRIO TERMODINAMICO

- EQ. MECCANICO ($\sum \vec{F}_{ext} = 0$)
- EQ. TERMICO ($\Delta T = 0$)
- EQ. CHIMICO (~~REAZIONI~~)

$\Rightarrow$ EQ. TERMOD.



AMBIENTE

SISTEMA — TRASFORMAZIONE → SISTEMA (TRA STATI DI EQ.)

EQ. T. 1 — EQ. T. 2

<u>STATO 1</u> — <u>STATO 2</u>

VAR. DI STATO

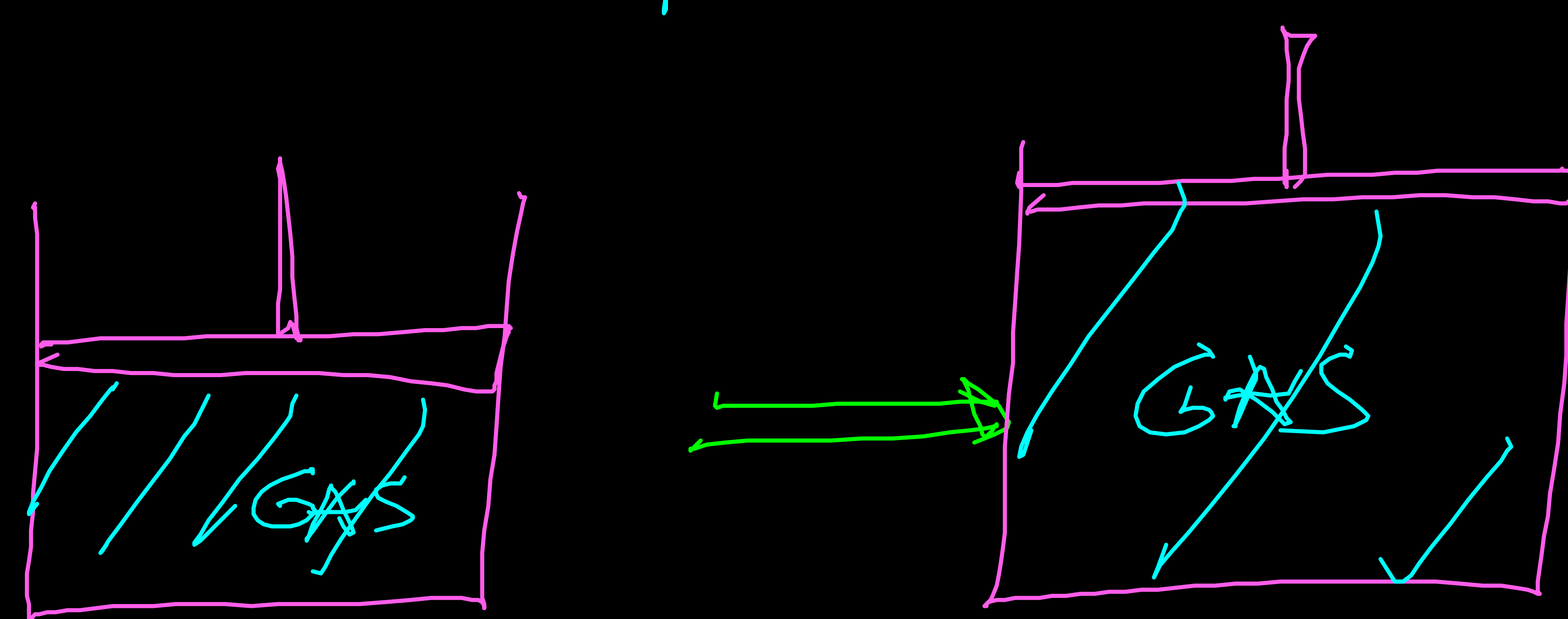
P_1, V_1, T_1, n_1, U_1, ... $\xrightarrow{\text{TRASF.}}$ P_2, V_2, T_2, n_2, U_2, ...

