Chapter 1

Introduction to Thermo/Stat. Mech

First let's look at some quotes about Thermo

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

What about Statistical Mech? \(\rightarrow\) It's the bridge (see Figure)

In this class we'll focus on the macroscopic until November \(\rightarrow\) 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?"

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

\(\rightarrow\) 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.

- So! Cannot realize 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 with s + v fixed
  - Enthalpy, H, is with s + p fixed
  - Gibbs Free Energy, G, is with p + t fixed
  - Helmholtz Free Energy, F, is with 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.