# Analysis

### Introduction

The solar system is an important part of the physics curriculum, and it’s something that children often find more interesting than other core physics topics such as circuits or mechanics. I think it’s important to teach the solar system because it’s fun, and because it can also help students understand the more boring topics, such as forces or energy, as forces and conservation of energy can be demonstrated with the solar system.

However, there is a lack of interactive tools available for teaching the solar system that also incorporate other physics topics such as energy. It would be useful to teachers, and students, to have an application that can use an interesting topic like space that also teaches important concepts from other topics such as conservation of momentum or Newton’s laws.

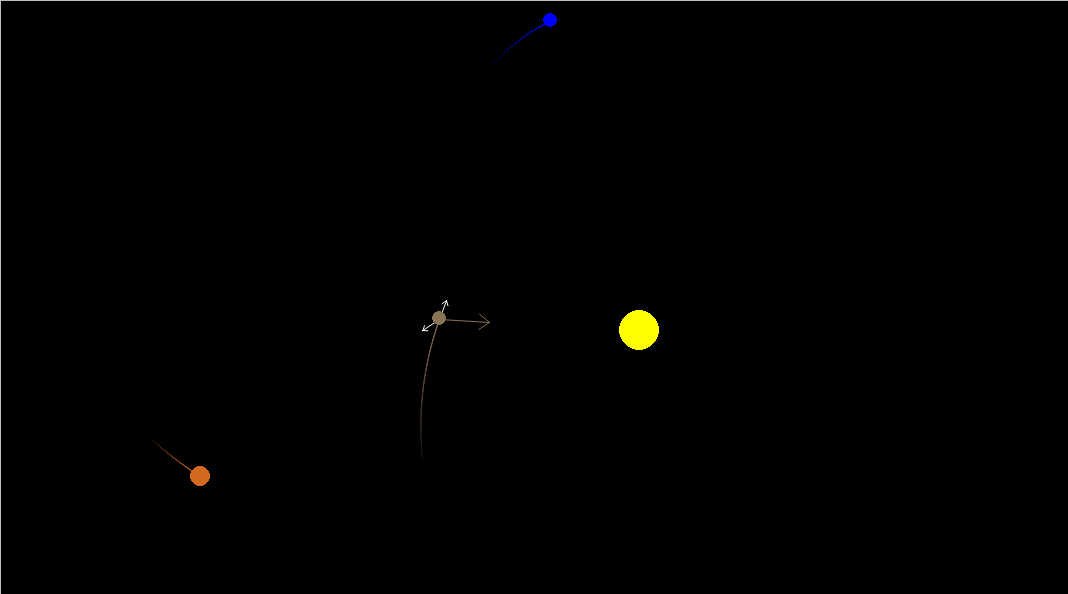
### How a simulation of the solar system works

The orbits of the planets are governed by two fundamental laws of physics:

* Newton’s second law of motion: , where F is the force acting on a body, m is the mass of a body, and a is the acceleration of the body
* Newton’s law of universal gravitation: once again F is the force, G is something called the “gravitation constant”, M and m represent the masses between two bodies, and r^2 is the distance between them.

To demonstrate this, a force diagram is attached. (Not

e to JSB / self, WIP diagram. Still working on how arrows are displayed, better one will be put in later. E.g. currently missing one of the arrows because of a silly bug)



The brown planet has 4 arrows around it. These are the forces acting on it. The arrow shows the direction of each force and the length of the arrow represents the strength of the force. The white arrows are indivdiual forces, you can see one pointing towards the orange planet, one pointing towards the blue planet, and one pointing towards the yellow sun. The arrow pointing towards the sun is much longer than the other arrows, representing that it has a stronger effect. This is because the sun has a much larger mass, and so the force of gravity due to it is a lot stronger.

The brown arrow is the resultant force. This is what happens when you pull the planet in the direction of all three arrows at the same time. Because the force from the sun is so much stronger than the force due to the other planets, the resultant force is pretty similar to the force from the sun.