

Esercizio simulazione Monte-Carlo

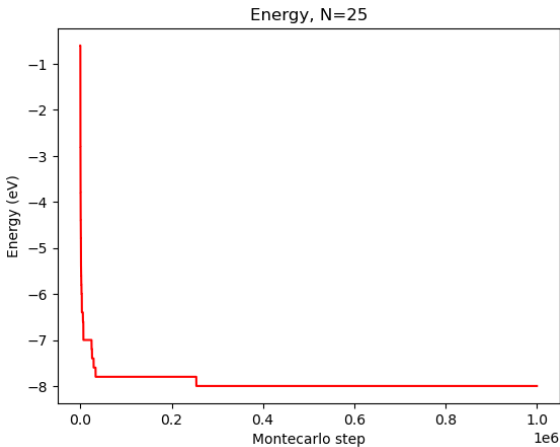
Lorenzo Tasca

Dipartimento di Fisica "Giuseppe Occhialini"
Università degli Studi di Milano-Bicocca

Aprile 2024

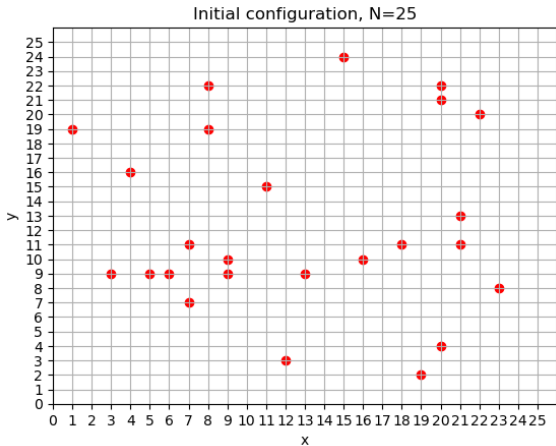
Zero temperature MC, minimum energy configuration

$$N = 25, E_{min} = -8 \text{ eV}$$



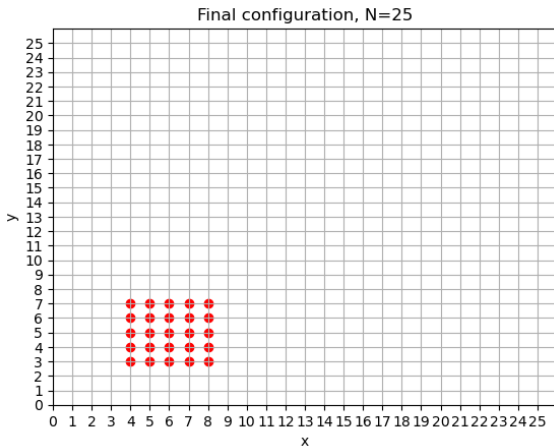
Zero temperature MC, minimum energy configuration

$$N = 25, E_{min} = -8 \text{ eV}$$



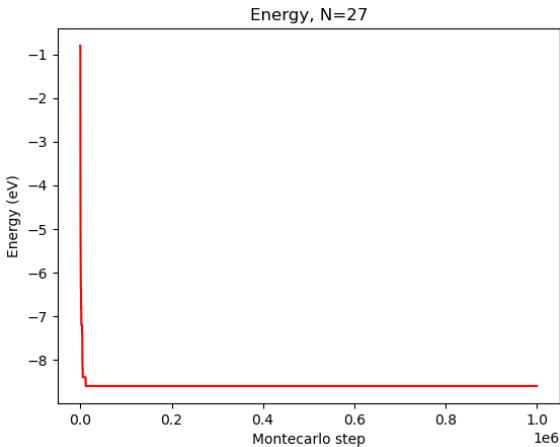
Zero temperature MC, minimum energy configuration

$$N = 25, E_{min} = -8 \text{ eV}$$



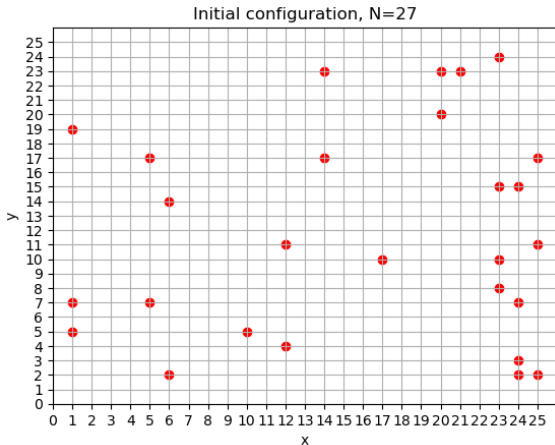
Zero temperature MC, minimum energy configuration

