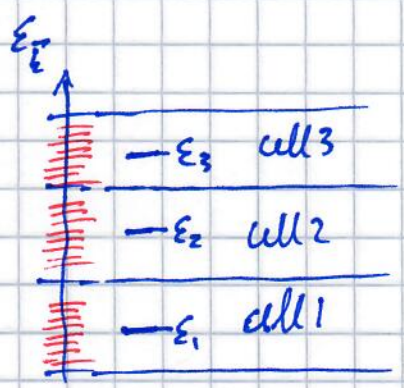
Key points 03/28 lecture

Group single-particle energies ε_i into groups: each cell i have average energy ε_i, degeneracy g_i, and occupation number n_i



demand: $\sum_i n_i = N$ (*)

$\sum_i \varepsilon_i n_i = E$ (**)

$$\Rightarrow \Gamma(E) = \sum_{\{n_i\}} W\{n_i\}$$

↑ sum over all states subject to constraints (*) and (**)

Identical bosons: $$W\{n_i\} = \prod_i w_i = \prod_i \frac{(n_i + g_i - 1)!}{n_i!\,(g_i-1)!}$$

Identical fermions: $$W\{n_i\} = \prod_i w_i = \prod_i \frac{g_i!}{n_i!\,(g_i - n_i)!}$$

Distinguishable particles: $$W\{n_i\} = \prod_i w_i = \prod_i \frac{g_i^{n_i}}{n_i!}$$

$$S = k \log(\Gamma(E)) = k \log\left(\sum_{\{n_i\}} W\{n_i\}\right) \approx k \log W\{\bar{n}_i\}$$

↑ "usual" connection between SM and thermo

↑ assumes: small fluctuations

$\{\bar{n}_i\}$: set that maximizes S under constraints (*) and (**).