

CH1010-A17-A03

A17

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2. New code for homework

PSMSPT-DROLL-CUTCH-DIVAN-MIMIR-SITES

Coming Up View Calendar

Ch1010-A17-A03 Daily 01
01/11/17 at 7:40pm
due 01/11/17 at 8:45pm

Ch1010-A17-A03 Daily 02
Ch1010-A17-A03
4 points • Aug 26 at 3:05pm

Ch1010-A17-A03 Daily 03
Ch1010-A17-A03
4 points • Aug 29 at 3:05pm

2 more in the next week ...

That's PSMSPT-DROLL-CUTCH-DIVAN-MIMIR-SITES

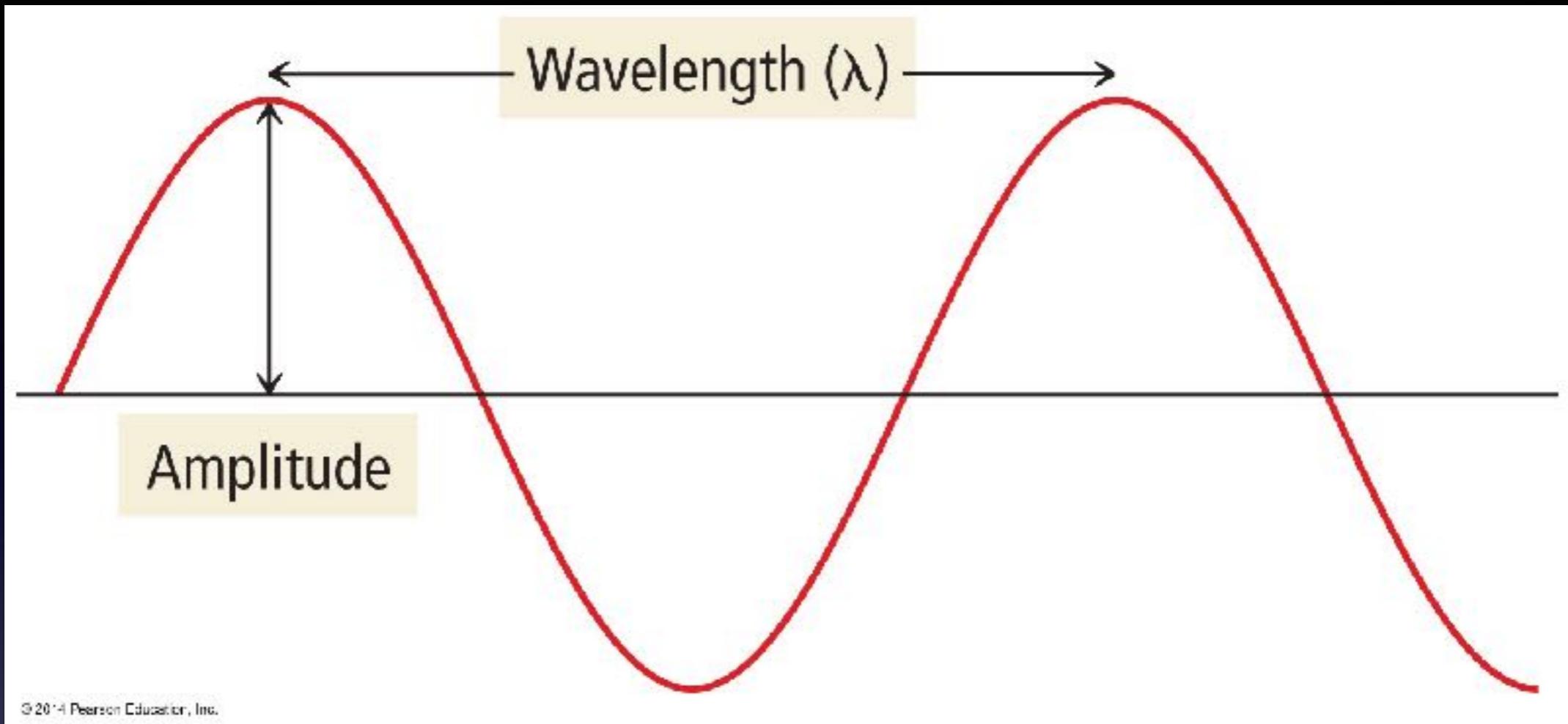


A photograph of a silver fork standing upright on a weathered wooden board. In the background, a paved road leads into a lush green forest under a clear blue sky.

Where are we going today?

