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## The Metropolis Algorithm

This dynamic method of generating an arbitrary probability distribution was invented by Metropolis, Teller, and Rosenbluth in 1953 (supposedly at a Los Alamos dinner party).

There are many possible choices of the  $W$ 's which will satisfy detailed balance. They chose a very simple one:

$$\begin{aligned}
 W(A \rightarrow B) &= e^{-\Delta E/kT} && \text{if } \Delta E > 0 \\
 &= 1 && \text{if } \Delta E \leq 0
 \end{aligned}$$

So, if  $E(B) > E(A)$

$$\frac{W(A \rightarrow B)}{W(B \rightarrow A)} = \frac{e^{-[E(B)-E(A)]/kT}}{1} = e^{-\Delta E/kT}$$

and if  $E(B) \leq E(A)$

$$\frac{W(A \rightarrow B)}{W(B \rightarrow A)} = \frac{1}{e^{-[E(A)-E(B)]/kT}} = e^{-\Delta E/kT}$$

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