Lab Quiz for PHY324

Q1: What experiment are you doing?

The Cavendish Experiment

Q2: Summarize the physics elements in this experiment.

The experiment focuses on the gravitational interaction between two masses. The masses are attached together by a wooden rod and are suspended from a wire. Then various other masses are placed nearby which creates a torque on the suspended masses due to their gravitational attraction to the nearby masses. This in turn causes the wire to twist.

Q3: Describe one major goal of the lab.

The goal of this lab is to measure the gravitational constant G using the aforementioned set up.

Q4: What do you measure directly in pursuit of the major goal described above?

There will be two key measurements taken in this lab using three distinct set ups. The three setups for this lab are as follows:

1. The two large lead balls are not mounted on the frame of the Cavendish balance.

2. The two large lead balls are mounted and positioned fully clockwise on the balance.

3. The two large lead balls are mounted and positioned fully counterclockwise on the balance.

The first measurement that will be taken for each scenario is their equilibrium positions. These will be measured using a beam that is reflected off a mirror which is on the Cavendish balance. These beams will then be projected on a screen and tracked using computer software. The equilibrium positions will be determined by analyzing the oscillations of the balance. The second key measurement will be the distance from equilibrium the projected beam has moved to within 45 minutes (or when equilibrium has been established). This will again be measured and tracked by computer software.

Q5: Outline how you get the answer to Q3 from the data collected as described in Q4. If you will graph data to achieve the goal in Q3 then explain what you will graph, what the trend-line will look like, and how it achieves the goal in Q3. Include any equations you will use to turn the data described in Q4 into the answer described in Q3.

We can use the first measurement (equilibrium positions) to determine the torsion constant in Eqn 4, since this measurement will give us T (period of oscillation).

The second set of measurements will give us x, and this will give us an angle theta. With both x and theta being known and with the symmetry argument that yields Eqn 5, we can determine G using Eqn 3 (after combining it with Eq. 4 to eliminate m).

Q6: Your TA asked you a/some question(s) about the equipment. Write the question(s) and answer(s) here.