Tutorial 4

Full diagonalisation of frustrated chains
Thermodynamic properties

Susceptibility

- Diagonalize the Hilbert space for all Sz sectors of a J1-J2 chain (e.g. at MG point)
- How to get the full S=0, S=1,... sectors ?
- Compute (and plot) the susceptibility:

$$\chi(T) = \frac{1}{NTZ} \sum_n (S_n^z)^2 \exp\left(-E_n^z/T\right)$$

- Extract the spin gap

Specific heat

- Show that the specific heat $C(T) = T\partial S/\partial T$ can be written as:

$$C(T) = -\beta^2(\langle H^2 \rangle - \langle H \rangle^2)$$

- Compute C(T) from the full energy spectrum and extract the spin gap

- Should we expect the phonon contribution to be important ?