The Energy Histogram

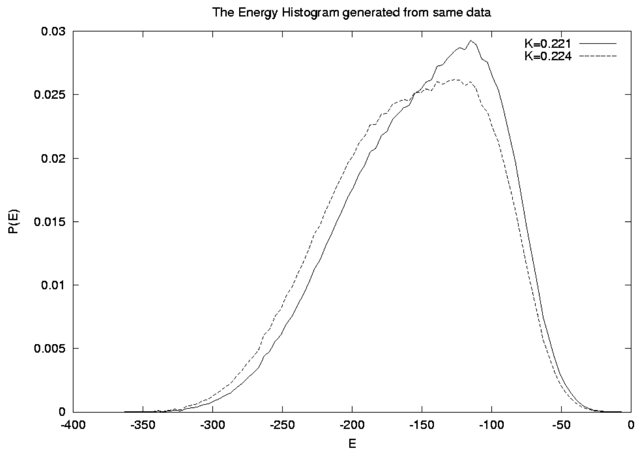
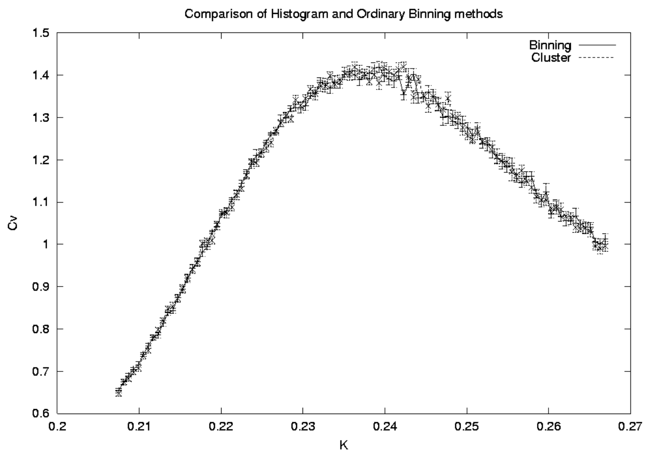


Figure 1: The Energy histogram, the simulation was carried out at 0.221 and extrapolated to 0.224

Note: The uncertainty is higher at lower energies. The peak of energy is lower for higher K, i.e. lower T as it should be.

Results are reliable only for $K \approx K_0$, the estimated histogram shifts away form K_0, and the peak gradually shifts into the wings, where statistical uncertainty is high.

The Resuting Curves



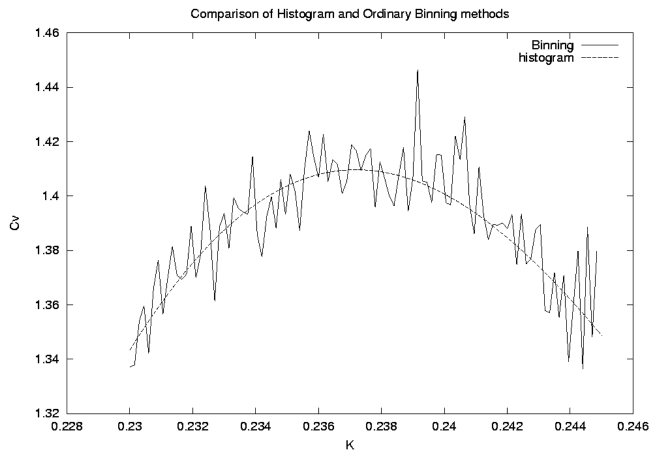
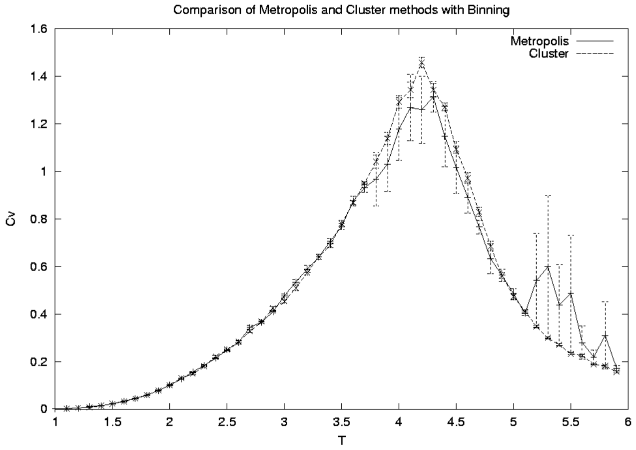


