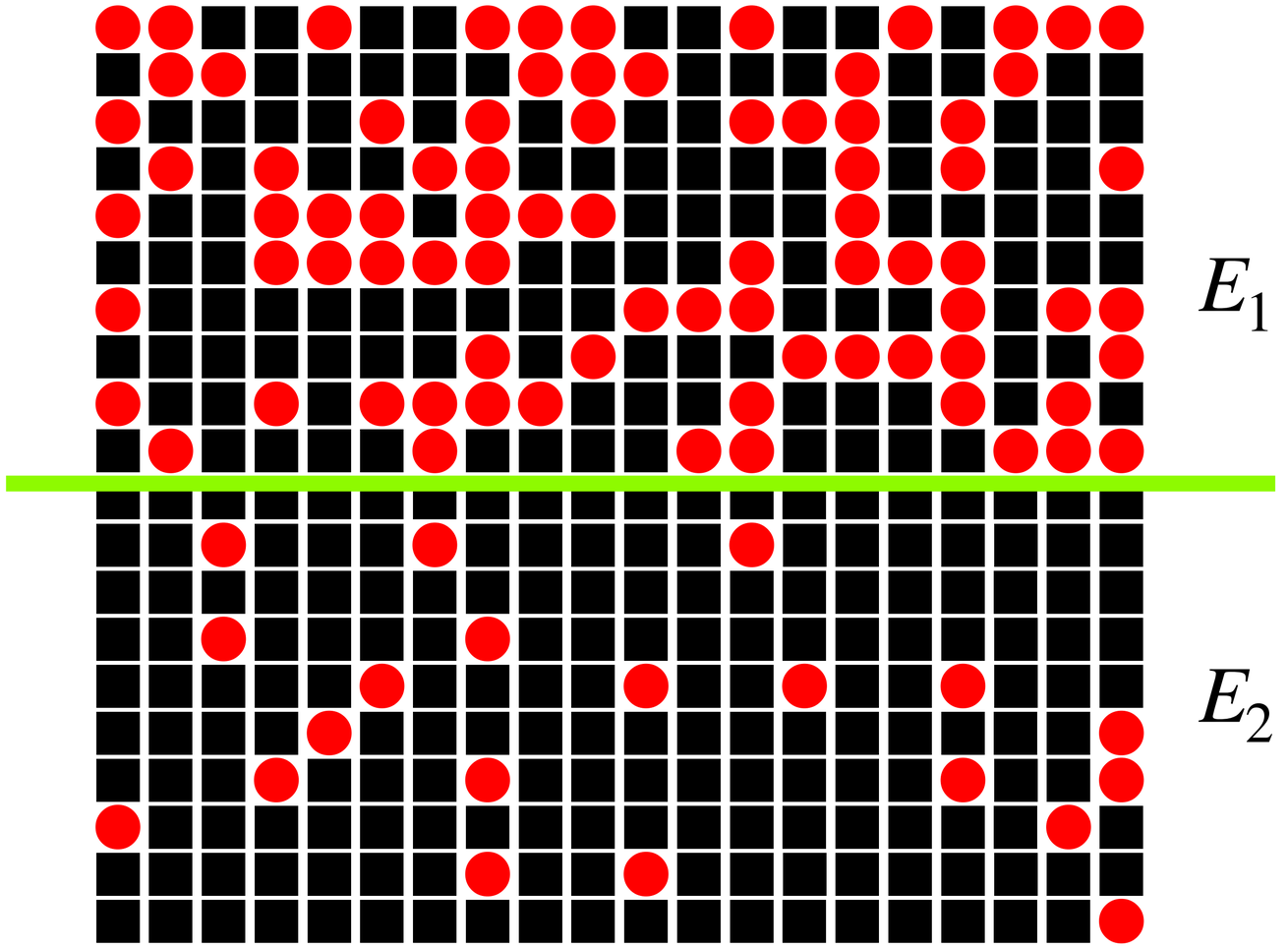
Two thermalized states, separated by a partition



