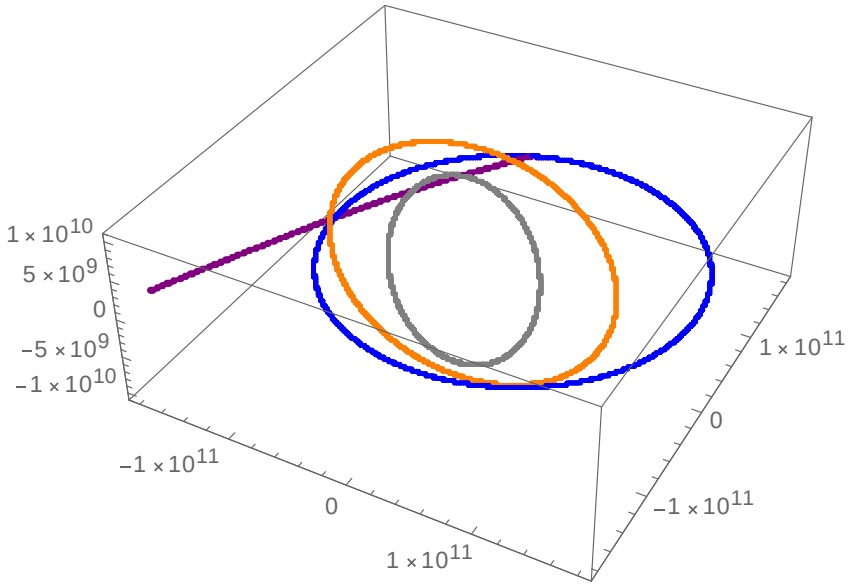
The goal of this project is to determine whether a projectile of trash could be launched from Earth into the Sun.

First, I simulated the orbit of Mercury (gray), Venus (orange), and Earth (blue) over the course of one year:



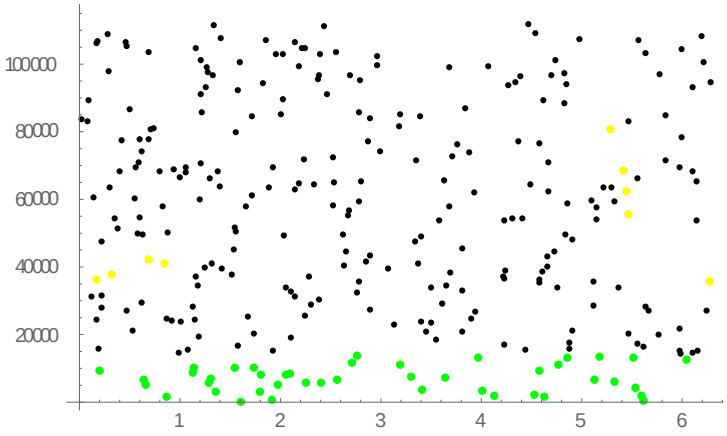
The sun lies at the origin, and the distance in meters of each planet from the sun was plotted as they orbited:

```
(* Calculate the new velocity and position for Earth *)
vEplus = vE + (fE / mE) * deltat;
pEplus = pE + vEplus * deltat;
vE = vEplus;
pE = pEplus;
(* Add to data set *)
AppendTo[earth, pE];

(* Repeat this process for Mercury *)
vMplus = vM + (fM / mM) * deltat;
pMplus = pM + vMplus * deltat;
vM = vMplus;
pM = pMplus;
AppendTo[mercury, pM];
```

Additionally, the graph shows a projectile that was launched from the surface of Earth with the following initial conditions: $\theta = \pi/2$, $\varphi = 1.14661$, and $v = 16696.4$. The path of the projectile is traced in purple on the plot.

I ran 400 trials of this simulation using Monte Carlo sampling to vary the initial conditions (both launch angle φ and launch velocity) for the projectile launch. This graph plots the results of the different launches:



In the plot, yellow points represent situations in which the projectile would hit the sun. The green points represent situations in which the projectile would hit the Earth. It makes sense that this happens when the launch velocity is low because the projectile will not be able to leave if it's launch velocity is below escape velocity.