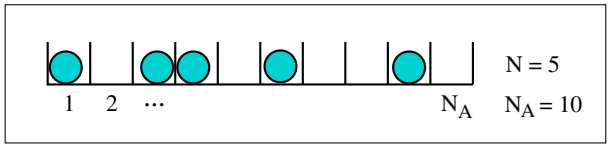
Combinatorics of fermions [pln4]

Consider a system with N_A orbitals and N particles.
Multiple occupancy is prohibited.
Orbitals are distinguishable.
Particles are indistinguishables, do not interact, and have energy ϵ.



Number of distinct microstates with N particles:

$$W(N) = \left(\begin{array}{c} N_A \\ N \end{array} \right) = \frac{N_A!}{N!(N_A - N)!} \, .$$

Multiplicity expression in standard form (for one species):

$$W(N) = \left(\begin{array}{c} d + N - 1 \\ N \end{array} \right), \quad d = A - g(N-1), \quad A = N_A, \quad g = 1.$$

- A: number of options for placing first particle (capacity constant).
- g: impact of placing one particle on capacity of system (statistical interaction coefficient).
- d: number of options for placing N^{th} particle.

Maximum capacity of system is reached when $N = N_A$: $W(N_A + 1) = 0$.