Ch1010-A17-A03 Lecture 2

- § 2.2 The Nature of Light
- § 2.2 Photoelectric Effect, Photons
- § 2.3 Atomic Spectroscopy and the Bohr Model

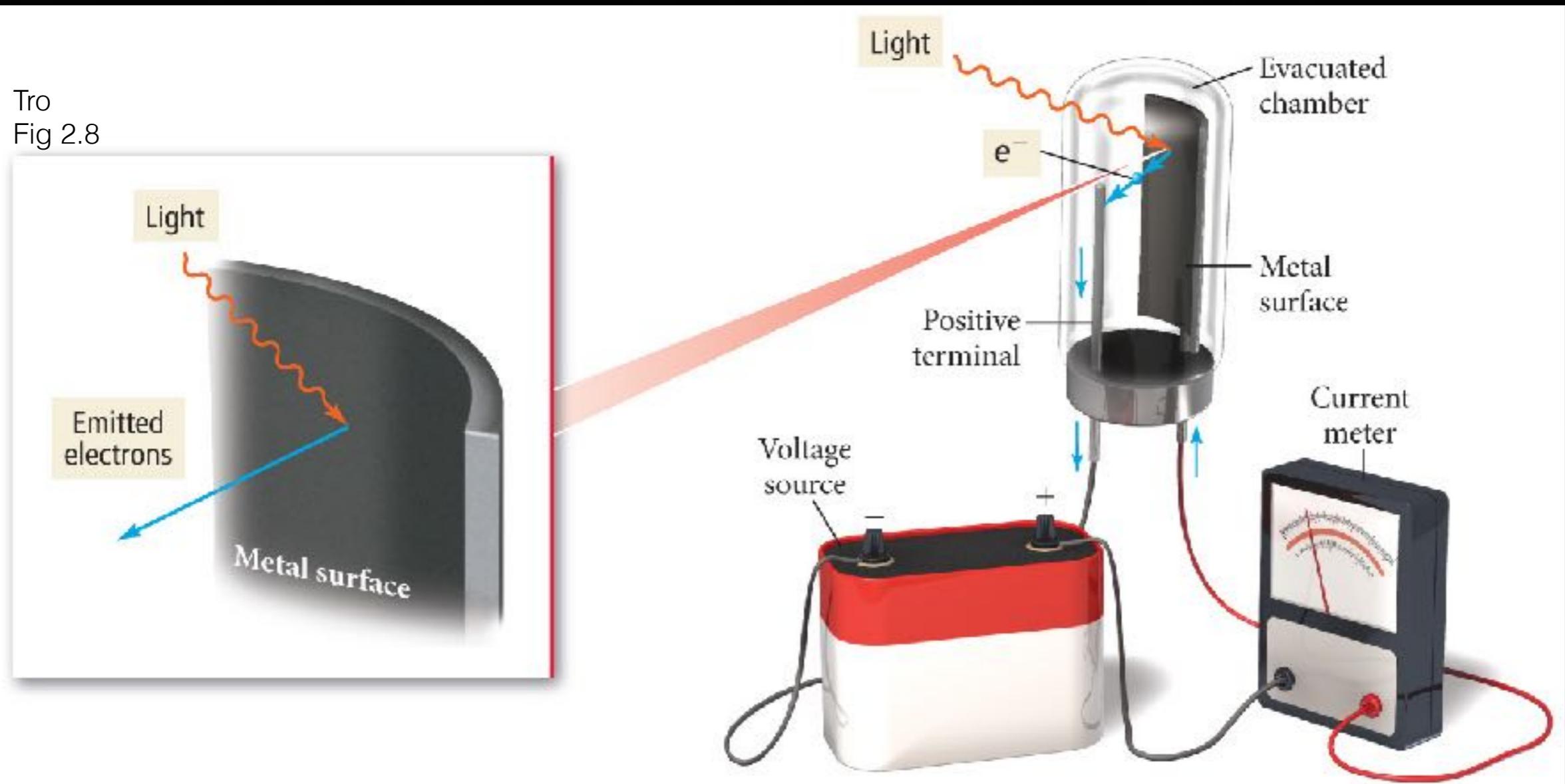


Tro
pg 77

- What's the relationship between... wavelength, frequency, and speed of propagation?
- You're responsible for knowing this!

