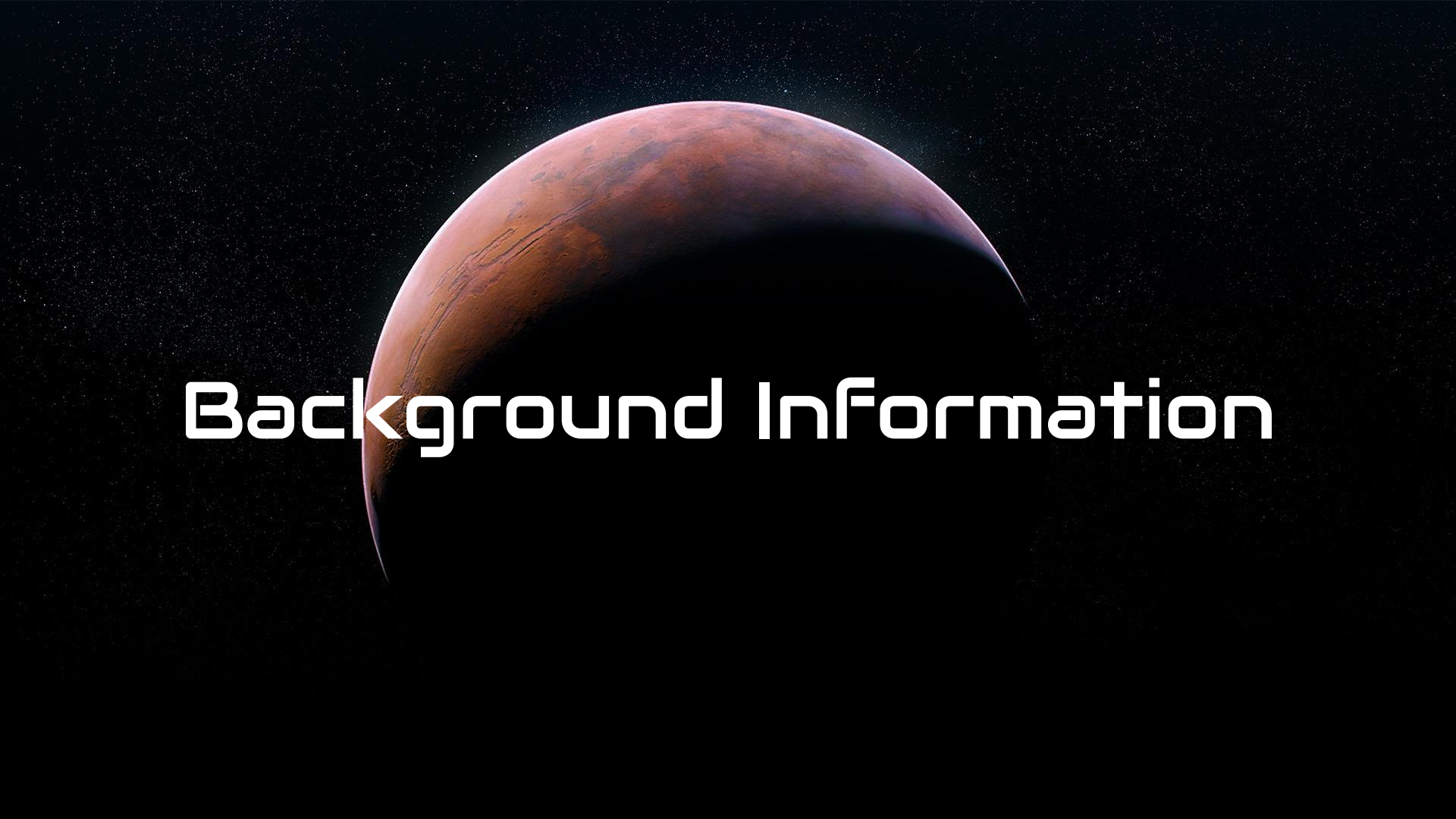
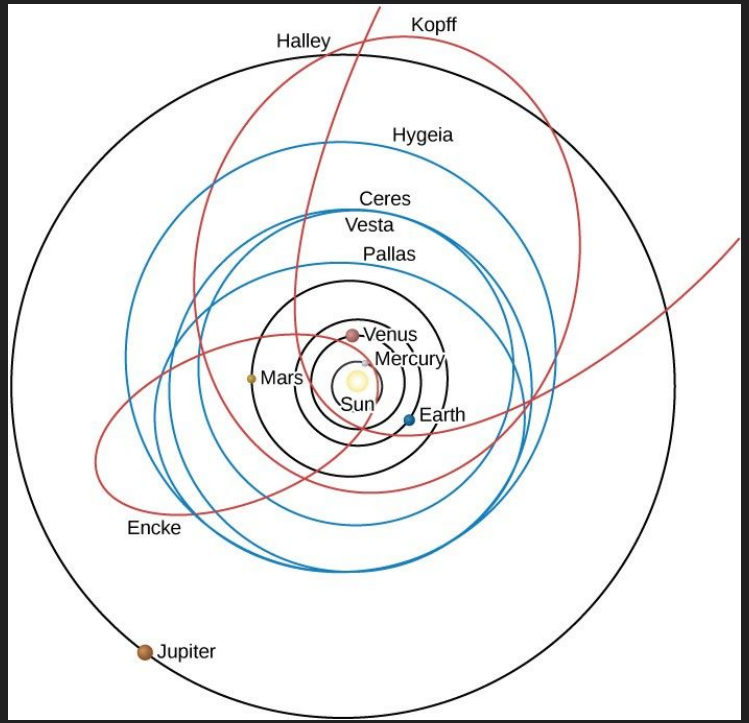
