Name

Recitation Assignment # 7

November 14, 2007

Seeing as Thanksgiving break is coming up, this assignment isn't due for two weeks.

As a change of pace, I'm going to start you with an existing code, and you're going to edit it.

In today's recitation, we're going to look at the basic effects of interference. The idea will be that you will imagine two "slits" through with we have emanating photons, each of which produces:

$$E_1 = E_0 \cos(kr_1 - \omega t) \tag{1}$$

In my code, I randomly generate photons from each slit, and combine them at various points along a wall. I then plot up the interference pattern, averaged once per second. As you will see, if you run the program for longer (or increase the photon rate), you will see a very smooth peak distribution.

For today's assignment, I would like you to:

1. Download the starter code from the course website.
2. Run the code and read through it. Add comments to indicate to Travis to that you understand what it's doing. Ask if you're not sure.
3. Ask the user for the slit separation.
4. Develop a method to measure the distance between the central peak and one of the adjacent peaks. Compare this to theory. For at least 4 values of "d", you will submit to Travis a plot of d vs Δy (difference between the two peaks). Make sure you show the theoretical fit as well.
5. Add lines to the code so that, in addition to plotting the real interference pattern, you also produce the pattern that would occur if the intensities from the two slits simply added to one another.
6. That's it! However, if you'd like to add some extras (to super-impress Travis), you may:

   Change the model to "electrons". To do this, you will want to send the electrons through one at a time. However, you will make a fraction of each electron go through each slit. How much through each slit? It should be a random number. For example:

   ```
   f1=random()
   f2=1.-f1
   ```

   Of course, you will still need to send a great many electrons in order to make this work.