



national science week 2022

DIY Science – Spiral Galaxy

Make a spiral galaxy in a bowl, measure orbital periods, and observe the Milky Way in the night sky.

Safety

An adult should help with finding a safe place to view the night sky, on a clear night, away from bright lights.

What you need

Bowl, water, splash of milk, dessert spoon, food colouring in a dropper bottle, paper confetti, stopwatch

What to do

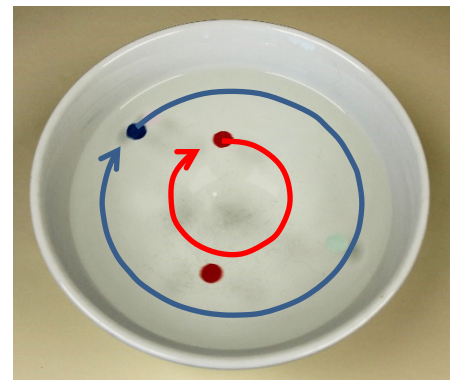
Spiral galaxy in a bowl

1. Add water to the bowl until it is almost full.
2. Add a splash of milk to the water to make it opaque.
3. Use the dessert spoon to stir the milky water around in a circle. Do at least five complete circles, getting a little faster with each stir.
4. Add a drop of food colouring to the milky water and watch what happens.
5. Add a few more drops of food colouring, with some near the edge of the bowl and some closer to the centre.



Orbiting confetti

1. Rinse out the bowl and fill it with water (no milk).
2. Sprinkle a few pieces of paper confetti over the water and then stir the water as in Step 3 above.
3. Choose one piece of confetti near the edge of the bowl. Use a stopwatch to measure the time it takes the confetti to do one complete orbit around the bowl. Record the time in the table on the next page and repeat two more times.
4. Repeat Step 7, but this time choose one piece of confetti that is close to the middle of the bowl. If you have a helper, do Steps 3 and 4 at the same time to make a more direct comparison between two pieces of confetti orbiting at the same time.



Observing the Milky Way galaxy

On a clear night, away from bright lights, look for a large cloudy streak across the sky. You are looking towards the centre of the Milky Way galaxy, through the clouds of gas and dust, and past distant stars.

What's happening?

The Sun, Earth, and other planets are inside the Milky Way galaxy. Galaxies are classified according to their shape and the Milky Way is a spiral galaxy. Other galaxy shapes include elliptical and irregular. The stars, planets, and other objects in the Milky Way orbit around a 'supermassive black hole' at the centre of the galaxy. The Milky Way galaxy has a bulge at the centre and two main spiral arms coming out of the bulge. The Milky Way gets its name because the galaxy looks hazy and white when viewed from Earth on a dark night.



Results

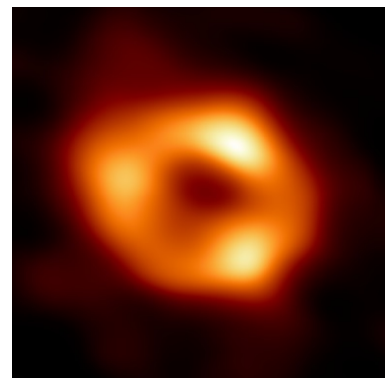
Write each of the confetti orbit times in the table below. We will call these times 'confetti orbital periods'. What do you notice?

The 'orbital period' of an astronomical object is the time it takes to complete one full orbit around another object. In the Solar System, the inner planets (Mercury, Venus, Earth, and Mars) orbit the Sun very quickly compared to the outer planets (Jupiter, Saturn, Uranus, and Neptune). The orbital period of the Earth orbiting the Sun is one year. The Sun and the Solar System are in a huge orbit around the centre of the Milky Way galaxy and the orbital period of the Sun orbiting the centre of the Milky Way is about 250 million years!

Repeat measurement	Confetti orbital period confetti piece close to the edge (seconds)	Confetti orbital period confetti piece close to the centre (seconds)
1		
2		
3		

Did you know?

In 2022, scientists recorded the first ever image of the supermassive black hole at the centre of the Milky Way. The stars in the Milky Way orbit around the black hole, which is called Sagittarius A. As material falls into the black hole it gives out radiation, creating a bright 'accretion disc' around the edge of the black hole. It's the accretion disc that can be seen in the image and the black hole is the dark area at the centre. This is the second image of a black hole to be recorded by the Event Horizon telescope which connects eight telescopes in various locations around the world.



Sagittarius A
Image credit: EHT Collaboration

Find out more

- Discover how the first images of black holes were recorded using the Event Horizon telescope. First ever image of a black hole, Messier 87, April 2019: <https://bit.ly/37QwwBM>
First image of Sagittarius A, May 2022: <https://bit.ly/3wx6r2X>
- Learn about the Milky Way and the Celestial Emu in a talk by Wiradjuri Woman, Kirsten Banks: <https://youtu.be/mYr7ZCn04eA>
- Become a citizen scientist and classify galaxies for the Galaxy Zoo project: <https://www.zooniverse.org/projects/zookeeper/galaxy-zoo>
- Explore the night sky using a smartphone app to locate astronomical objects and discover how the sky changes throughout the year. Search for 'astronomy apps' such as Star Walk 2 or SkyView.