$$\lambda v = c$$
$$\lambda = c / v$$

The photoelectric effect



Observation

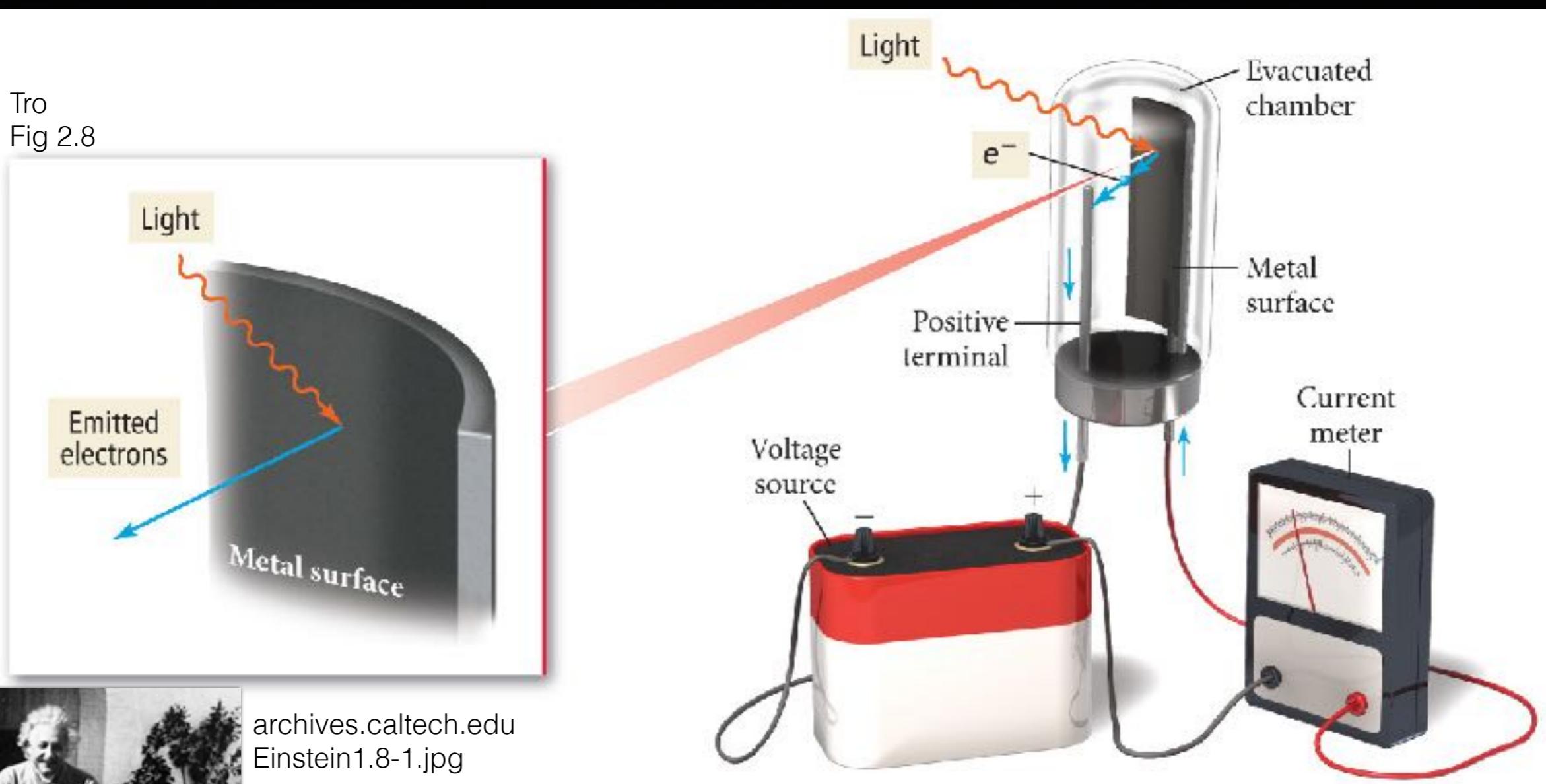
Intense red light would not produce current
but dim blue light would produce current

