Thermodynamics

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1 Definitions of entropy & temperature

The entropy, S, of a system is defined in terms of the logarithm of the number of accessible microstates:

$$S := k_B \ln \Omega(E)$$

We can define temperature, T, in terms of the relationship between E and $\Omega(E)$, if we pretend that E and $\Omega(E)$ are differentiable.

$$\frac{1}{T} = \frac{\partial S}{\partial E} = \frac{k_B}{\Omega(E)} \cdot \frac{\partial \Omega(E)}{\partial E}$$

That simplifies to

$$T = \frac{\Omega(E)}{k_B \Omega'(E)}$$

TODO: COME UP WITH AN INTUITIVE WAY TO INTERPRET TEMPERATURE AS IT IS DEFINED HERE

2 Boltzmann factor

2.1 Derived using partial derivatives

2.2 Derived using Stirling's approximation

3 Derivation of ideal gas law

4 Derivation of Maxwell-Boltzmann velocity distribution

Find formula for median, mode, mean, and RMS

5 Stern–Gerlach experiment

6 Other misc stuff from textbooks?