Electron Game

In this problem you will create A simple game which allows you to "drive" an electron around the screen with a Tkinter scale widget.

The electron should initially be moving with a velocity of 1m/s in the positive x direction. A scale widget should allow the user to vary a uniform magnetic field parallel to the z axis which will cause the electron to move in a circular path in either direction (clockwise/counterclockwise). The strongest value for the field should cause the electron to move in a circular path with a radius of .25m.

Email your completed program to `tolnasb@evergreen.edu` by Thursday May 27^{th}.

1. First compute the field strength required to move an electron with a velocity of 1m/s along a circular path of radius .25m.

2. Set up a simulation using Euler's method which will start a VPython sphere object with a radius of about .1 (not the size of an eletron!) out at the origin moving 1m/s in a uniform field parallel to the z axis with the strength you computed above. Verify visually that the electron is moving in a path with about the right radius and speed. Because of numerical errors the simulated electron will gradually spiral outwards when using Euler's method.

3. Create a Tkinter root window and add a scale widget to it.

4. place the body of the simulation loop into a function (or method). This function will need to be called continuously by Tkinter's mainloop. Don't forget to call the root window's `mainloop()` method to start the simulation. See idlecallback examples on the website for how to do this. Remember that to specify the time interval given to the `after()` method in milliseconds ($1/1000^{th}$ of a second).

5. If B is the maximum field strength you computed above, make the scale widget start with a value of 0 and adjust the field between -B and B with at least 100 steps in between.