

## SPACE - Sun-Plasma Connection

The Sun's energy sustains life on Earth.

We see it as a mass of glowing gas but it is actually in a state called plasma.

Plasma is the 4<sup>th</sup> state of matter - the others are solid, liquid & gas.

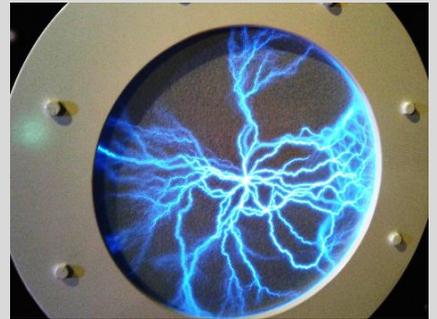
About 99% of the visible universe is formed of plasma.

Check out the **Plasma Discs**:

What do you see? Place your hand on one of the discs.  
Don't worry, it's safe. Now try it with one finger.

What happened?

Plasma does not normally occur naturally on Earth but we can find them at home, and at business & industrial applications.



Which of the following has/use plasma? Put a **✓** against your choice.

- |   |       |
|---|-------|
| • Fluorescent lamp                            | _____ |
| • Power production                            | _____ |
| • Propulsion in space                         | _____ |
| • Incandescent light bulb                     | _____ |
| • Hypersonic flight                           | _____ |
| • Very hot flames                             | _____ |
| • Medical devices                             | _____ |
| • Lasers                                      | _____ |
| • Lightning                                   | _____ |
| • Static electric sparks                      | _____ |
| • Auroras (northern lights & southern lights) | _____ |



Checkout the cool **Plasma Tube!**

Get the Science Communicator or Volunteer on duty to show you cool tricks!

## DO YOU KNOW?

1. Gases can become plasmas. How? By heating the gas, atoms will break apart into charged particles to form plasma. [This is not the same type of plasma that is found in your blood.]
2. Plasmas do not happen naturally on Earth but we can find man-made plasmas everywhere – e.g. fluorescent light bulbs & neon signs. Natural plasmas can be found for example in a ball of lightning or stars.
3. The Sun's plasma is so hot that the most energetic charged particles can escape from the Sun's gravity and fly out into space. This plasma is called the solar wind.
4. Plasma is ionized gas. Gas into which sufficient energy is provided to free electrons from atoms or molecules and to allow both species, ions and electrons, to coexist.

## TO EXPLORE

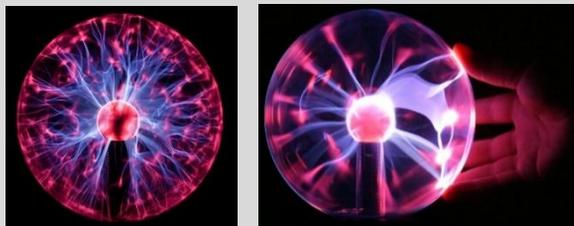
### Plasma Ball Science Experiment

#### What you need

- Plasma Ball
- Florescent lamp (short)

#### What to do

- Be very careful with the florescent lamp!
- Hold the lamp next to the plasma ball. Is it glowing?
- Try making a circuit by putting your hand on the plasma ball. With the other hand, hold one end of the lamp out & let a friend grab the opposite end of the lamp.



[Credit: Wikimedia Commons]

#### Important:

- a. Be sure that the only thing your friend is touching is the light bulb.
- b. Be very careful when handling the plasma ball – it breaks easily.
- c. Please discuss with your teacher or parents first if you want to try experiments not stated here.

#### What is going on

- The Plasma Ball is powered by a Tesla Coil that emits a high frequency / high voltage electromagnetic field.
- This energy causes nearby gasses to glow.
- The plasma ball is filled with special gasses which allow you to see purple streamers.
- The florescent light bulb has gas in it as well.
- When the light bulb is close enough to the Tesla Coil, the gas inside the bulb will begin to glow.

## Watch these!

- Aurora : <https://www.youtube.com/watch?v=izYiDDt6d8s>  
Lightning : <https://www.youtube.com/watch?v=mnUk5mU2Plc>  
Plasma Ball : <https://www.youtube.com/watch?v=7YFEMwtgqgY>  
Solar Plasma : <https://www.youtube.com/watch?v=7YFEMwtgqgY>

**[Keywords: state of matter, plasma]**

[Teachers/parents guidance may be required]



**PETROSAINS**

