Franck-Hertz Experiment

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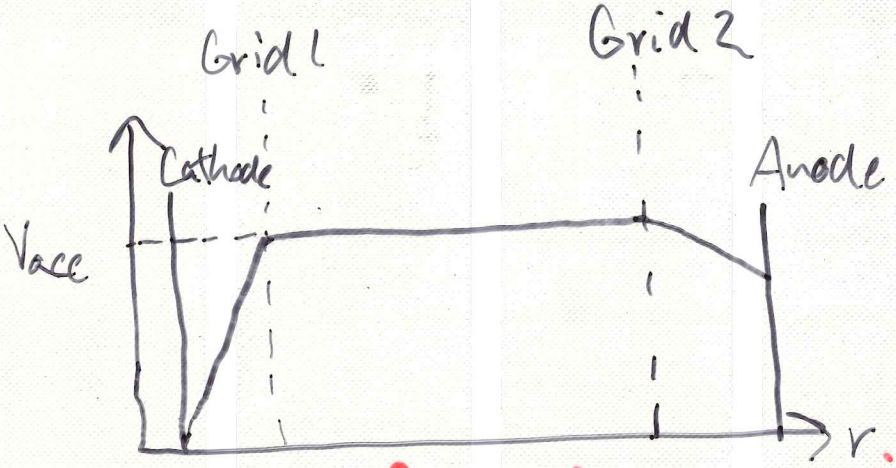
Energy quantization

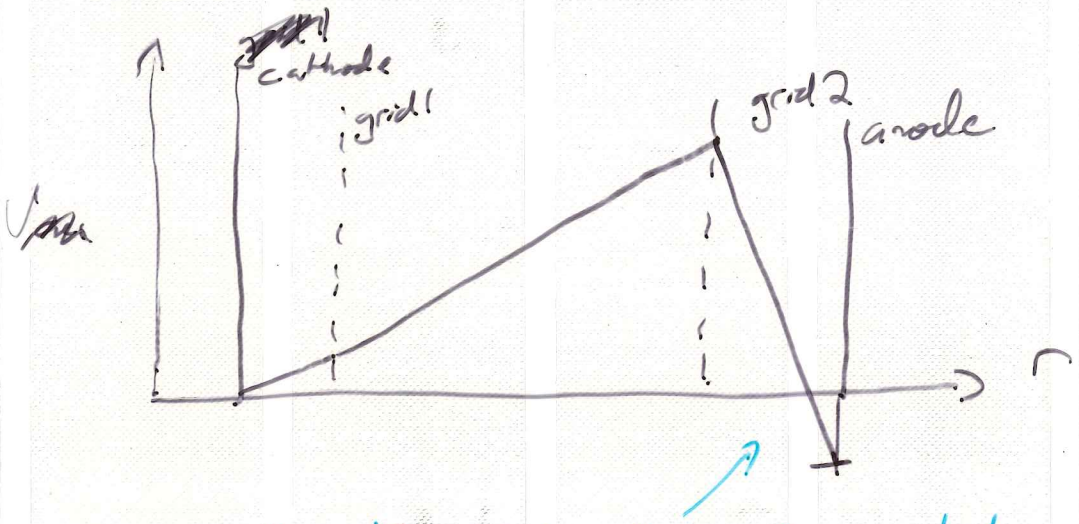
In this experiment we will inelastically scatter electrons off of Hg vapor and find in what units their energy is lost.