The photoelectric effect

Tro
Fig 2.8



archives.caltech.edu
Einstein1.8-1.jpg



Conclusion

Energy of light is related to its color
Power is related to its intensity



Energy of light is related to its color
Power is related to its intensity

$$E = h\nu$$

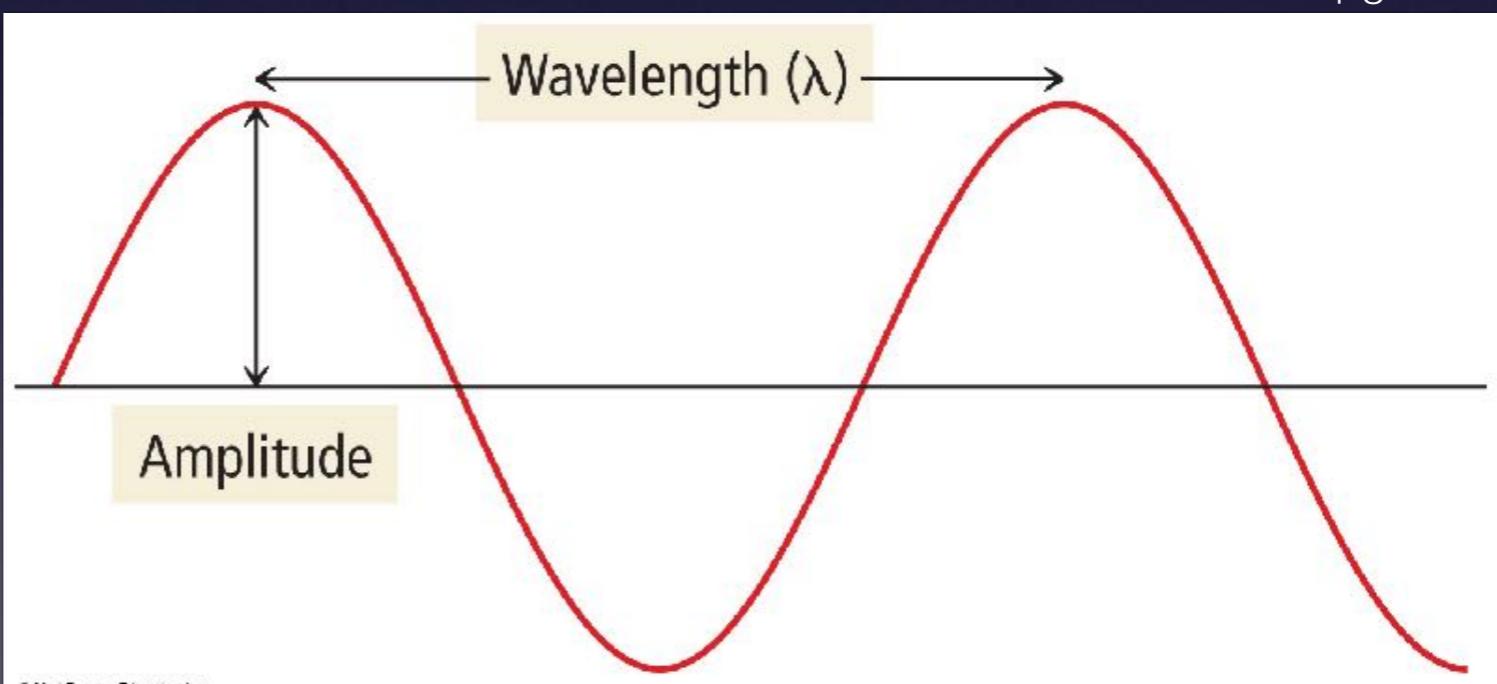
$$E = \frac{hc}{\lambda}$$

$$h = 6.626 \times 10^{-34} \text{ Js}$$

