

4.9. Fuel Value of Information

A collection of N non-interacting spins initially all up, evolves into a random collection of up and down spins through interaction with its surroundings.

4.9a The entropy of the collection

(a) increases by $Nk \ln 2$

(b) decreases by $Nk \ln 2$

(c) increases by $k \ln 2$

(d) decreases by $k \ln 2$

(e) None of the above

4.9b Suppose this collection of spins is coupled to a device. Consider the following statements:

A. Any device will deliver $NkT \ln 2$ of useful energy as output..

B. Only a properly designed will deliver $NkT \ln 2$ of useful energy as output.

C. The output energy is extracted from the spins whose energy is lowered.

D. The output energy is extracted from the surroundings, the spins neither gain nor lose any energy.

(a) B is correct, A, C and D are wrong.

(b) B and D are correct, A and C are wrong.

(c) A and C are correct, B and D are wrong.

(d) D is correct, A, B and C are wrong

(e) A, B, C and D are all wrong