$$N = 27, E_{min} = -8.6 \text{ eV}$$



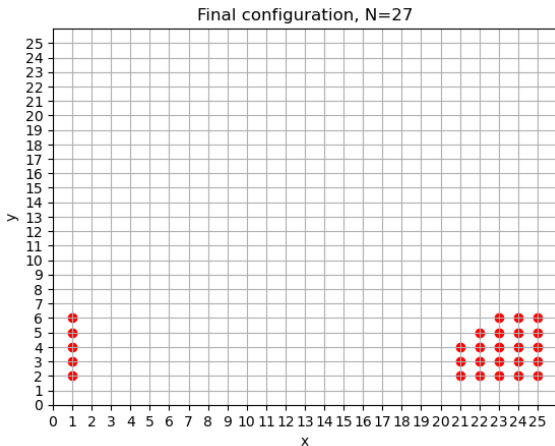
Zero temperature MC, minimum energy configuration

$$N = 27, E_{min} = -8.6 \text{ eV}$$



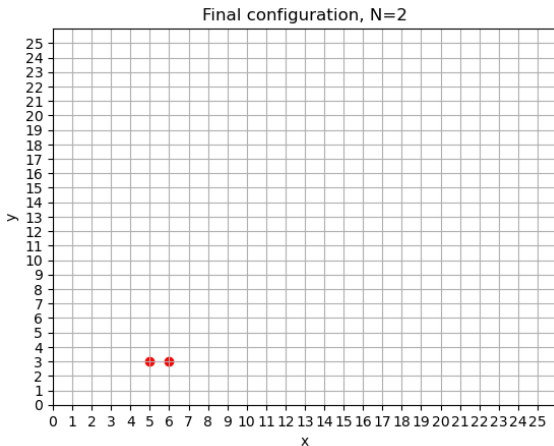
Zero temperature MC, minimum energy configuration

$$N = 27, E_{min} = -8.6 \text{ eV}$$



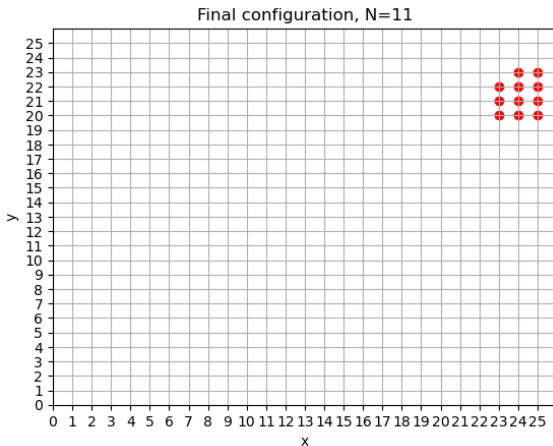
Zero temperature MC, minimum energy configuration

Obtain minimum energy configuration for different values of N



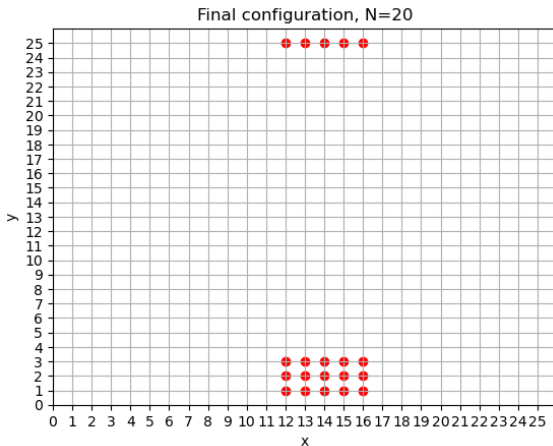
Zero temperature MC, minimum energy configuration

Obtain minimum energy configuration for different values of N

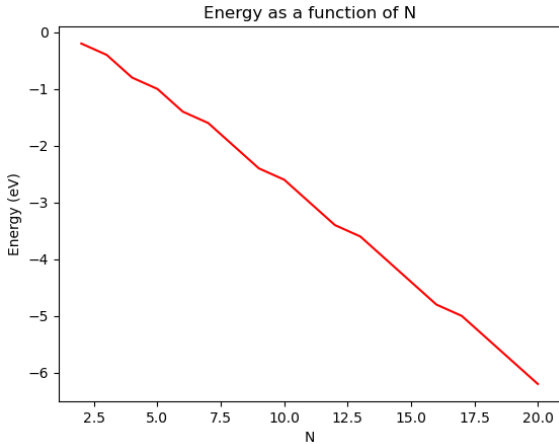


Zero temperature MC, minimum energy configuration

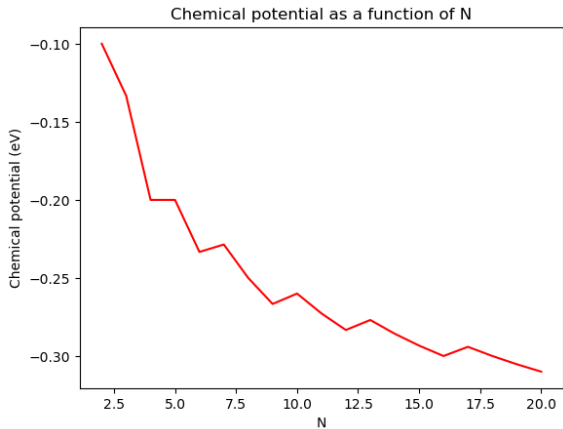
Obtain minimum energy configuration for different values of N