$$c = 2.998 \times 10^8 \text{ m s}^{-1}$$

$$1 \text{ eV} = 1.602 \times 10^{-19} \text{ J}$$

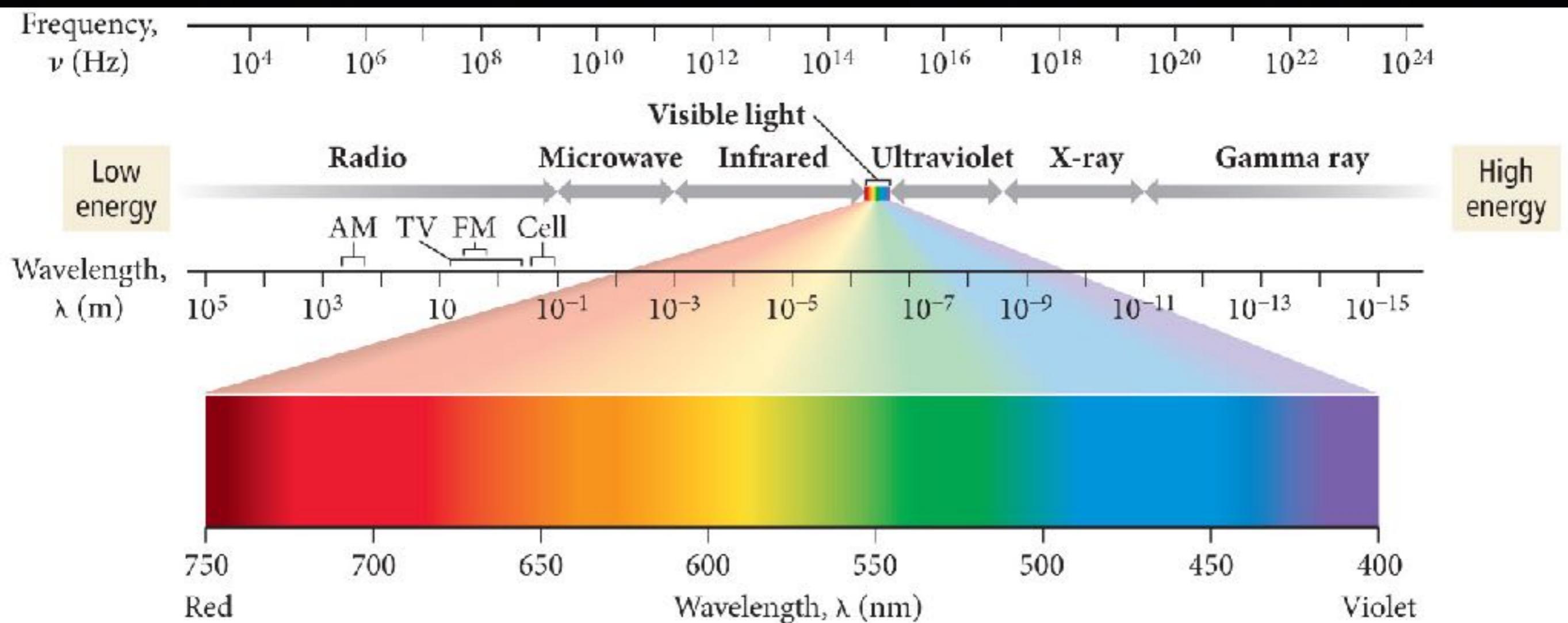
Tro
pg 77



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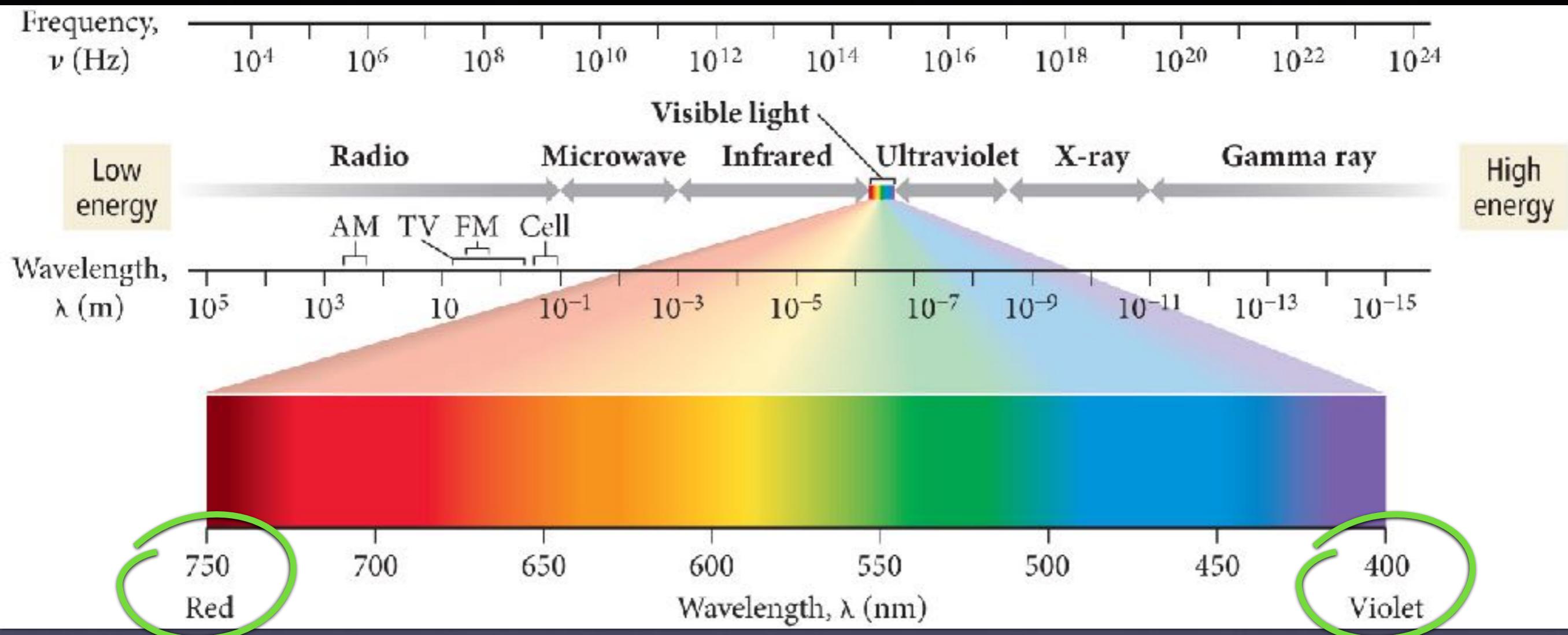
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sunburned



Practice conversions...

