Fys4150
Project 4 Figures and stuff

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https://github.com/kaaja/fys4150

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4b

mcs	Eavg	absMavg	Cv	chi
100	-2.000000	1.000000	0.000000	0.000000
1000	-1.972000	0.991500	0.220864	0.022711
10000	-1.991000	0.996950	0.071676	0.009263
100000	-1.995180	0.998475	0.038467	0.004321
1000000	-1.995904	0.998634	0.032701	0.004093
10000000	-1.995942	0.998643	0.032401	0.004074

Table 1: Estimated quantitites

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mcs	Eavg	absMavg	Cv	chi
100	0.201300	0.134106	-100.000000	-100.000000
1000	-1.201518	-0.717034	588.428762	466.254675
10000	-0.249606	-0.171303	123.412688	130.949678
100000	-0.040185	-0.018598	19.901104	7.728200
1000000	-0.003912	-0.002677	1.928037	2.039441
10000000	-0.002028	-0.001736	0.994274	1.573251

Table 2: Percentage deviations from analytical results

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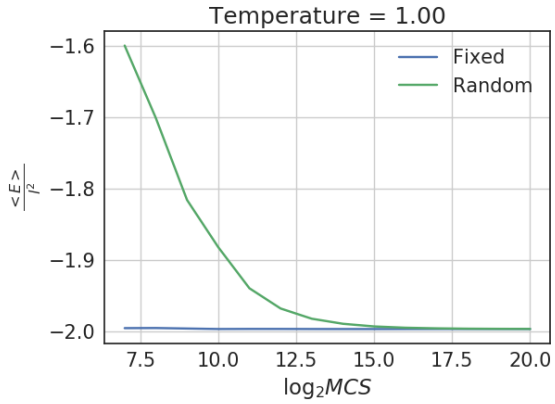

Figure 1: Expected Energy divided by L^2. $T = 1.0$.
Equilibrium reached after 2^{20} *Monte Carlo cycles.*

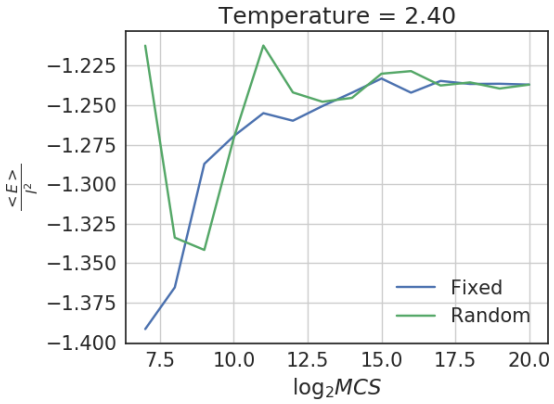

Figure 2: Expected Energy divided by L^2. $T = 2.4$.
Equilibrium reached at same point as for $T = 1$.

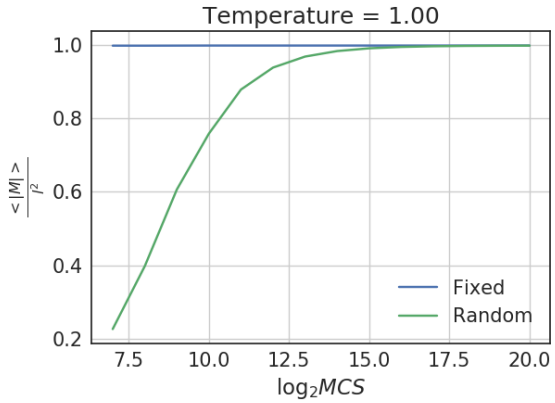

Figure 3: Expected absolute magnetic momentum divided by L^2. $T = 1.0$.
Equilibrium reached at same point as for the energy.

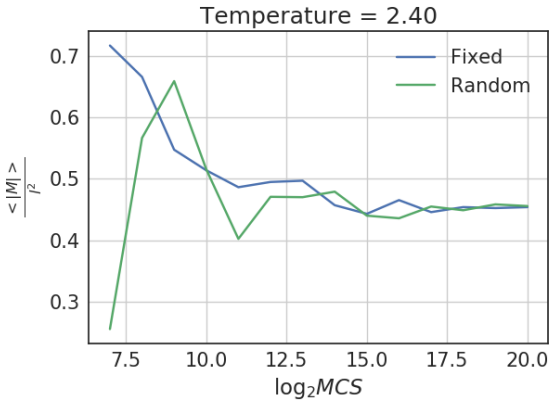

Figure 4: Expected absolute magnetic momentum divided by L^2. $T = 2.4$.
Equilibrium reached at same point as for the others.