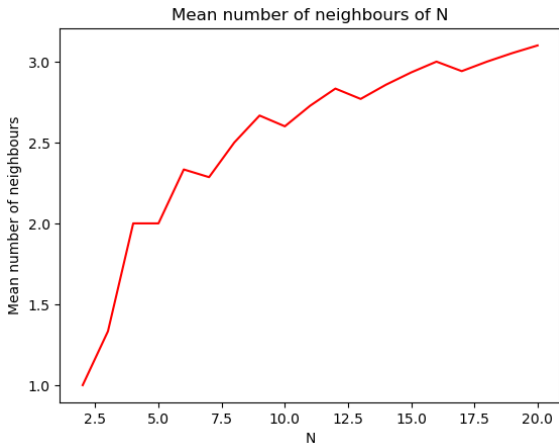
Zero temperature MC, energy variation with N



Zero temperature MC, μ variation with N

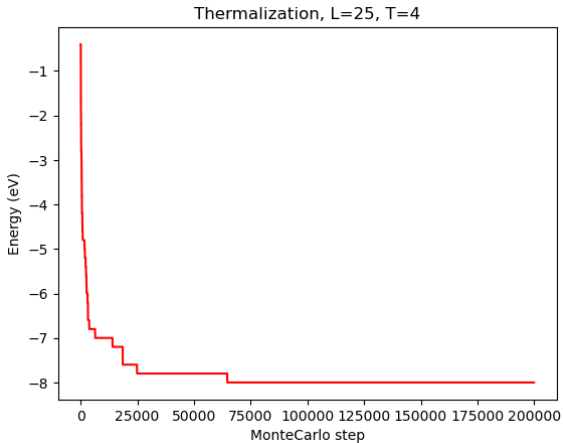


Zero temperature MC, number of neighbours variation with N



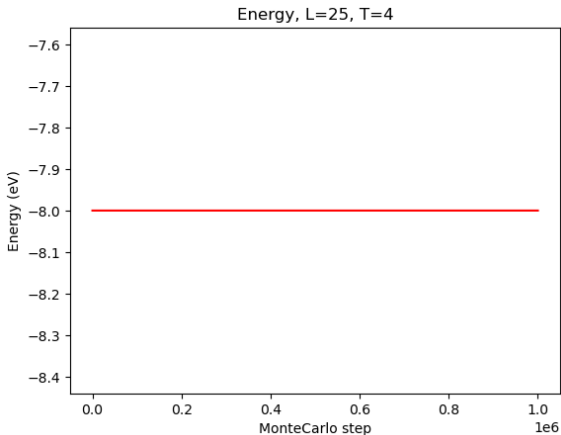
Finite temperature MC, $L = 25$

$$T = 4 \text{ K}$$



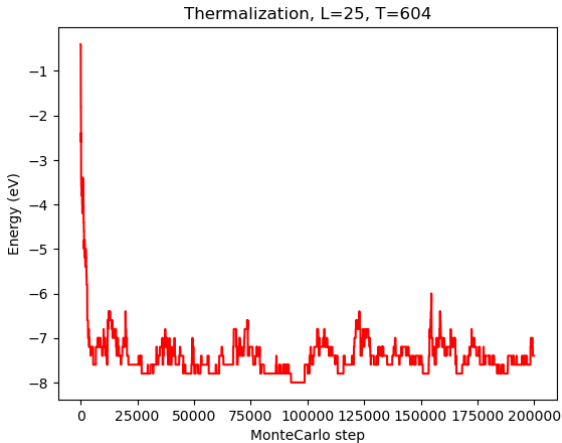
Finite temperature MC, $L = 25$

$$T = 4 \text{ K}$$



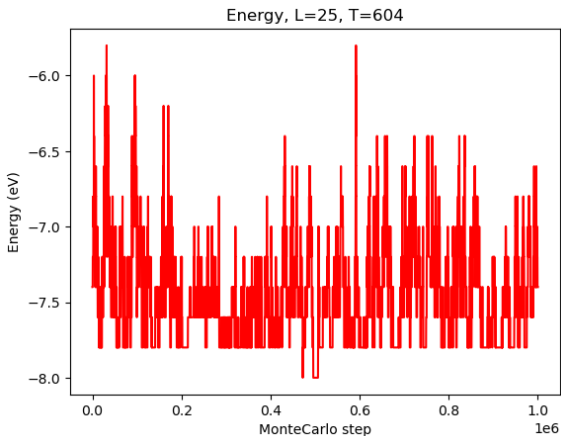
Finite temperature MC, $L = 25$

$$T = 604 \text{ K}$$