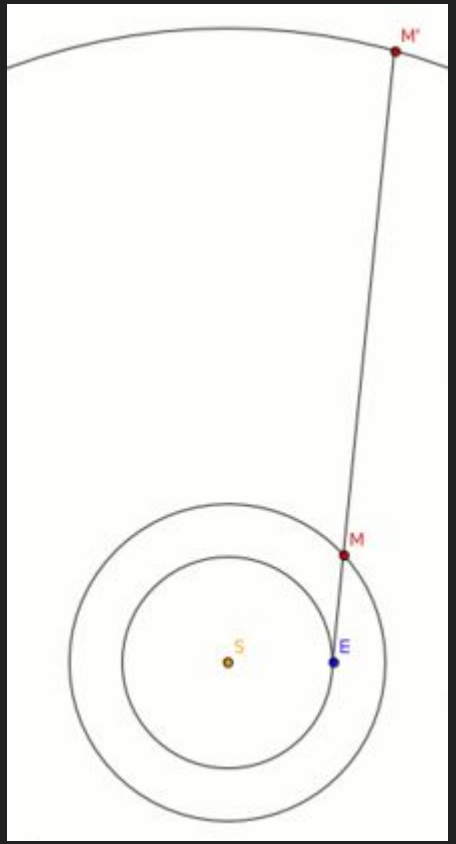

