

# PHY307, Science and Computers I

## Lab #8, October 8, 2002 (due by end of lab TODAY)

### Acceleration Arrows and Bagging Butterflies

#### Summary of what you will do:

You will look at your simulation of the effects of a massive Mars on the Earth in a little more detail, by visualizing the acceleration and velocity of **bigmars** and the distance between **earth** and **earth2**.

#### LOAD YOUR MODULES

1. Log in and continue your report for Lab #8 – turn this in today via e-mail.
2. Read about the **arrow** object under HELP in IDLE. Pay attention to the **pos** attribute and the **axis** attribute.
3. Make a simple program to draw three arrows: one at position (0,0,0) with axis (0,1,0), another at position (0,2,0) with axis (0,0,1) and one at position (2,2,2) with axis (-1,-1,-1). Include the code and a snapshot in your report.
4. You will adapt your modules **gravity.py** and **fakesolarsystem.py** and your code **theplanets.py** for this lab. So have them ready under IDLE.
  - a. Import everything from **visual.graph** into **theplanets.py** and start up a **gcurve** object before the main loop.
  - b. You will need to create two arrows before your main loop in **theplanets**. Name one **vel\_arrow** and the other **accel\_arrow**. They don't need any parameters.
  - c. You will need a time variable; use **t=0**, set before you start the loop.
  - d. In your loop (also see step 5):
    1. Update time by adding **dt** to **t**.
    2. Update the position **mars\_vel\_arrow** to have the position of **bigmars**. Set the **axis** attribute to be the **vel** attribute of **bigmars**.
    3. Update the position and axis of **mars\_acc\_arrow** to have the position of **bigmars** and an axis given by the **gravaccel** function:  
**vel\_arrow.pos=bigmars.pos**  
**acc\_arrow.axis=gravaccel(bigmars.pos,vector(0,0,0), 1.0)**
    4. Add a point to the **gcurve** object with coordinates **t** and distance between **earth** and **earth2**, using the **plot** method for your **gcurve** object.
  - e. You will need to modify the mass of **bigmars** under **fakesolarsystem.py** (remember to SAVE CHANGES.)
5. Submit a report with pictures showing the arrows and snapshots of the plots, for each of the values of the mass of **bigmars=0.0, 0.02, and 0.05**. COMMENT ON THE ORIENTATION AND MAGNITUDE OF THE ARROWS. COMMENT ON THE RELATIONSHIP BETWEEN YOUR PLOTS AND THE BUTTERFLY EFFECT. Submit your report using e-mail to aam@syr.edu.