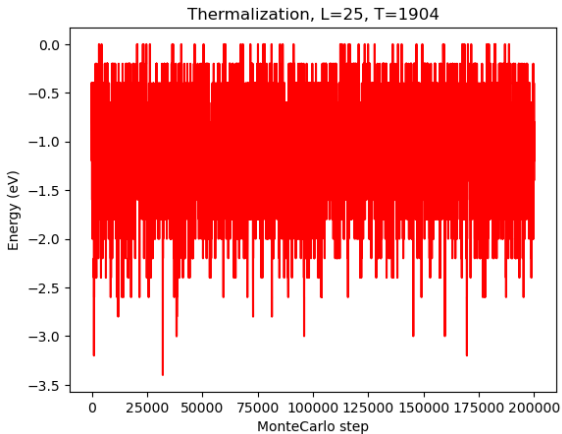
Finite temperature MC, $L = 25$

$$T = 604 \text{ K}$$



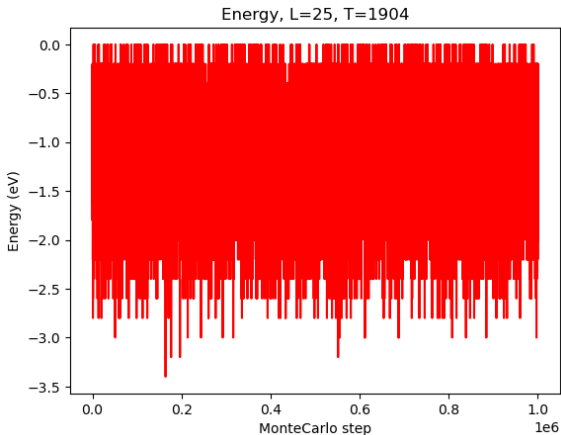
Finite temperature MC, $L = 25$

$$T = 1904 \text{ K}$$



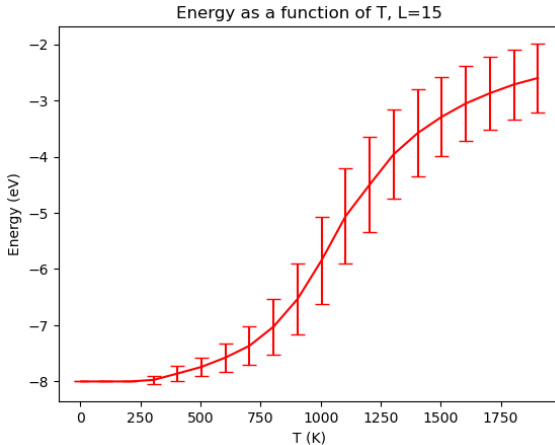
Finite temperature MC, $L = 25$

$$T = 1904 \text{ K}$$



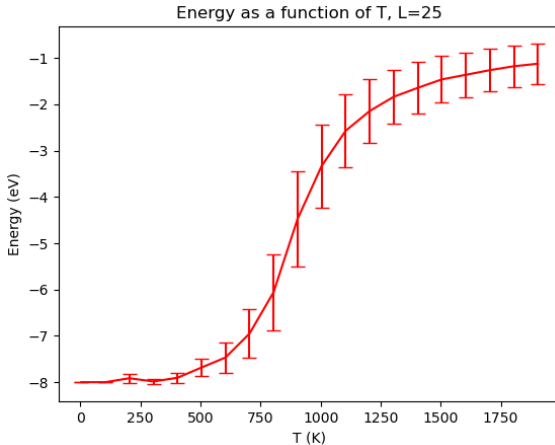
Finite temperature MC, $L = 15$

Mean energy variation with temperature



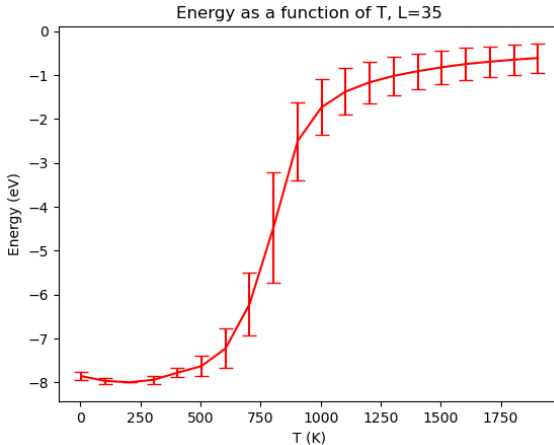
Finite temperature MC, $L = 25$

Mean energy variation with temperature



