Planck

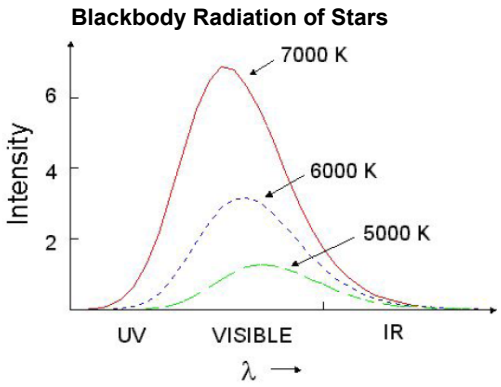
$$E(\lambda,T)=\frac{2hc^2}{\lambda^5}\frac{1}{e^{hc/\lambda kT}-1}$$

$$E_{min}=hf$$

$$E=nhf$$

$$E=(n-1)hf$$

$$E=hf$$

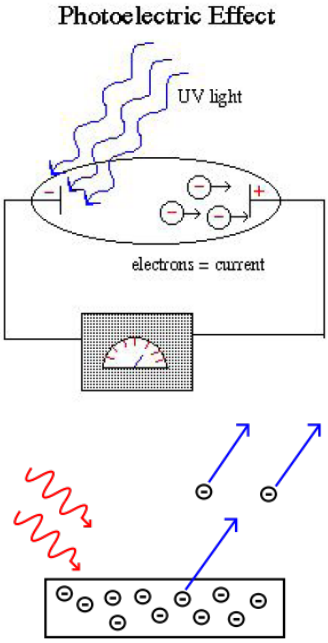


The Photoelectric Effect

1899 - Julius Elster, Hans Geitel

$E = hf$ $c = \lambda f$ $f = \frac{c}{\lambda}$

$KE_{max} = eV_0 = qV_0$



Consequences of the Photoelectric Effect

EM wave theory predictions:

1. Greater intensity of the light means more energy, so more electrons and thus greater KE_{max}
2. KE should be unaffected by frequency

Photon theory (Particle theory) predictions:

1. Greater intensity means more photons, so more electrons, KE_{max} is unchanged

2. if frequency increases, max energy increases in a linear fashion, where the $KE_{max} = hf - W_0$

3. if the frequency is less than the cut-off frequency f_0, no electrons will be emitted $hf_0 = W_0$