Tro, Fig 2.5



$$E = h\nu$$

$$E = \frac{hc}{\lambda}$$

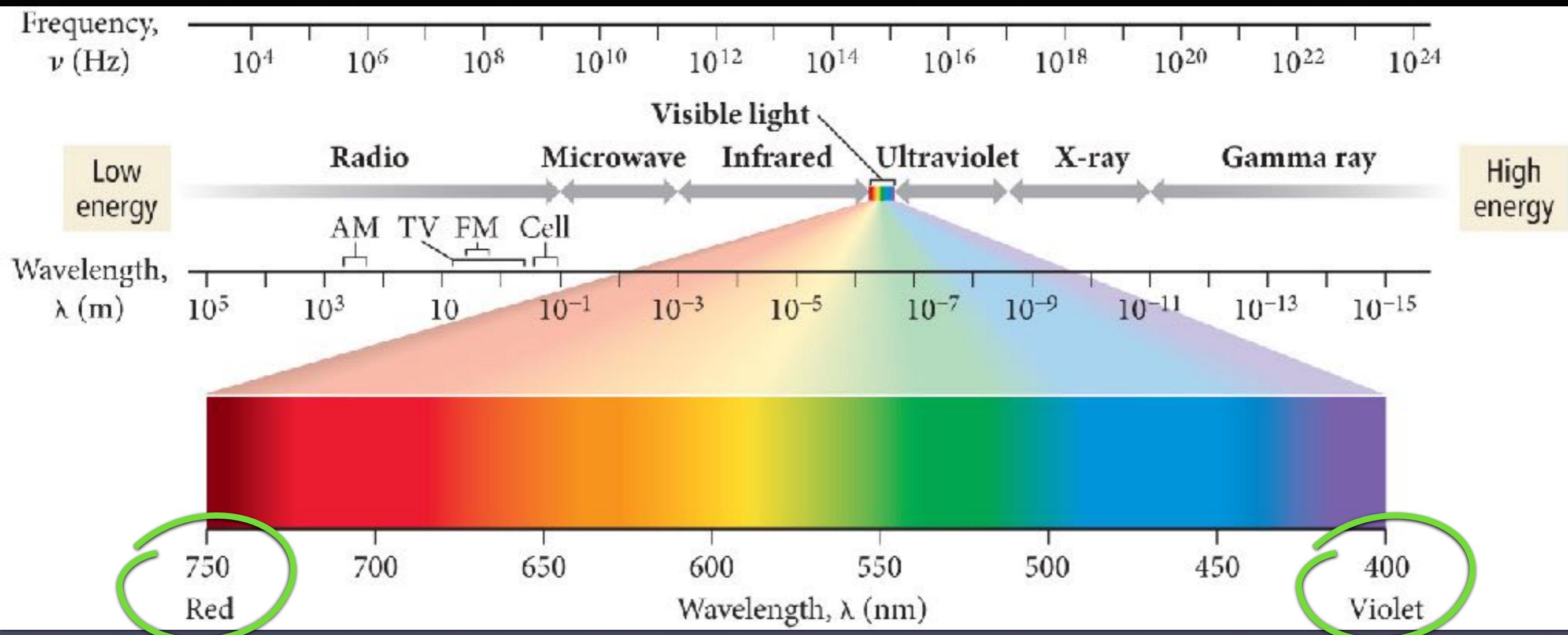
$$h = 6.626 \times 10^{-34} \text{ J s}$$

$$c = 2.998 \times 10^8 \text{ m s}^{-1}$$

$$1 \text{ eV} = 1.602 \times 10^{-19} \text{ J}$$

Practice conversions...

Tro, Fig 2.5



1.653 eV

$2.648 \times 10^{-19} \text{ J}$

3.099 eV

$4.966 \times 10^{-19} \text{ J}$

These are the kinds of problems I love giving on exams....

- The bandgap of TiO_2 is 3.2 eV, what wavelength of light does that correspond to?
- The principal wavelengths of an Ar^+ laser are 488 nm and 512 nm. What is that energy in J? What is that energy in eV?