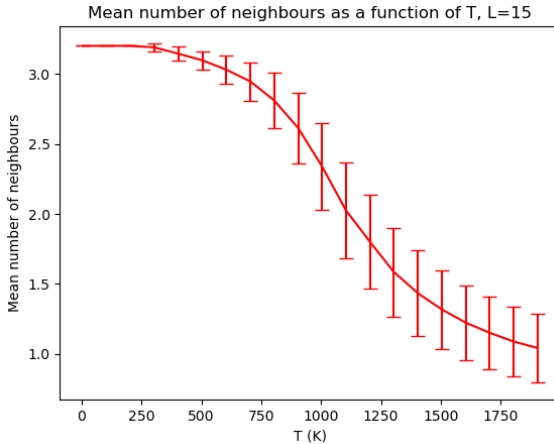
Finite temperature MC, $L = 35$

Mean energy variation with temperature



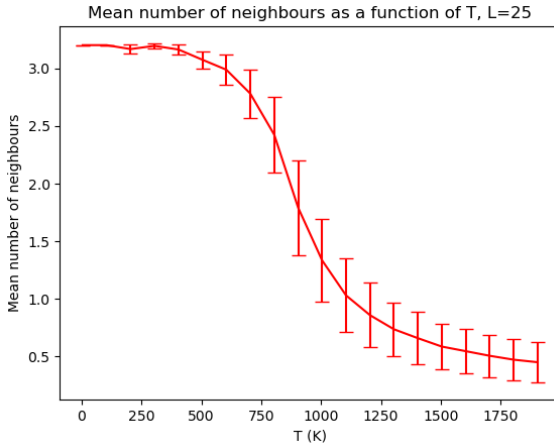
Finite temperature MC, $L = 15$

Mean number of neighbours variation with temperature



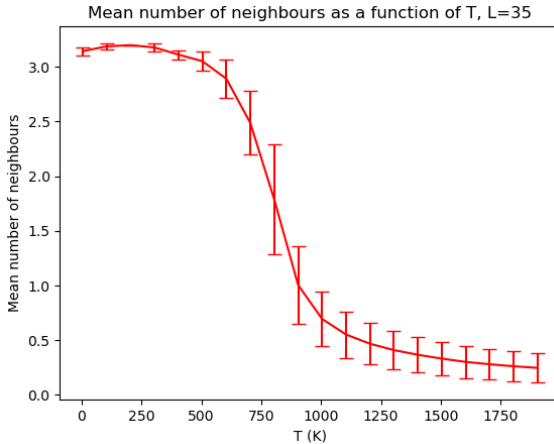
Finite temperature MC, $L = 25$

Mean number of neighbours variation with temperature



Finite temperature MC, $L = 35$

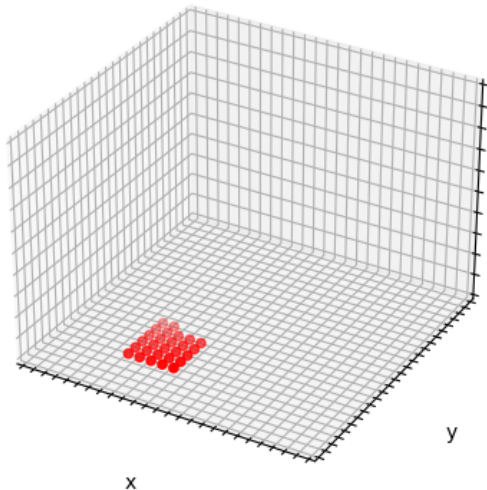
Mean number of neighbours variation with temperature



