Key points of 01/19 lecture:

- Statistical mechanics: system in equilibrium (static, no statement on likelihood)

- Microcanonical ensemble: isolated system w/ macro variables E, V, N

- Postulate of equal a priori probability: in thermodynamic equilibrium, all states consistent with macro variables are equally probable.

- Ensemble average:

$$\langle f \rangle = \frac{\int f(\vec{p}, \vec{q})\, \rho(\vec{p}, \vec{q})\, d^{3N}\vec{p}\, d^{3N}\vec{q}}{\int \rho(\vec{p}, \vec{q})\, d^{3N}\vec{p}\, d^{3N}\vec{q}}$$

observed value

$$\rho(\vec{p}, \vec{q}) = \begin{cases} \text{const} & \text{for } E < \mathcal{H}(\vec{p}, \vec{q}) < E + \Delta E \\ 0 & \text{otherwise} \end{cases}$$

- Fluctuations $\ll 1$: $\dfrac{\langle f^2 \rangle - \langle f \rangle^2}{\langle f \rangle^2} \ll 1$

Thermodynamics <-> Statistical Mechanics

absolute temperature

- $\boxed{S(E, V, N) = k \log \Gamma(E, V, N)}$; $\boxed{\left(\dfrac{\partial S(E, V, N)}{\partial E}\right)_{V,N} = T^{-1}}$