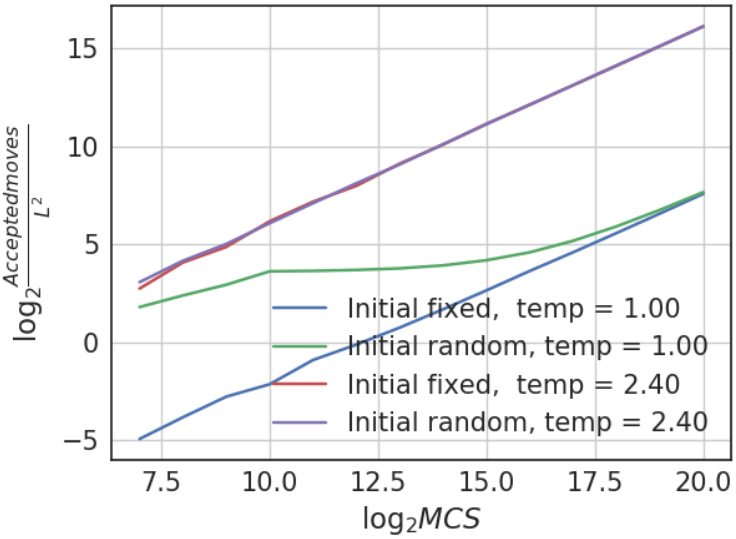

Figure 5: Accepted moved divided by L^2.

2 4d

$\log_2 MCs$	T	μ_E/L^2	$< E > /L^2$	$(\frac{\mu_E/L^2}{<E>/L^2} - 1) \cdot 100$	σ_E^2/L^2	$\frac{<E^2>-<E>^2}{L^2}$	$(\frac{\sigma_E/L^2}{1/L^2(<E^2>-<E>^2)} - 1) \cdot 100$	$< \lvert M \rvert > /L^2$	$\frac{<\lvert M \rvert^2>/L^2-<\lvert M \rvert>^2}{L^2}$	Cv/L^2	χ/L^2
20.0	1.0	-1.997172	-1.997172	-8.152091e-07	0.023281	0.023281	1.080300e-06	0.999279	0.001560	0.023281	0.001560
20.0	2.4	-1.236940	-1.236940	3.699787e-06	8.185407	8.185407	-4.893184e-07	0.453954	21.269744	1.421077	8.862393

Table 3: Statistics. Fixed initial config.

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$\log_2 MCs$	T	μ_E/L^2	$< E > /L^2$	$(\frac{\mu_E/L^2}{<E>/L^2} - 1) \cdot 100$	σ_E^2/L^2	$\frac{<E^2>-<E>^2}{L^2}$	$(\frac{\sigma_E/L^2}{1/L^2(<E^2>-<E>^2)} - 1) \cdot 100$	$< \lvert M \rvert > /L^2$	$\frac{<\lvert M \rvert^2>/L^2-<\lvert M \rvert>^2}{L^2}$	Cv/L^2	χ/L^2
20.0	1.0	-1.997043	-1.997043	4.680687e-07	0.039074	0.039074	-3.837571e-07	0.999040	0.065137	0.039074	0.065137
20.0	2.4	-1.236953	-1.236953	-2.208352e-06	8.094424	8.094424	1.406145e-07	0.455685	20.956863	1.405282	8.732026

Table 4: Statistics. Random initial config.

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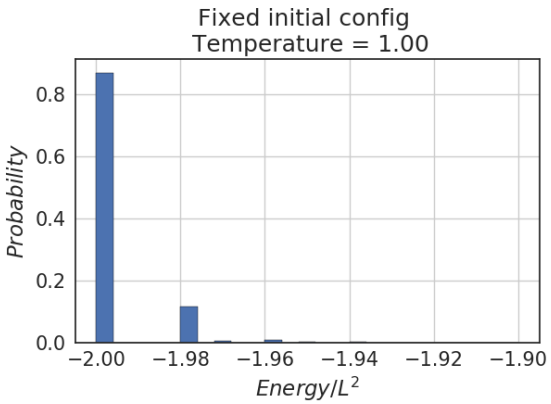

Figure 6: Probability distribution. Fixed intital $T = 1$.

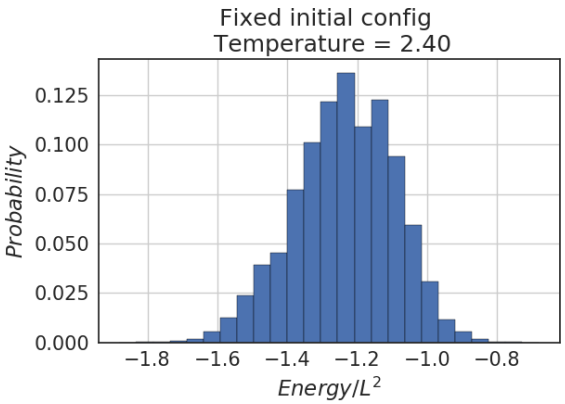

Figure 7: Probability distribution. Fixed intital $T = 2.4$..

