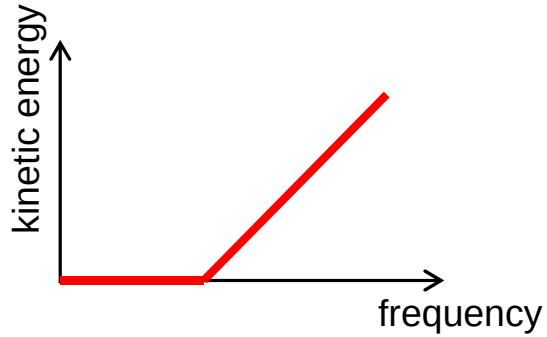


Can one determine Planck's constant *h* from the kinetic energy vs. frequency observation in the photoelectric effect?

(A)Yes, via the intersection with the x-axis

(B) Yes, via the slope of curve

(C) No, it is not possible.

A photon at 300 nm will “kick out” an electron with an amount of kinetic energy, KE_{300}. If the wavelength is *halved* and it is absorbed an electron in the metal that is bound with same energy as the previous electron, the energy of the electron coming out is

(A) less than ½ KE_{300}.

(B) ½ KE_{300}

(C) = KE_{300}

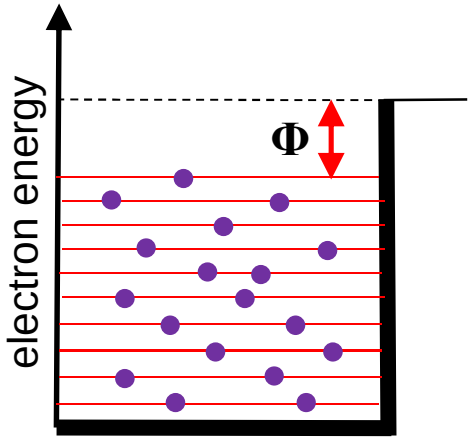
(D) 2 x KE_{300}

(E) more than 2 x KE_{300}

Careful:
Draw pictures / use formula

Discuss your answer
Use reasoning

You initially have blue light shining on metal. If you change the frequency to violet light (at same # of photons per second), what happens to the number of electrons coming out?



(A) fewer electrons kicked out

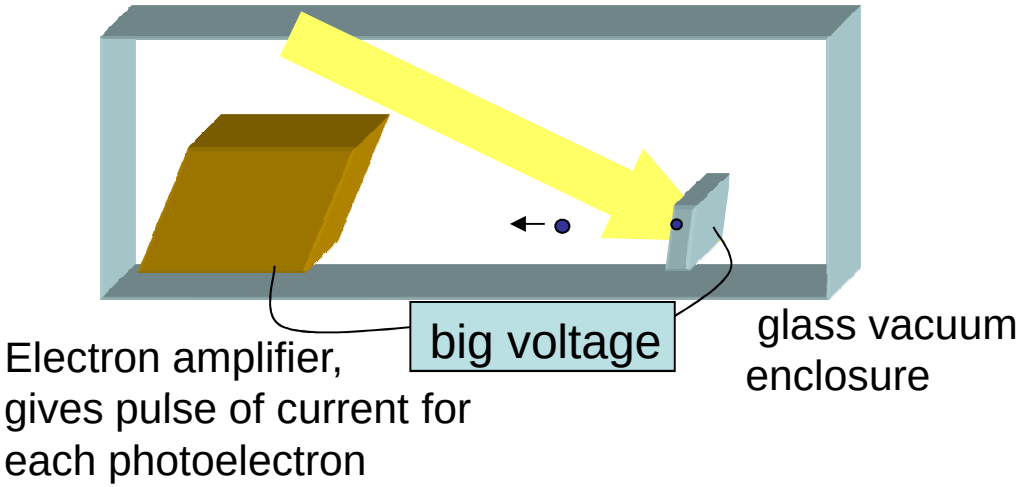
(B) same # of electrons

(C) more electrons kicked out

(D) not enough information

My first answer is that I need more information: For example, how large is the work function Φ, how much energy does it require to free the most tightly bound electrons?
Assuming the photon energy of both blue and violet light is larger than the work function but insufficient to free the most tightly bound electrons, than more electrons are kicked by the violet light (larger photon energy) than by the blue light.
If this explanation is too brief, do not hesitate to ask one of the team.

Application of photoelectric effect: Photomultiplier



Apparatus to detect single photons
(eye is incredible good: can detect few photons)

Atom models

Greek philosophers:

αтομου (atom) – indivisible

John Dalton:

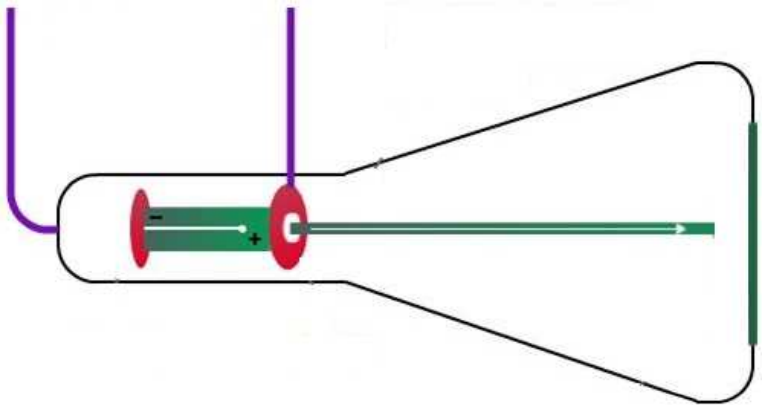
all matter consists of atoms

J.J. Thomson:

discovery of electron

atoms are made up of smaller particles

Cathode rays (J.J. Thomson)



E-field: ray consists of charged particles

Crossed E&B-fields: charge-to-mass ratio
(independent of material of cathode)

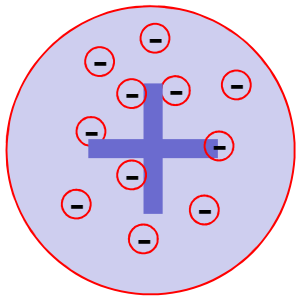
→ same charged particle (electron)

Atom model (J.J. Thomson)

Following Thomson's discovery of electron:

- Atoms must consist of positively and negatively charged particles

- But: How are the charges distributed?



electrons in
positively charged soup
(Plum-pudding model)