

The relationship that Einstein proposes between the stopping potential and the frequency is $V_{stop} = \left(\frac{h}{e}\right)f - \frac{\Phi_{eff}}{e}$ which is in fact the linear regression model to which we fit Millikan's data. We can see from how our graphs turned out that this model seems to fit the data extraordinarily well with very little deviation. We are comfortable with saying that this, along with the fact that our fitted Planck's constant (h) was very close to the generally accepted value, provides enough evidence to confirm Einstein's prediction about the linearity of this relationship.

Now let us consider how this result aligns with the classical wave model of light. The power transmitted by any transverse wave is proportional to the square of its amplitude times the square of its angular frequency. If we take the classical wave model of light to be true, we should see that the energy transmitted by a beam of light is proportional to its frequency squared. The stopping potential is proportional to the kinetic energy of the fastest electron since it is literally how much of a potential difference you have to add on top of the work function (the worst case potential difference that the electron must overcome to escape the target) in order to stop the electron. The kinetic energy of the electron is given to it by the beam of light and therefore the stopping potential must be proportional to the energy transmitted by the light. If we are accepting the wave model of light, the stopping potential would thus have to be proportional to the square of the frequency. However, the relationship between the frequency and stopping potential that we fitted from Millikan's data is linear and thus, the experimental results do not align with the classical wave model of light.