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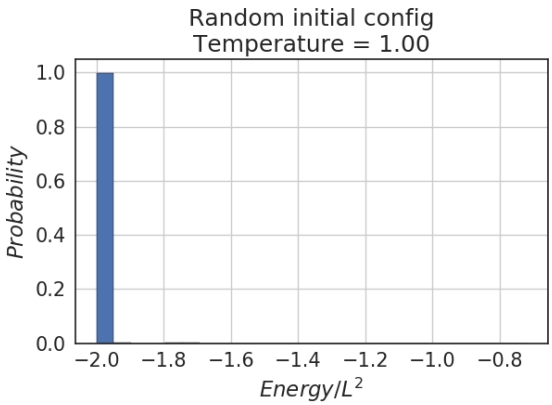

Figure 8: Probability distribution. Random intital $T = 1$.

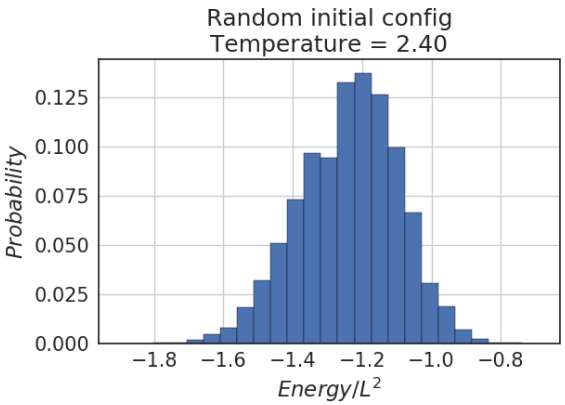

Figure 9: Probability distribution. Random intital $T = 2.4$.

3 4e

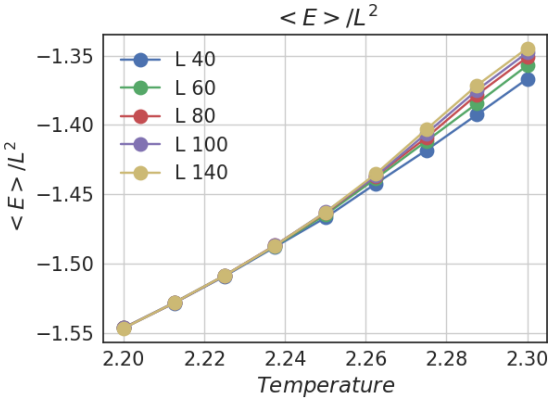

Figure 10: Expected value energy.

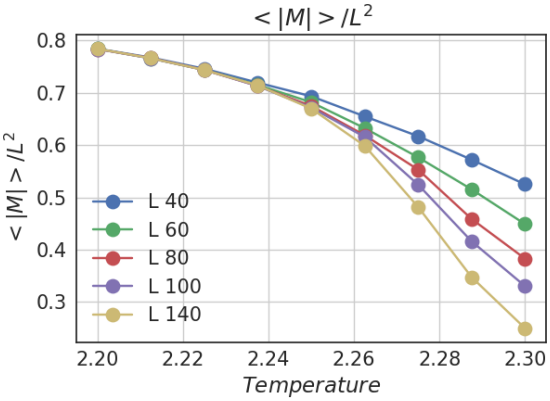

Figure 11: Expected value magnetic moment.

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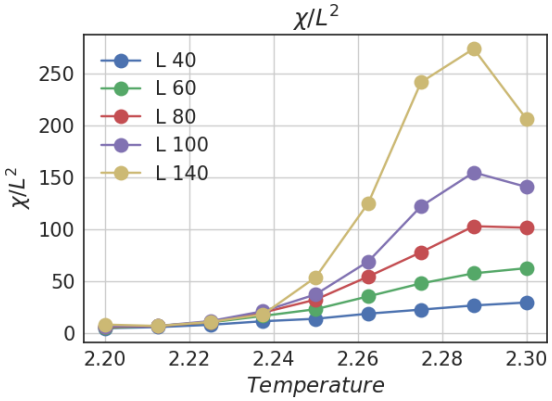

Figure 12: Susceptibility

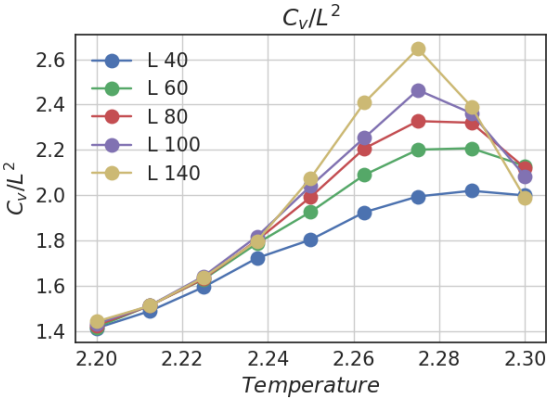

Figure 13: Specific heat capacity

Spin combos	$T_c^{Estimate}(L=\infty)$	$(\frac{T_c^{Estimate}(L=\infty)}{T_{c,exact}} - 1) \cdot 100$
$[40, 60]$	2.2875	0.80710401536
$[40, 60, 100]$	2.27916666667	0.439865020769
$[40, 60, 100, 140]$	2.27708333333	0.348055272121

Table 5: Estimated T_C.

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