<u>VARI TIPI DI TRASF.</u>

- ADIABATICHE $Q \neq 0$
- ISOTERME $\Delta T = 0$
- ISOCORE $\Delta V = 0$
- ISOBARE $\Delta p = 0$
- CICLICHE $S_i = S_f$

CARATTERISTICHE COMUNI DELLE TRASF.
(CHE SAPPIAMO "TRATTARE")

- Procedono per successivi stati di equilibrio
$\Downarrow$



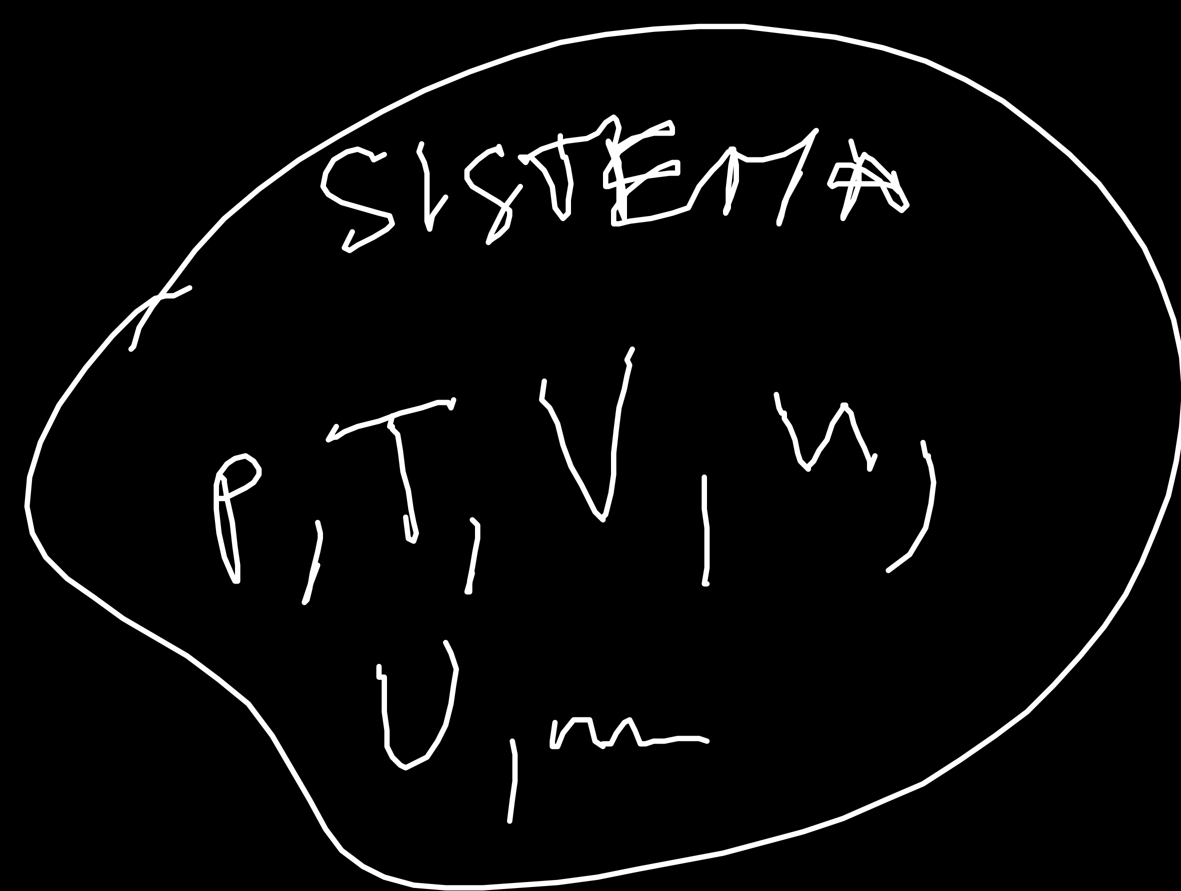
$\Delta V > 0$

Trasf. QUASI-STATICHE

1) Si solleva velocemente il pistone $\Rightarrow$ NON procede per stati di eq.

2) Si solleva lentamente il pistone $\Rightarrow$ Trasf. QUASI-STATICA
Procede per stati di equilibrio

EQUAZIONI DI STATO



EQ.

Sperimentalmente:

$$\boxed{p = f(T, V, n, U, S, \dots)}$$

oppure $T = g(p, V, n, U, S \dots)$

EQ. DI STATO → (dipende dal sistema!!!)