$E_1 = 80\,\Delta$

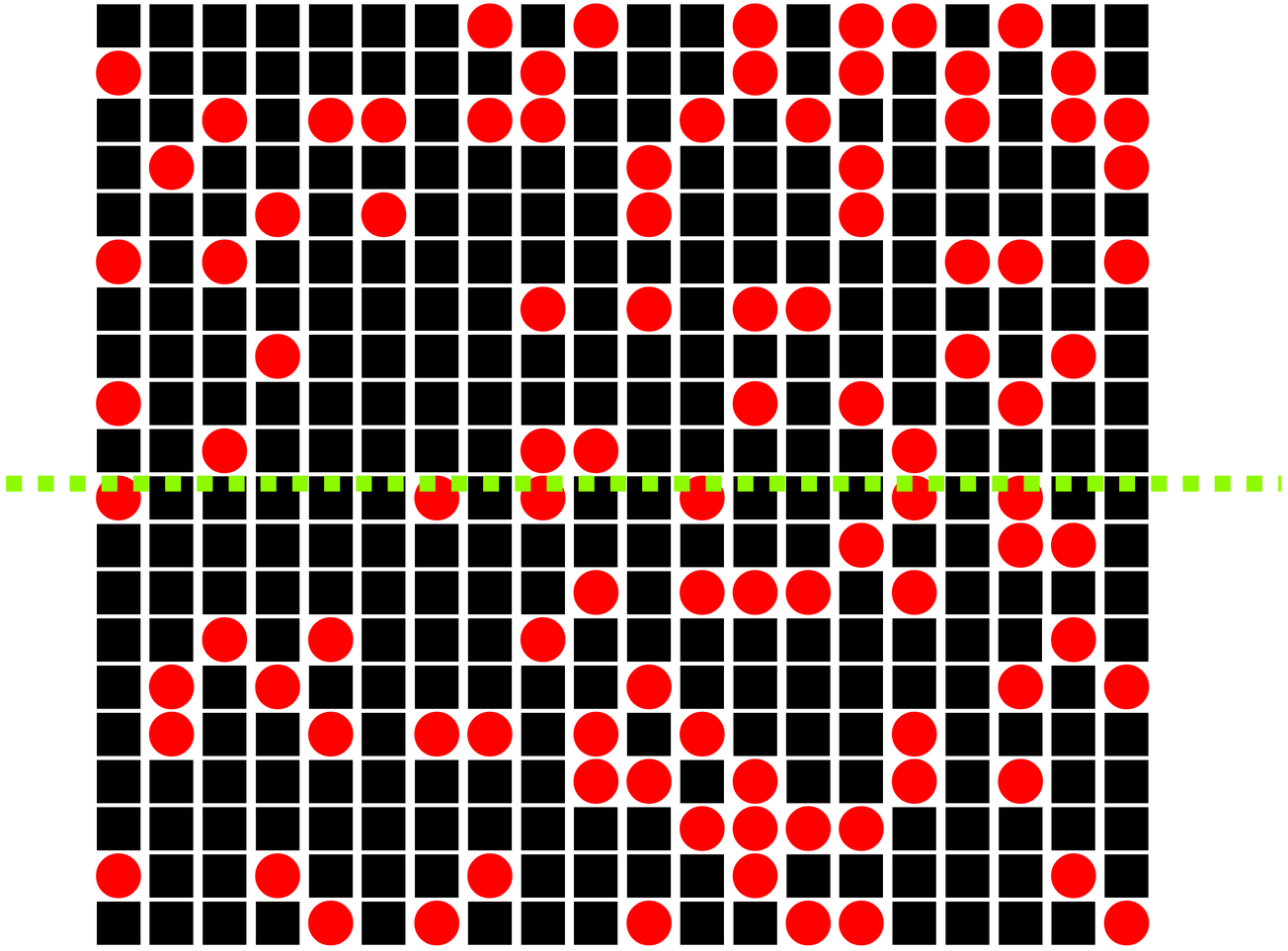
$E_2 = 20\,\Delta$

The macro state is

$$(E_1, E_2) = (80,20)$$

When the partition is removed the system hops exploring configurations with different partitions of energy.

When the partition is removed the system thermalizes. This is irreversible



When the partition is removed the system hops exploring all configurations.

The probability is essentially zero that it will return to the partition $(E_1, E_2) = (80,20)\Delta$

The process is irreversible