## Overview, ch 2-5

Chapter 1 introduced heat, work energy, temperature.

what remains...

- microstates and macrostates
  entropy and the second law
- $\mathbf{0} \Rightarrow$  temperature, heat and entropy (and pressure)
- consequences of the second law: heat engines and refrigerators
- consequences of the second law: chemical reactions

Remaining questions to answer:

- What is temperature really?
- Why does heat flow from hotter to colder objects?
- Why do many processes happen in one direction only, but not in the referse?
   "irreversible"

Short answer:

Irreversible processes are very very probable but not inevitable.

If energy moves around "randomly" the chances that it will be distributed more uniformely are more than huge.

## Plan

Examine how systems store energy and count the number of ways it can be arranged — conbinatorics.

2.1 Two state systems:

- Small systems (flip three coins)
- Big systems,  $N \sim 100$  coins
- 2.2 Model of a solid
  - Three oscillators
  - N oscillators
- 2.3 Interacting systems
  - Small
  - ▶ Big,  $N \sim 100$
- 2.4 Huge systems,  $N\sim 10^{20}$
- 2.5 The ideal gas
- 2.6 Entropy

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