Planetary Orbit
Simulation Generator
Chen-You Tang, Charlie Tolley, Aria Tomar, Blake Grantham


Background Information

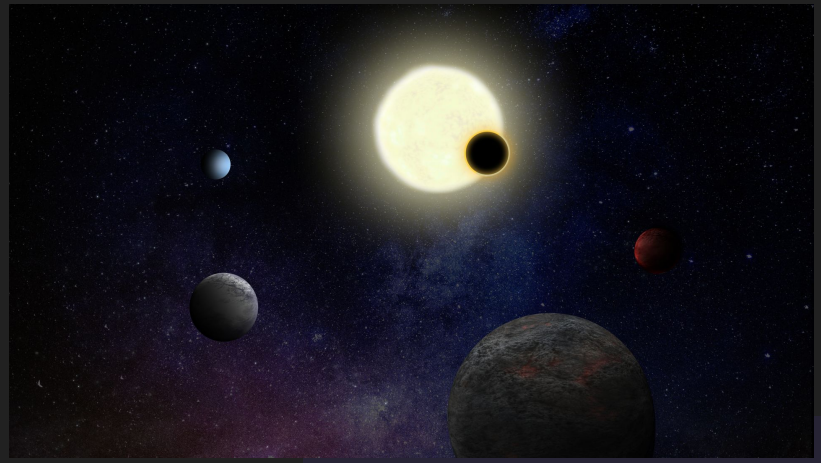
# Planetary Orbits



# Goal of Our Project

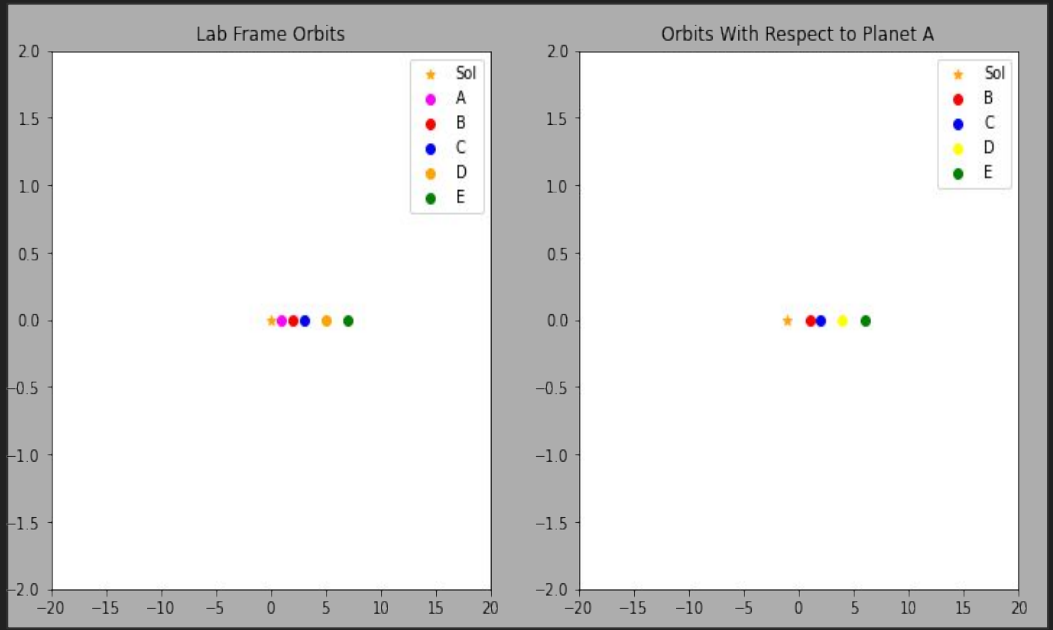
- Simulate the paths/orbital periods of the planets in our solar system.
- Identify potential eclipses, collisions, & alignments from the perspective of Earth.
- Use various initial conditions like given mass and max orbital velocity.