3 dimensional MC, $N = 27$

Minimum energy configuration variation with J_0

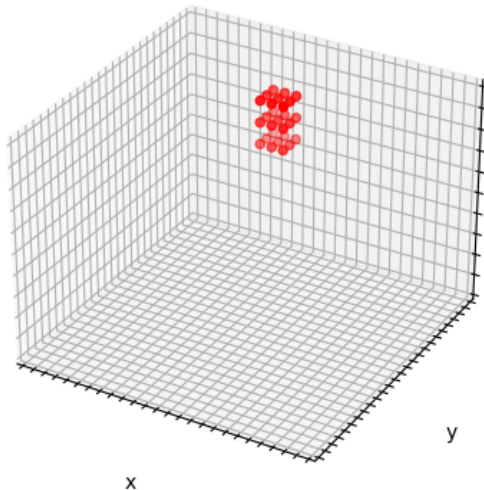
Final configuration, $J_0 = -0.1$ eV



3 dimensional MC, $N = 27$

Minimum energy configuration variation with J_0

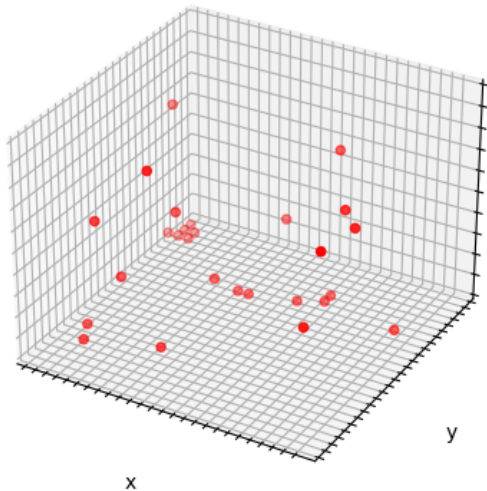
Final configuration, $J_0=0.1$ eV



3 dimensional MC, $N = 27$

Final configuration variation with J_0

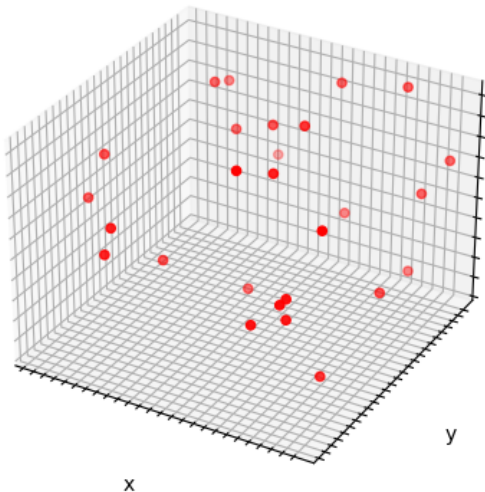
Final configuration, $J_0 = -0.1$



3 dimensional MC, $N = 27$

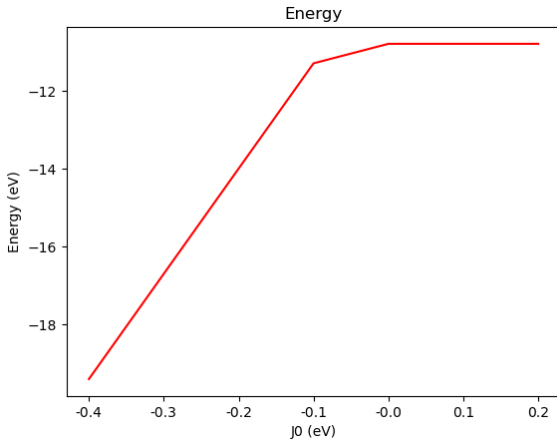
Final configuration variation with J_0

Final configuration, $J_0=0.1$



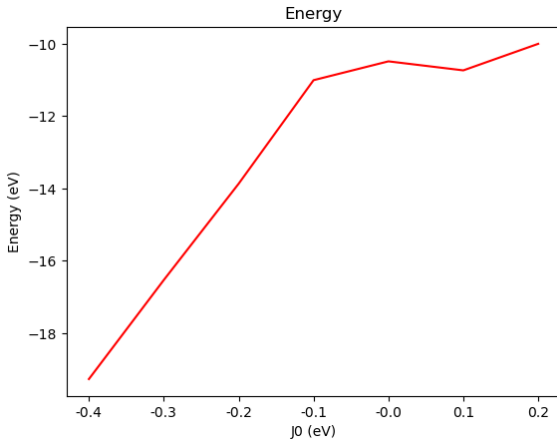
3 dimensional MC, $N = 27$

Energy @ $T = 0\text{ K}$