Figure 2: Plot of the susceptibility Cv from binning and histogram technique

The two plots agree within the errorbars.

The Resuting Curves



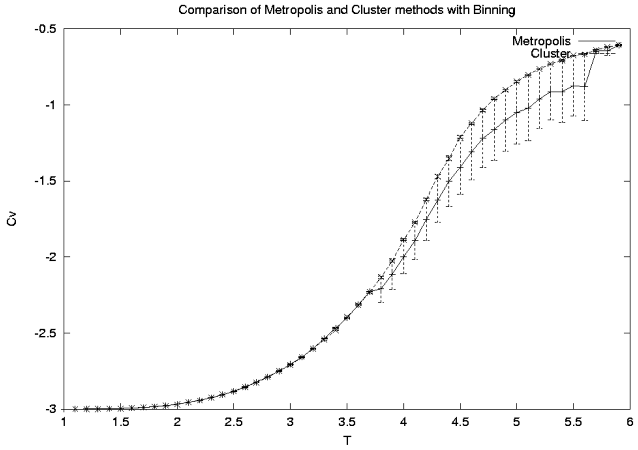
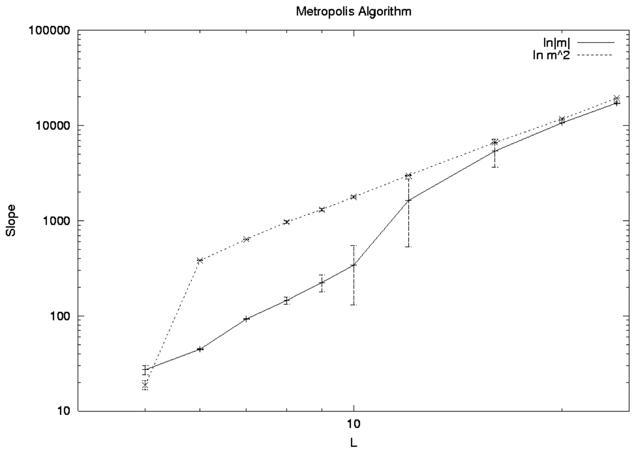


Figure 3: Plot of the susceptibility Cv and energy E from Metropolis and Histogram technique.

The errorbars are reduced for the cluster algorithm. Note, energy goes to -3 for low T.

Results: Estimation of ν



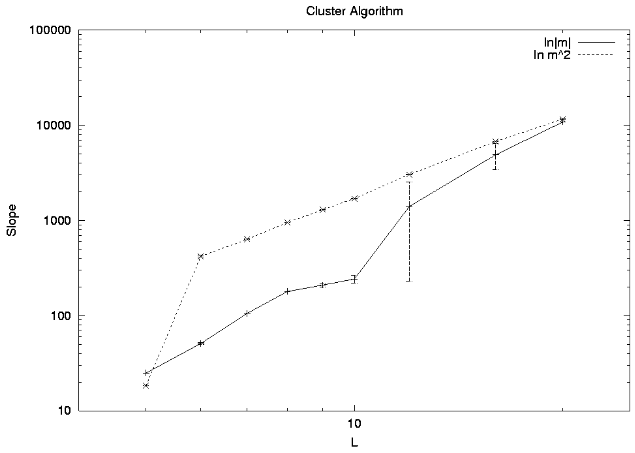


Figure 4: Log-log plot of size dependance of max. values of logarithmic derivatives of thermodynamic quantities

This result is valid for $L \geq 24$ so this plot becomes a straight line only at high L.

