Statistically interacting particles (generic) [pln14]

Generalized Pauli principle [Haldane 1991]

> How is the number of states accessible to one particle of species m affected if particles of any species m' are added?

$$\Delta d_m = -\sum_{m'} g_{mm'}\Delta N_{m'} \quad \Rightarrow \; d_m = A_m - \sum_{m'} g_{mm'}(N_{m'} - \delta_{mm'}).$$

Energy and multiplicity of many-body microstates:

$$E(\{N_m\}) = E_{pv} + \sum_m N_m\epsilon_m, \quad W(\{N_m\}) = n_{pv}\prod_m \begin{pmatrix} d_m + N_m - 1 \\ N_m \end{pmatrix}.$$

System specifications:

- energy of pseudo-vacuum: E_{pv}
- particle energies: ϵ_m
- degeneracy of pseudo-vacuum: n_{pv}
- capacity constants: A_m
- statistical interaction coefficients: $g_{mm'}$

This template is applicable to generic cases with open boundary conditions. For periodic boundary conditions, the multiplicity expression has a different prefactor [Liu et al. 2012].

Some attributes of A_m:

- A_m extensive for compacts and hosts (proportional to size of system)
- $A_m = 0$ for hybrids, tags, and caps

Some attributes of $g_{mm'}$:

- $g_{mm} > 0$ for compacts,hosts, and caps
- $g_{mm} = 0$ for tags
- $g_{mm'} < 1$ and $g_{m'm} \geq 0$ for hosts (m') and hybrids (m)
- $g_{mm'} < 1$ and $g_{m'm} \geq 0$ for hybrids (m') and caps or tags (m)
- $g_{mm'} < 0$ possible for compacts