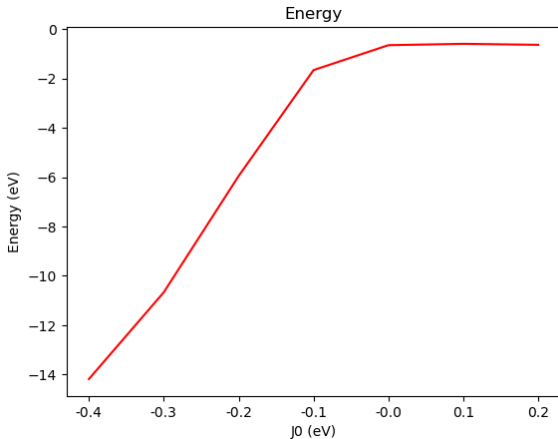
3 dimensional MC, $N = 27$

Energy @ $T = 500\text{ K}$



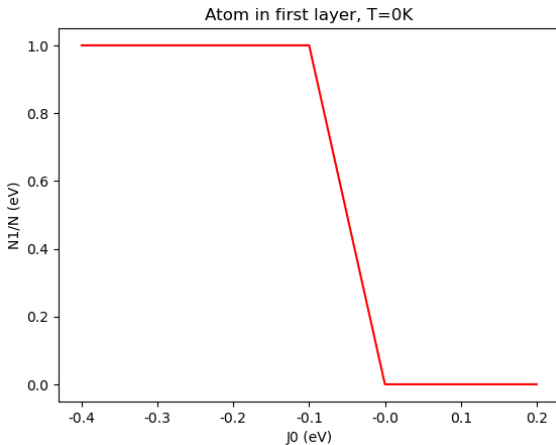
3 dimensional MC, $N = 27$

Energy @ $T = 1000\text{ K}$



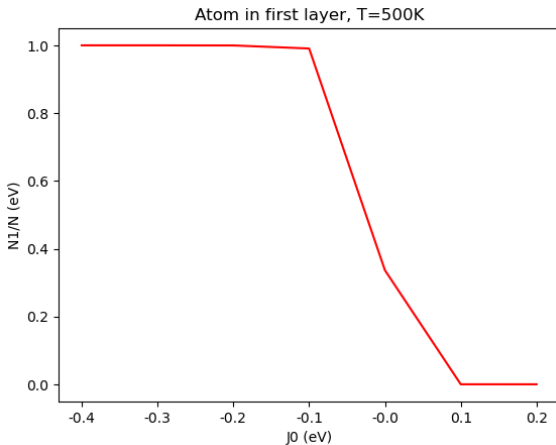
3 dimensional MC, $N = 27$

$$N_1/N @ T = 0 K$$



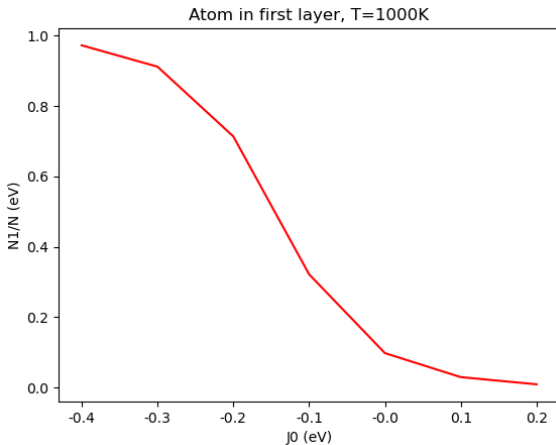
3 dimensional MC, $N = 27$

$$N_1/N @ T = 500 K$$



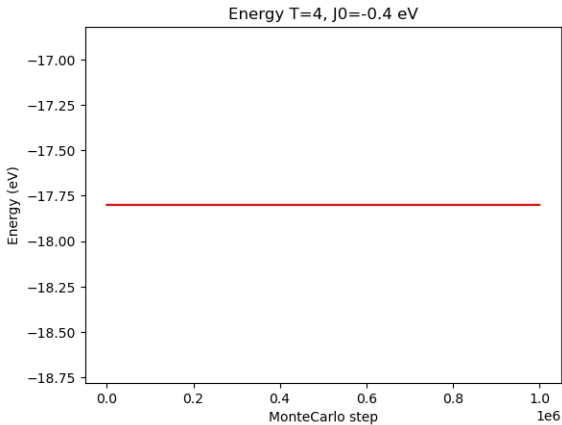
3 dimensional MC, $N = 27$

$$N_1/N @ T = 1000 K$$



Monolayer distribution

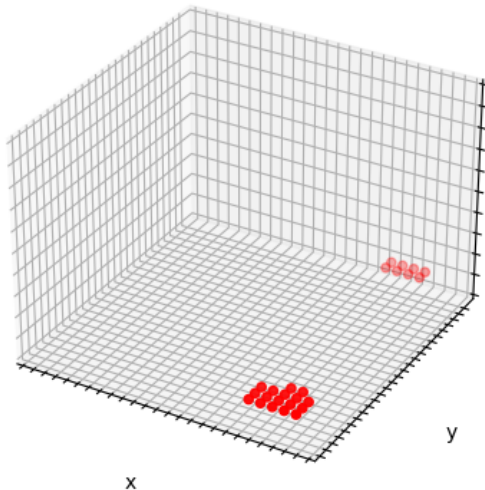
Low temperature, negative coupling



Monolayer distribution

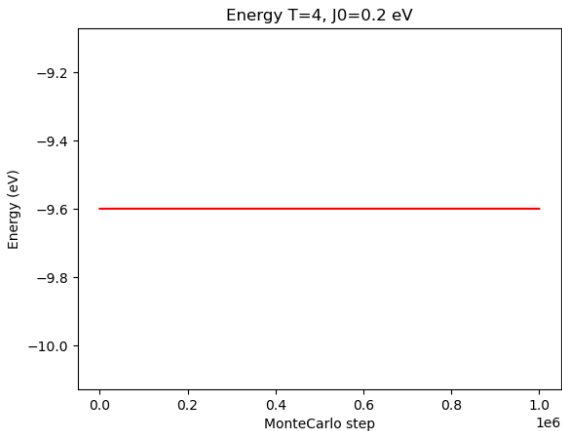
Low temperature, negative coupling

