Key points lecture 02/02/2022

Final definition:
(micro canonical ensemble)
(3D case)

$$\boxed{\Sigma(E) = \frac{1}{N!\,h^{3N}} \int_{\mathcal{H}<E} d^{3N}\vec{p}\; d^{3N}\vec{q}}$$

$$\boxed{\Gamma(E) = \frac{1}{N!\,h^{3N}} \int_{E<\mathcal{H}<E+\Delta E} d^{3N}\vec{p}\; d^{3N}\vec{q}}$$

$$= \frac{1}{N!\,h^{3N}} \int_{\text{all space}} \Delta E\; \delta(\mathcal{H}-E)\; d^{3N}\vec{p}\, d^{3N}\vec{q}$$

$\frac{1}{h^{3N}} d^{3N}\vec{p}\; d^{3N}\vec{q} \;\hat{=}$ dimensionless

$\frac{1}{N!}$ not needed if particles are fixed in space

$\boxed{\text{Canonical ensemble: macro variables } T, V, N}$

ensemble density $\propto e^{-\mathcal{H}(\vec{p},\vec{q})/kT}$

T: temperature of thermal bath

Partition function: $$\boxed{Q_N(V,T) = \frac{1}{N!\,h^{3N}} \int e^{-\beta\mathcal{H}(\vec{p},\vec{q})}\, d^{3N}\vec{p}\; d^{3N}\vec{q}}$$