

Stretchy Spacetime

WORKSHOP



Why do apples fall from trees? How do planets orbit our sun? What makes black holes so mysterious? The answer is...**gravity!**

Gravity is a force we see in action everywhere around the universe. It decides how objects will move around in space and interact with each other.

Spacetime is a way of describing gravity in 3D space - think of it like *the fabric of the universe*. Objects move through spacetime based on where gravity tells them to go. Massive objects, like stars and black holes, can even create **wobbles** and **waves** in spacetime when they interact.

Scientists at **OzGrav** study these waves at **Gravitational Wave Detectors** such as LIGO and VIRGO, and use their findings to discover more about our universe.

Your Mission

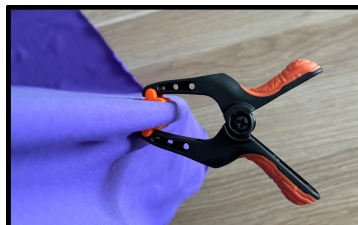
In this activity, you will work in teams to create your own model of **spacetime** out of stretchy fabric. Use your model to explore gravity in action and predict how objects in space might behave. See if you can complete all four challenges!

Getting Started



Collect your materials:

Hula Hoop
Stretchy Fabric
Clips
Weights



Stretch your fabric across the hoop, and carefully clamp it in place.



Adjust the tension of the fabric, and try adding weight!

Challenges

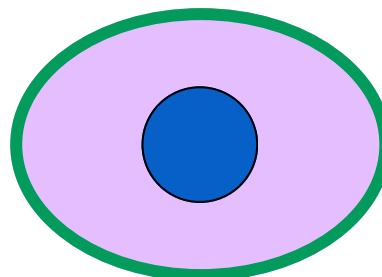
Once you have built your model, try completing each challenge!
What sorts of situations might they represent in real life?

Setup 1: Single Body

Start with nothing on the hoop. Place a single weight in.

What do you notice?

Does the weight of an object change how it behaves?



Challenge 2: Two Bodies

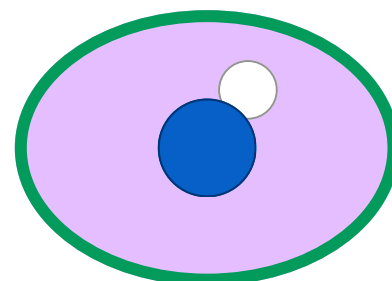
Start with a heavy weight in the centre of the hoop, then roll in a lighter ball.

Repeat with the weights swapped (roll a heavy one towards the light one).

Repeat again with two objects of the **same weight**.

What differences do you notice? What happens if you roll

the ball in at an angle, versus simply dropping it into the hoop?

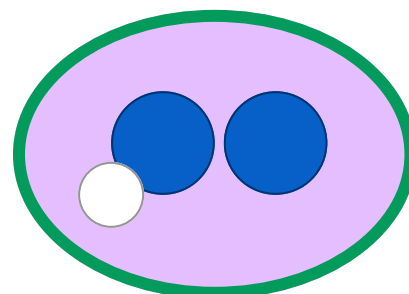


Challenge 3: Three Bodies

Start with **two** central heavy weights; also called a Binary System!

Roll ('launch') a light ball into the system and observe what happens.

*How does the path of the lighter ball behave if
you change its 'launch' speed?*



Bonus Challenge: Orbits

Using the setup from Challenges 2 or 3, Can you get a ball to successfully orbit the others?

See if different 'launch' speeds make it easier or harder to travel around the weights.

How many rotations can you get around the central weight(s) before your ball loses speed?

What might this represent in the real world?

