

# Brendan Philbin

## Ising Model Minimum Energy

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### Import relevant files and define plots

```
In[35]:= Clear["Global`*"];
SetDirectory[NotebookDirectory[]];
numSweeps = Range[0, 100];
colors = {Darker[Red], Blue, Darker[Green], Black, Orange};
trials = Range[1, 50];
plots = Range[1, 50];
For[i = 1, i ≤ 50, i++,
  Evaluate[Symbol["rawTrial " <> ToString[i]]] =
    Flatten[Import["min_energy_output " <> ToString[i] <> ".csv", "CSV"]];
  Evaluate[Symbol["trial " <> ToString[i]]] =
    Transpose[{numSweeps, Evaluate[Symbol["rawTrial " <> ToString[i]]]}];
  trials[[i]] = Evaluate[Symbol["trial " <> ToString[i]]];
  Evaluate[Symbol["plot " <> ToString[i]]] =
    ListLinePlot[trials[[i]], PlotStyle → colors[[Mod[i, 5]]];
  plots[[i]] = Evaluate[Symbol["plot " <> ToString[i]]];
];
```

### Create 10 plots grouping 5 trials with same J\_SEED

```
In[42]:= Show[plots[[1]], plots[[2]], plots[[3]], plots[[4]], plots[[5]], Frame → True, FrameStyle → Black,
  LabelStyle → Black, FrameLabel → {"# of sweeps", "dimensionless energy"},
  PlotRange → All, PlotLabel → "Spin Glass: N = 16, M
    = 100,  $\beta$  = 5, J_SEED = 2, MC_SEED = 45, SPIN_SEED varies"]

Show[plots[[6]], plots[[7]], plots[[8]], plots[[9]], plots[[10]], Frame → True, FrameStyle → Black,
  LabelStyle → Black, FrameLabel → {"# of sweeps", "dimensionless energy"},
  PlotRange → All, PlotLabel → "Spin Glass: N = 16, M
    = 100,  $\beta$  = 5, J_SEED = 3, MC_SEED = 45, SPIN_SEED varies"]

Show[plots[[11]], plots[[12]], plots[[13]], plots[[14]],
  plots[[15]], Frame → True, FrameStyle → Black, LabelStyle → Black,
```

```

FrameLabel → {"# of sweeps", "dimensionless energy"},
PlotRange → All, PlotLabel → "Spin Glass: N = 16, M
= 100,  $\beta$  = 5, J_SEED = 4, MC_SEED = 45, SPIN_SEED varies"]

Show[plots[16], plots[17], plots[18], plots[19],
plots[10], Frame → True, FrameStyle → Black, LabelStyle → Black,
FrameLabel → {"# of sweeps", "dimensionless energy"},
PlotRange → All, PlotLabel → "Spin Glass: N = 16, M
= 100,  $\beta$  = 5, J_SEED = 5, MC_SEED = 45, SPIN_SEED varies"]

Show[plots[21], plots[22], plots[23], plots[24],
plots[25], Frame → True, FrameStyle → Black, LabelStyle → Black,
FrameLabel → {"# of sweeps", "dimensionless energy"},
PlotRange → All, PlotLabel → "Spin Glass: N = 16, M
= 100,  $\beta$  = 5, J_SEED = 6, MC_SEED = 45, SPIN_SEED varies"]

Show[plots[26], plots[27], plots[28], plots[29],
plots[30], Frame → True, FrameStyle → Black, LabelStyle → Black,
FrameLabel → {"# of sweeps", "dimensionless energy"},
PlotRange → All, PlotLabel → "Spin Glass: N = 32, M
= 100,  $\beta$  = 5, J_SEED = 2, MC_SEED = 45, SPIN_SEED varies"]

Show[plots[31], plots[32], plots[33], plots[34],
plots[35], Frame → True, FrameStyle → Black, LabelStyle → Black,
FrameLabel → {"# of sweeps", "dimensionless energy"},
PlotRange → All, PlotLabel → "Spin Glass: N = 32, M
= 100,  $\beta$  = 5, J_SEED = 3, MC_SEED = 45, SPIN_SEED varies"]

Show[plots[36], plots[37], plots[38], plots[39],
plots[40], Frame → True, FrameStyle → Black, LabelStyle → Black,
FrameLabel → {"# of sweeps", "dimensionless energy"},
PlotRange → All, PlotLabel → "Spin Glass: N = 32, M
= 100,  $\beta$  = 5, J_SEED = 4, MC_SEED = 45, SPIN_SEED varies"]

Show[plots[41], plots[42], plots[43], plots[44],
plots[45], Frame → True, FrameStyle → Black, LabelStyle → Black,
FrameLabel → {"# of sweeps", "dimensionless energy"},
PlotRange → All, PlotLabel → "Spin Glass: N = 32, M
= 100,  $\beta$  = 5, J_SEED = 5, MC_SEED = 45, SPIN_SEED varies"]

Show[plots[46], plots[47], plots[48], plots[49],
plots[50], Frame → True, FrameStyle → Black, LabelStyle → Black,
FrameLabel → {"# of sweeps", "dimensionless energy"}, PlotRange → All, PlotLabel →

```