Final configuration $T=4$ K, $J_0=-0.4$ eV



Monolayer distribution

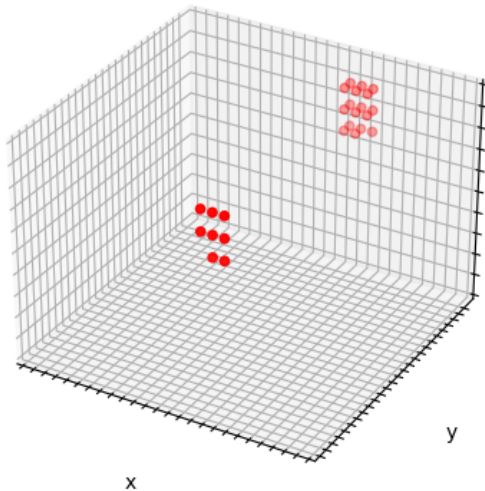
Low temperature, positive coupling



Monolayer distribution

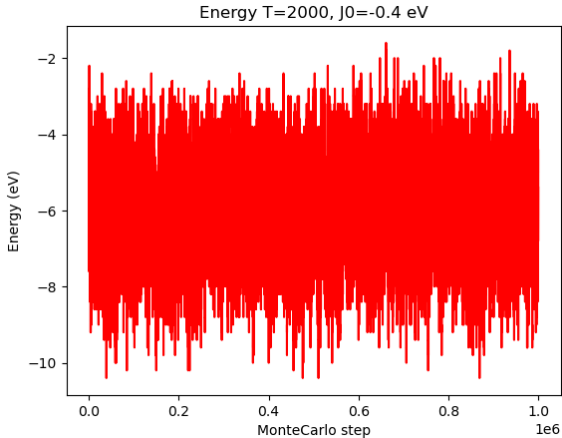
Low temperature, positive coupling

Final configuration $T=4$ K, $J_0=0.2$ eV



Monolayer distribution

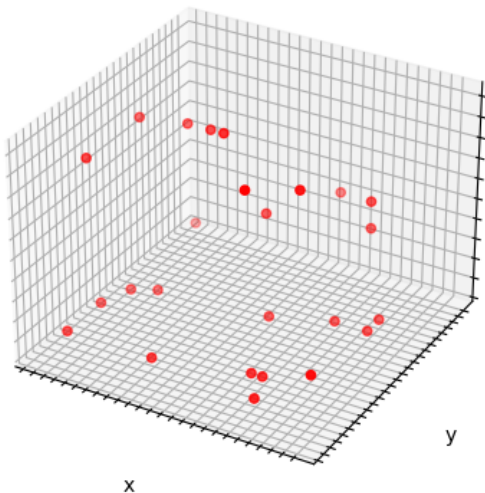
High temperature, negative coupling



Monolayer distribution

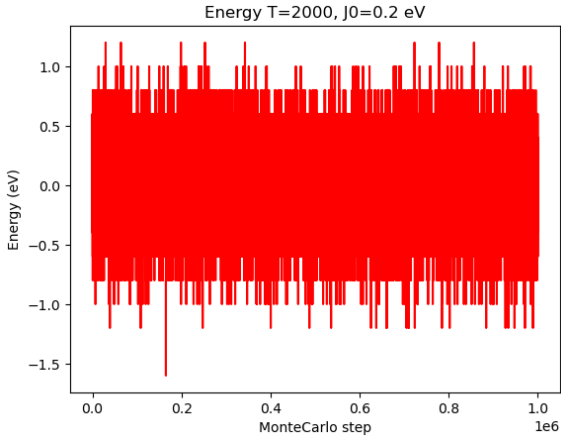
High temperature, negative coupling

Final configuration $T=2000$ K, $J_0=-0.4$ eV



Monolayer distribution

High temperature, positive coupling



Monolayer distribution

High temperature, positive coupling

Final configuration $T=2000$ K, $J_0=0.2$ eV

