

Ast 25 week 3a: Useful readings/Homework #03

Wikipedia readings

Skip over the math on these; stick to the text.

Particle-wave duality

http://en.wikipedia.org/wiki/Particle_wave_duality

Videos

The Tacoma Bridge failure:

<http://www.youtube.com/watch?v=3mclp9QmCGs>

The consequences of when the poor design of a bridge made it susceptible to having wind energy pumped into it at a resonant wavelength.

Electron double slit interference (Local file):

http://www.youtube.com/watch?v=ZUI3lhRje_0

A demonstration of the wave-like nature of electrons.

Homework #03 (5 pts):

1) A bolt of lightning strikes the ground 1 km from you. How many seconds does it take for the sound from the strike (i.e., the thunder) to reach you? A second strike hits the ground 1 “mile” from you. How many seconds does it take for the thunder from this strike to reach you? Use $v_{\text{sound}} = 0.343 \text{ km/s}$, or 0.214 miles/s .

Hint for questions 1, 2: you only need to use the rate equation ($v=x/t$).

2) Consider again the two lightning strikes. How many seconds does it take for the photons from the first flash to reach you? How many seconds does it take for the photons from the second flash to reach you?
Use $c=3 \times 10^5 \text{ km/s}$, and $c=1.88 \times 10^5 \text{ miles/s}$.

3) Consider the fact that the unfamiliar wave-phenomena like diffraction and interference are strongest in photons with longer wavelengths. Why don't we easily see wave-phenomena in objects like you, cars, and planets?