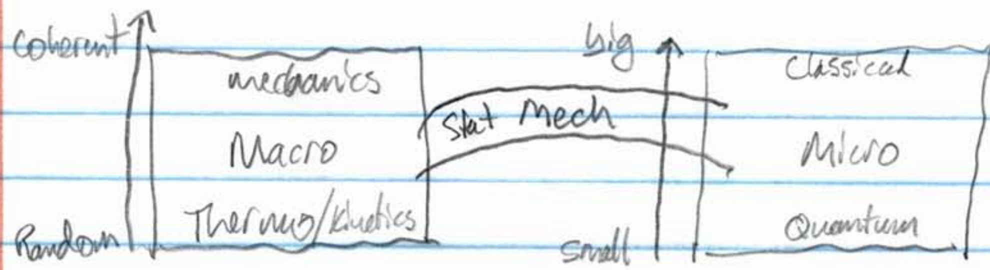
Chapter 1

Introduction to Thermo/Stat. Mech

First let's look at some quotes about Thermo

- Arnold Sommerfield: Thermo is hard!
- Albert Einstein: Classical thermo is important.

What about Statistical Mech? → it's the bridge (see Figure)



In this class we'll focus on the macroscopic until November ⇒ chp 17 deals w/ Stat. Mech

Speaking of the syllabus, let's all look at it now...

...ok, so let's talk more about "What is Thermo?"

→ it started in ~1770 with people trying to figure out how things heat up and cool down (caloric theory)

→ the equivalence of heat and work was found in 1798 by Count Rumford while drilling canons.

Now we'll do a demo...

- That demo was the same thing that James Joule (who was inspired by Rumford) did in ~1840.

- The second demo shows the conversion of heat back into work.
  - ↳ Sadi Carnot realized (in ~1820) that there is an upper limit to how much heat can be converted to work
    - ↳ We'll see in chapter 3 that this upper limit depends on the absolute temperatures of the hot body and of the cold body (heat is "transfer of energy from hot body to cold body")

- So, two experiments (work → heat, and heat → work) started people thinking in a whole new way.

- In the end, the found out that it is more convenient to discuss energy by specifying additional parameters
  - ↳ Internal Energy, U, is the energy of a system w/ S + V fixed
  - ↳ Enthalpy, H, " " " " " " w/ S + P Fixed
  - ↳ Gibbs Free Energy, G, " " " " " " w/ P + T Fixed
  - ↳ Helmholtz Free Energy, F, " " " " " " w/ T + V Fixed

- These 4 kinds of energies can be understood by an analogy to money: stocks, bonds, mutual funds, T-bills all are $

Now, let's look again at our PowerPoint slides handout:

- system vs. surroundings
- open vs. closed vs. isolated vs. adiabatic

We'll look at these again next lecture