Metropolis: $\log m^2 : \nu = 0.368454 \pm 0.004126$

Cluster: $\log m^2 : \nu = 0.373703 \pm 0.009420$

Results: Determination of K_c

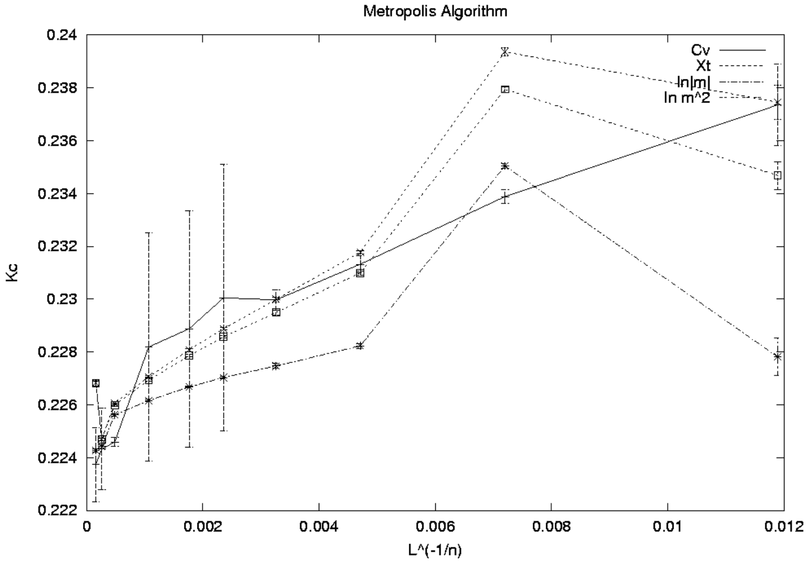
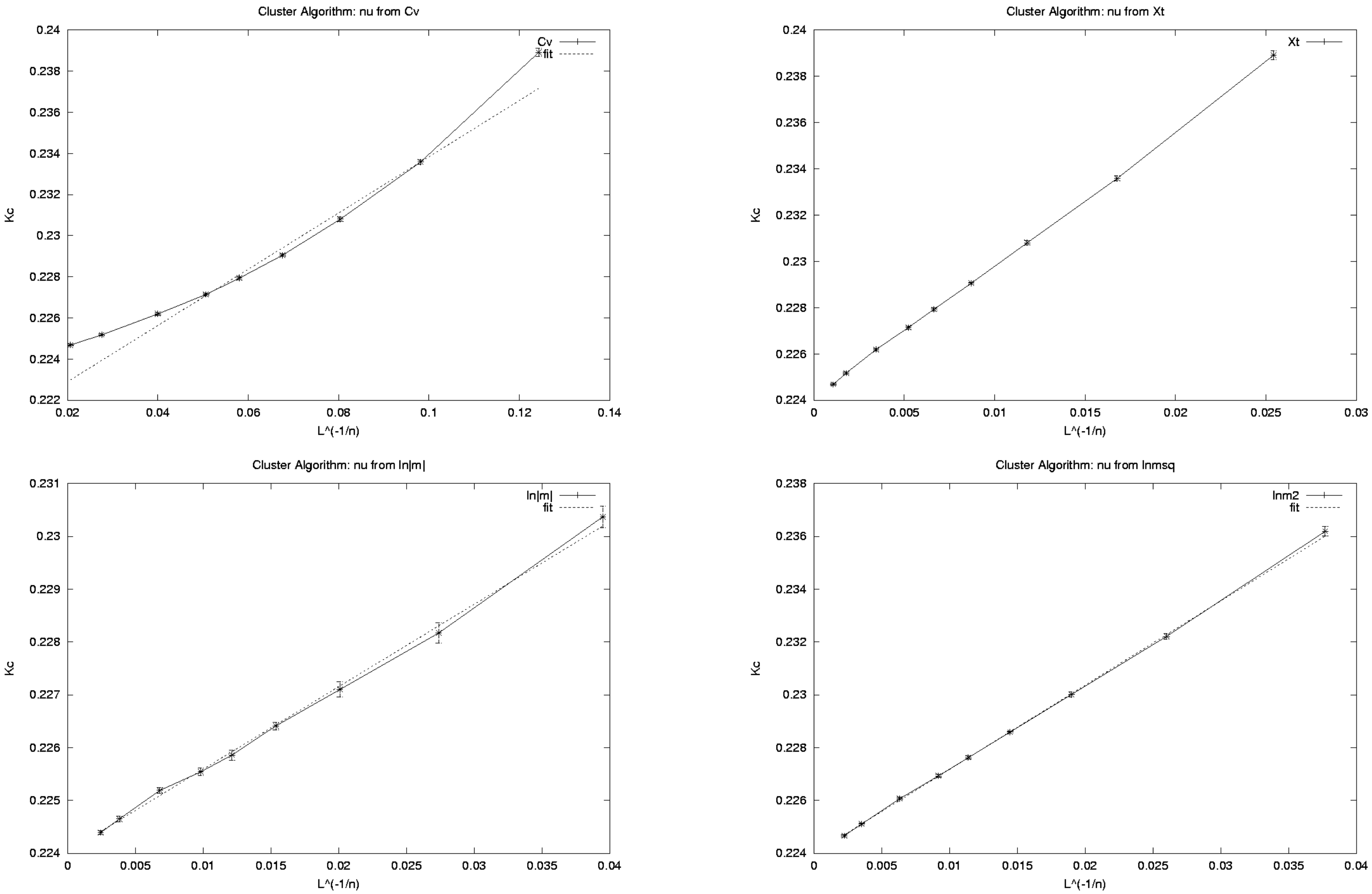