→ Vale negli stati di equilibrio

GAS RAREFATTO ($\Rightarrow$ GAS "PERFETTO")

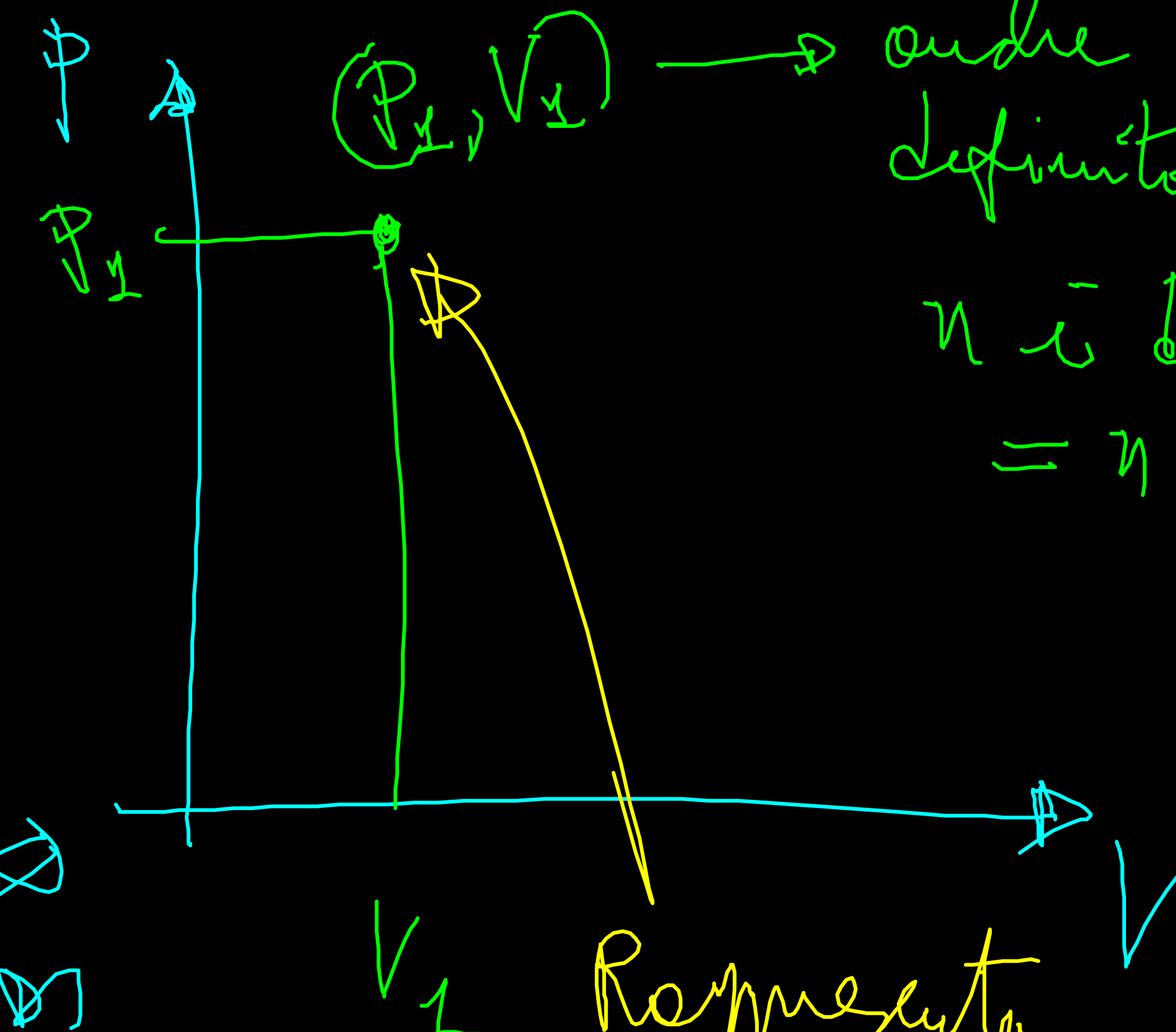
Risultati sperimentali

i) n, T fissi $\qquad pV = \text{cost}$ (Boyle)

ii) n, V fissi $\qquad \dfrac{p}{T} = \text{cost}$

iii) n, p fissi $\qquad \dfrac{V}{T} = \text{cost}$

iv) V, T fissi $\qquad \dfrac{p}{n} = \text{cost}$



PIANO DI CLAPEYRON

$(p_1, V_1) \rightarrow$ onde T è definito $= T_1$

n è definito $= n_1$

Rappresenta uno stato di equilibrio del gas