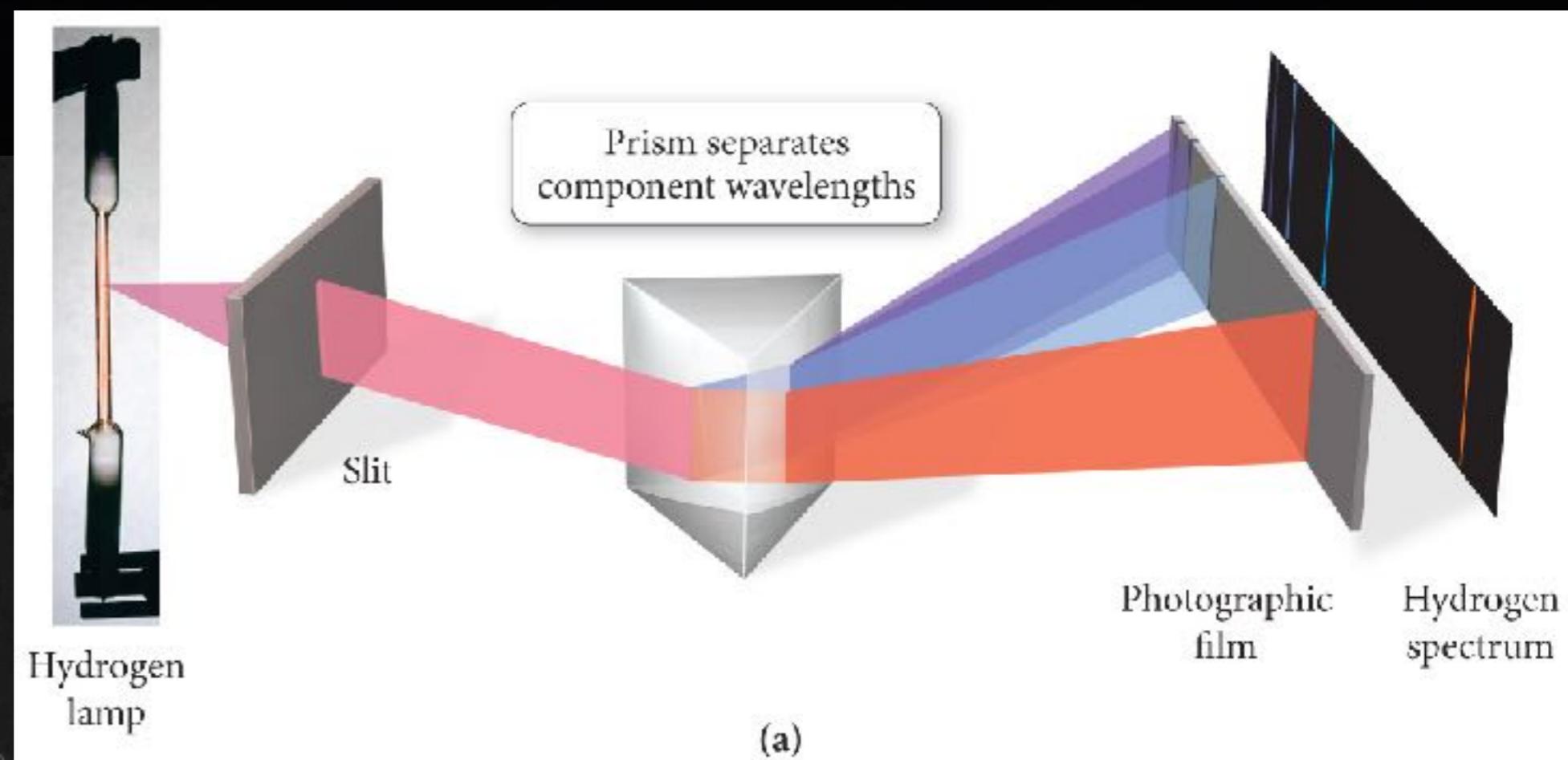
$$E = h\nu$$

$$E = \frac{hc}{\lambda}$$

$$h = 6.626 \times 10^{-34} \text{ Js}$$

$$c = 2.998 \times 10^8 \text{ m s}^{-1}$$

$$1 \text{ eV} = 1.602 \times 10^{-19} \text{ J}$$



Tro, Fig 2.11a

upload.wikimedia.org
Balmer.jpeg

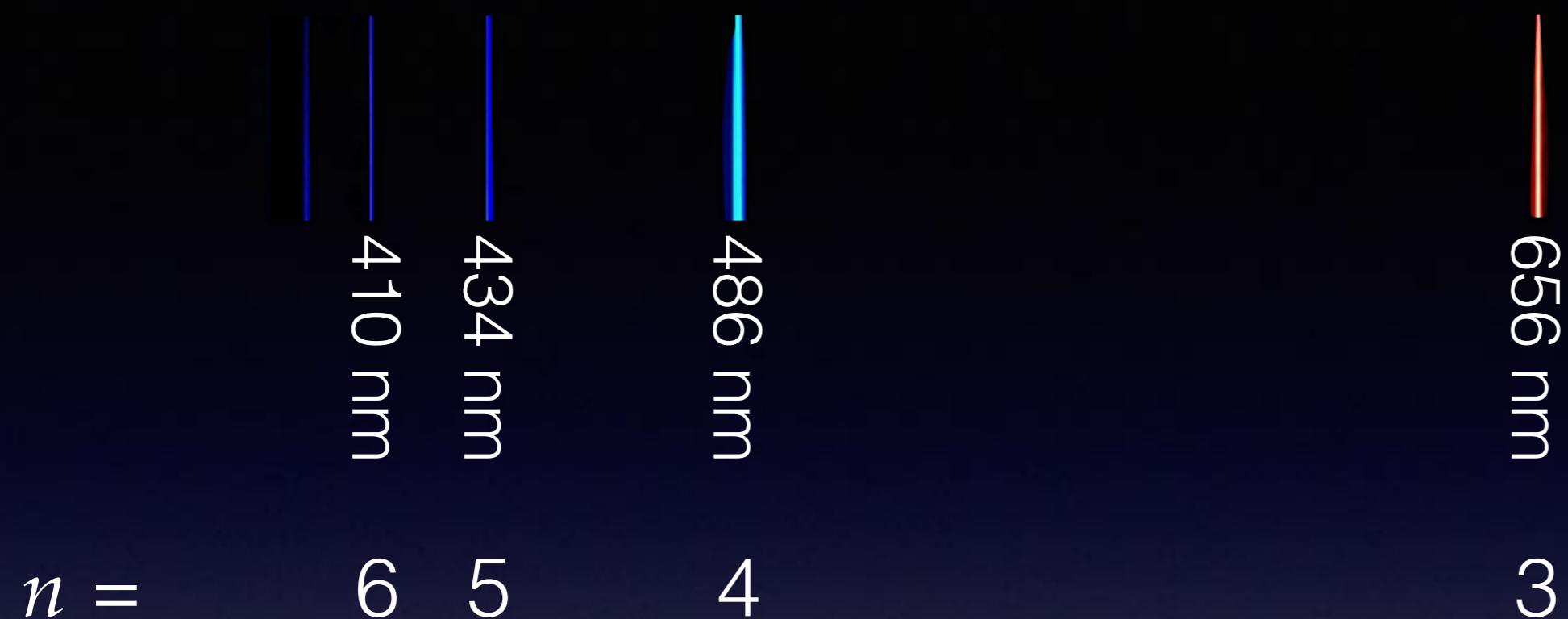


410 nm
434 nm

486 nm

656 nm

upload.wikimedia.org
Visible_spectrum_of_hydrogen.jpg



$$\lambda = 364.56 \text{ nm} \left(\frac{n^2}{n^2 - 4} \right)$$

Practice:

What's the wavelength of the next line in the Balmer series?



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Rydberg%2C_Janne.jpg

$$\lambda = 364.56 \text{ nm} \left(\frac{n^2}{n^2 - 4} \right)$$

$$\lambda = 364.56 \text{ nm} \left(\frac{n^2}{n^2 - 2^2} \right)$$

$$\frac{1}{\lambda} = \frac{0.01097}{\text{nm}} \left(\frac{1}{2^2} - \frac{1}{n^2} \right)$$



upload.wikimedia.org
Rydberg%2C_Janne.jpg

$$\lambda = 364.56 \text{ nm} \left(\frac{n^2}{n^2 - 4} \right)$$

$$\lambda = 364.56 \text{ nm} \left(\frac{n^2}{n^2 - 2^2} \right)$$

$$\frac{1}{\lambda} = \frac{0.01097}{\text{nm}} \left(\frac{1}{2^2} - \frac{1}{n^2} \right)$$



For Balmer series, this number is 2.

What if this number was 3?



Where did we go today?

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- § 2.2 The Nature of Light
- § 2.2 Photoelectric Effect, Photons
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Next time...

- § 2.3 The Great Dane
- § 2.4 Matter as Waves