Consider large $T$ (above melting pt.)

1. Pick a state of system (above melting)
2. Generate $T_c$
3. Calculate $E(a + \delta a)$
4) if $E(a+\Delta a) \leq E(a)$, then accept $\Delta a$

if $E(a+\Delta a) - E(a) > 0$, accept with a probability $P = e^{-\Delta E/kT}$ where $T$ chosen as $E(a)$

Metropolis algorithm
Note: The lower the temperature, less likely an uphill step is taken! $P \sim e^{-\Delta E/T}$

Generalizing: One must provide:
1) A description of all possible system configurations, i.e., given $\xi$, can you find $E(\xi)$?

2) A generator of random changes in the "state" or configuration, these changes are presented as options to the system, i.e., must be able to provide $\xi$.
3) An objective (cost) function, analogous to Energy, whose minimization is the goal!

4) A control parameter, analogous to $T$ and an "annealing" schedule which tells how $T$ is lowered from high to low; e.g., after how many random changes in
configuration is each 19 6 downward step in \( T \) taken, and how large is \( \Delta T \)?

An illustration: The famous Traveling salesman problem.

1) Configuration. Cities are numbered 1, 2, 3... \( N \). "Energy" permutation of visitation is a configuration.
2) Rearrangements.

A **efficient** set of moves could be:

a) A section of path is removed and replaced by same cities in **opposite** order.

1 2 3 4 5 6 ...

1 2 5 4 3 6 ...
b) a section of path is removed and replaced between two cities on another, randomly chosen, section.