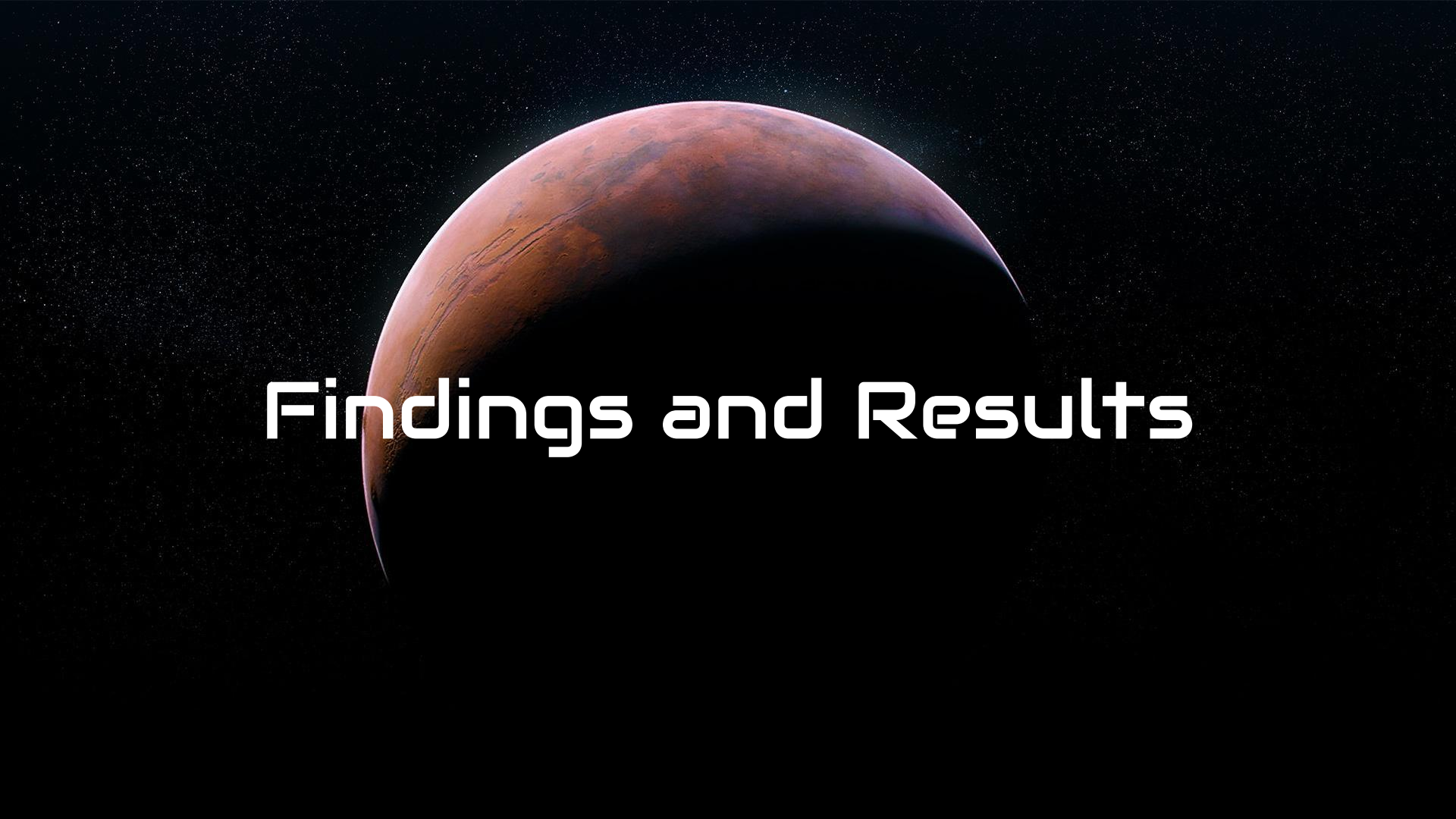



Methods and Techniques

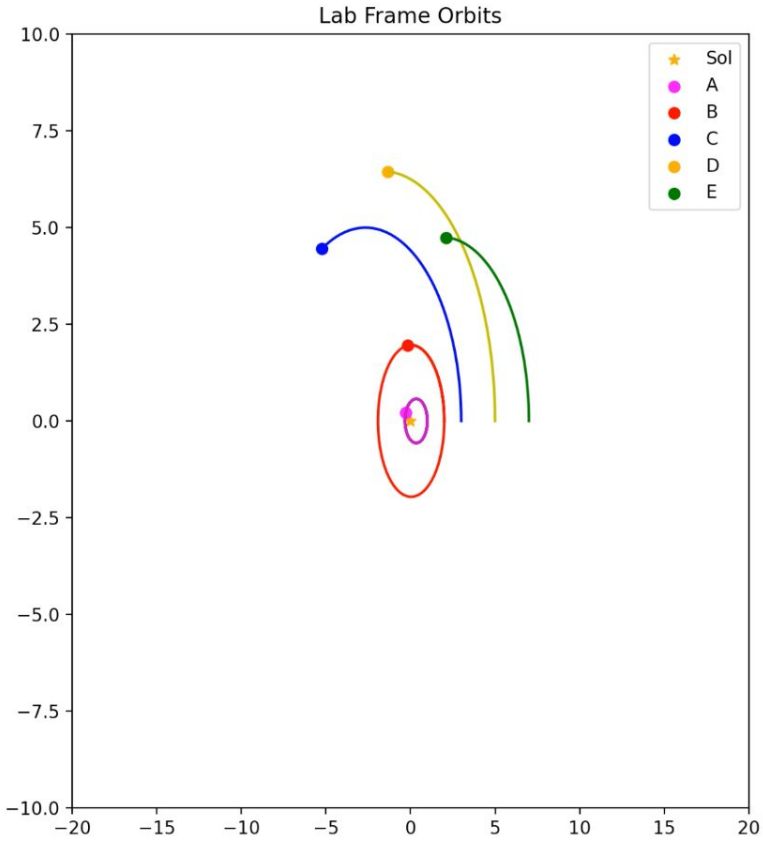
# Method

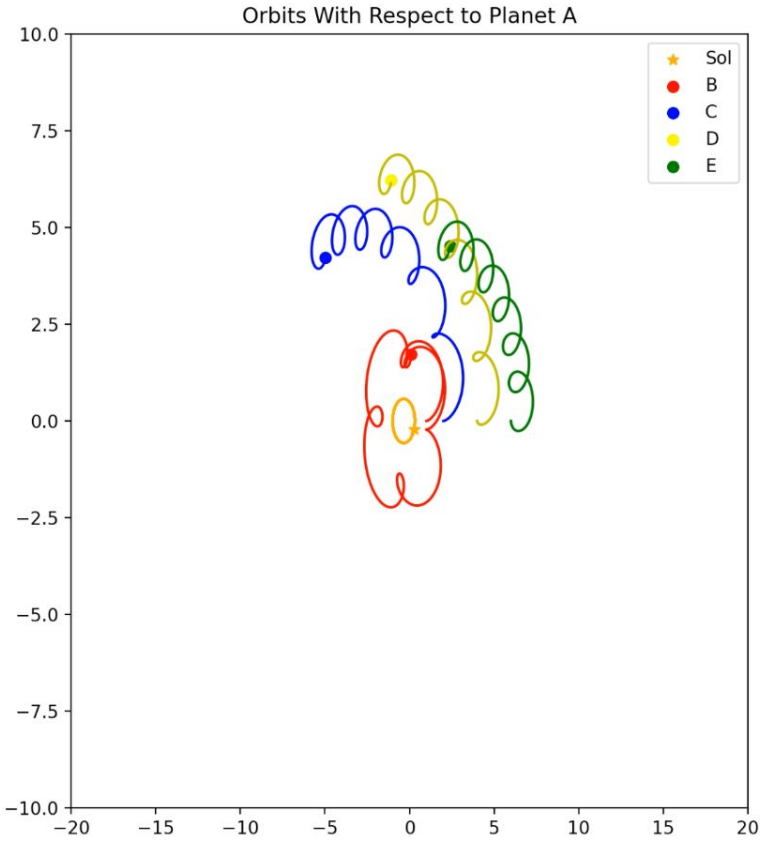
- Arbitrary initial parameters
- Using OOP
  - Vector class to keep track of position with respect to:
    - an arbitrary lab frame
    - the star
    - Planet A
- Using scipy.integrate.odeint, we calculated the positions
  - $F=GMm/r^2$




Findings and Results

Lab frame vs. Earth’s perspective


Lab Frame Orbits
Sol
A
B
C
D
E
10.0
7.5
5.0
2.5
0.0
−2.5
−5.0
−7.5
−10.0
−20
−15
−10
−5
0
5
10
15
20


Orbits With Respect to Planet A
Sol
B
C
D
E
10.0
7.5
5.0
2.5
0.0
−2.5
−5.0
−7.5
−10.0
−20
−15
−10
−5
0
5
10
15
20

# Drawbacks/Limitations

- Relative lack of physics knowledge
- Computational power!
- Originally planned to simulate our solar system and create a simulation like we saw earlier, but the ODE integrator would not run, so we generalized our code for a simulated solar system.


Citations

# References (MLA Citation)

“Apparent Retrograde Motion.” Wikipedia, Wikimedia Foundation, 23 Nov. 2021, https://en.wikipedia.org/wiki/Apparent_retrograde_motion.

“Jplephem.” PyPI, https://pypi.org/project/jplephem/.

“Planetary Fact Sheet.” NASA, NASA, https://nssdc.gsfc.nasa.gov/planetary/factsheet/.

+ Various Python Libraries (e.g. jplephem)

# Thanks