Figure 5: Size dependance of finite lattice effective critical temperatures.

This graph is again illustrates that the scaling law is not valid for small lattice size.

Results: Determination of K_c



Independent plot of each of the quantities from the Cluster run, using their individual ν values.

Results: Determination of K_c

	Metropolis				Cluster			
	C_V	χ_T	$\log\|m\|$	$\log m^2$	C_V	χ_T	$\log\|m\|$	$\log m^2$
K_c	.221	.224	.224	.225	.221	.224	.224	.224
ν	0.72	0.36	0.32	0.34	0.77	0.43	0.49	0.49

Reference Values:

$$K_c = 0.221659 \pm 0.0000026$$

$$\nu = 0.6289$$

Probably the estimation of the magnetisation is incorrect.

Results: Comparison of the time and Efficiency

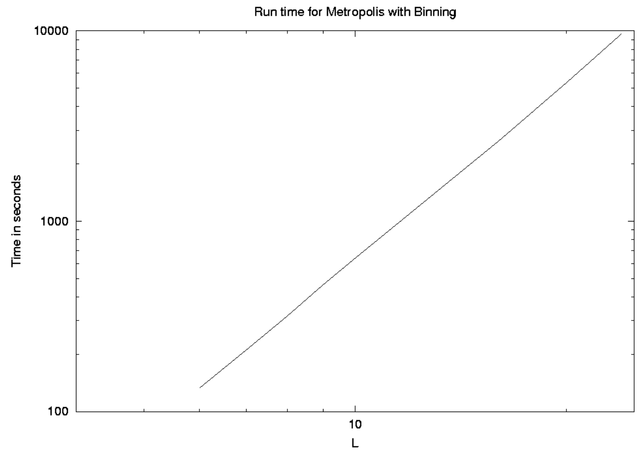


Figure 6: The run time for the Metropolis method with binning scales as L cube

The scaling for the run time is approximately 2.8 .

Efficiency

Metropolis(H)	Metropolis(B)	Cluster(H)	Cluster(B)
15045	403	21026	596