Potentials for single excitation experiment

We will vary Vacc and plot current collected on the anode vs. Vacc

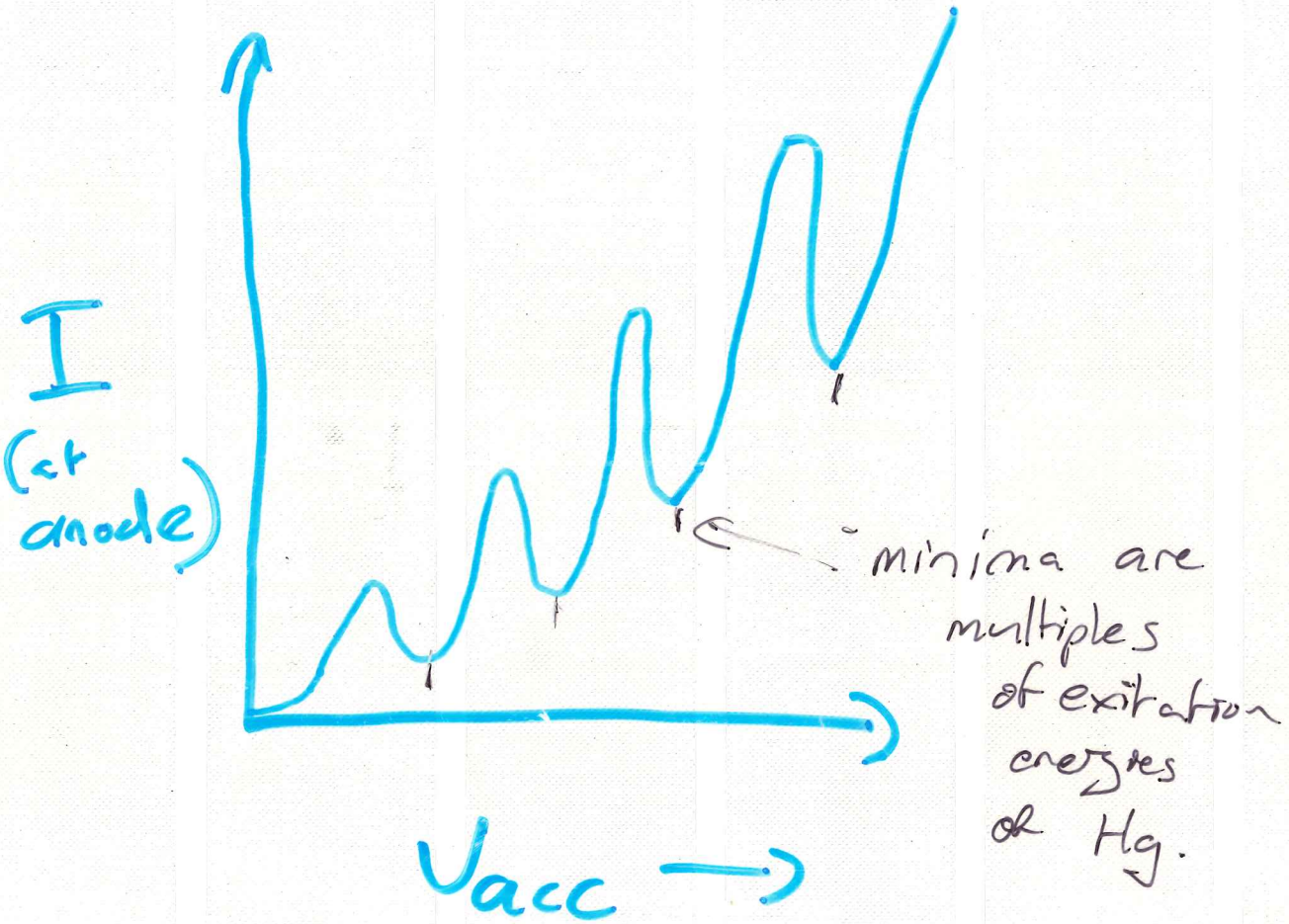
Ionization Energies



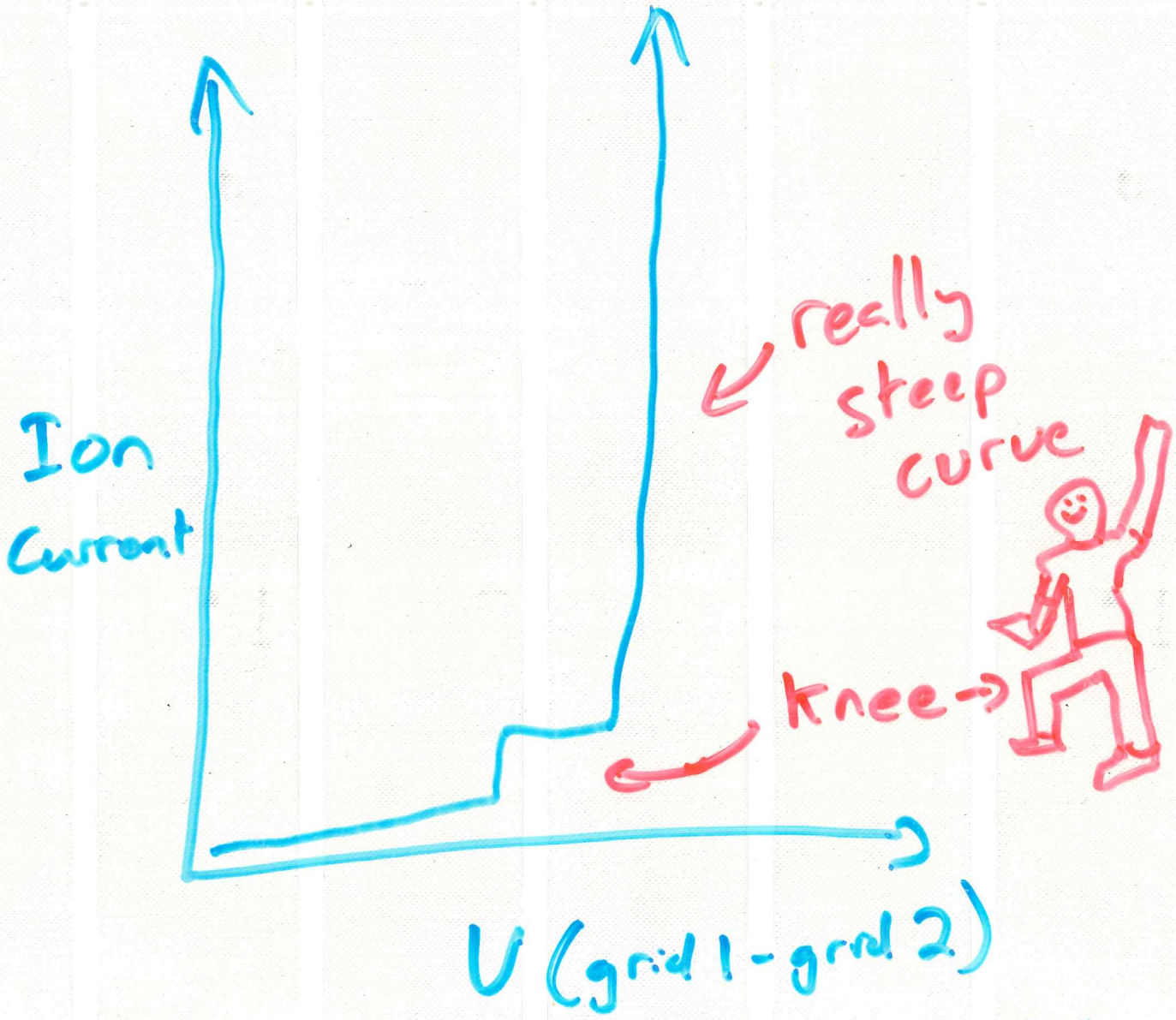
note the total voltage drops between the cathode and the anode. No electrons can get through.

Ions produced near grid 2 will be accelerated towards the anode, and create an ion current...

We expect...



When the electrons have energies at (or above) the excitation energies of Hg, they can lose energy in multiples of the excitation energy.



The knee is due to the photo-electric effect (excited mercury atoms give off UV photons when they fall back to the ground state. Those photons hit the anode, and the loss of negative electrons creates the same sort of currents as a gain of positive ions.)