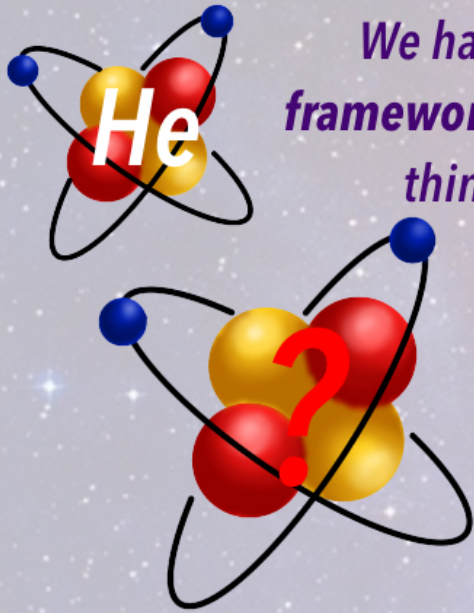


# Dark Matter

1



We have **models** and **theoretical frameworks** that explain very well the things that we know, but they're incomplete, there are things that **we don't fully know**, that remain as a mystery. **Dark Matter** is one of these things.

2

Even if we think that **science** has the **knowledge** about almost the entire **universe**, it's estimated that the matter that we know makes up only **20%** of this.



And **dark matter** makes up approximately **80%** of **universe**.

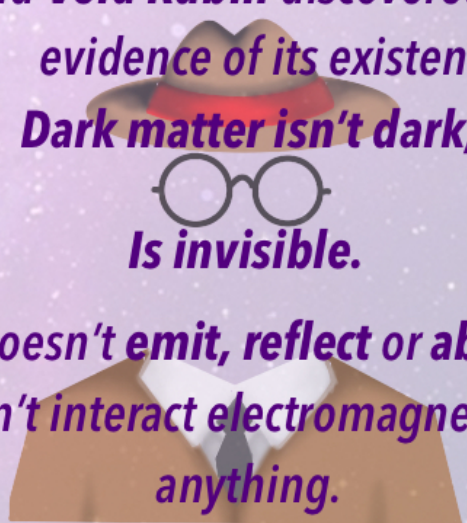
3

When we started to measure the **rotational velocities** of **galaxies** we notice that they were **higher** than the velocities that were **theoretically predicted** with the **luminosity**, then, the scientists began to think that there must exist a type of mass that we couldn't see.



4

**Fritz Zwicky** called this type of matter "Dark Matter" and **Vera Rubin** discovered the strongest evidence of its existence.

**Dark matter isn't dark,**  
  
**Is invisible.**

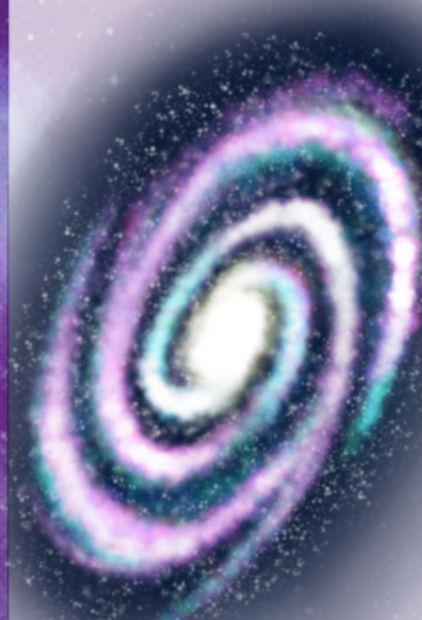
Because it doesn't **emit, reflect or absorb light**; it just doesn't **interact electromagnetically** with anything.

5



We know that dark matter exists because of its **gravitational interactions**. It interacts with **objects**, like stars and galaxies, but also with **light**, distorting its path and creating **gravitational lenses**.

6



We used to think that dark matter could be **grouped** in "dark planets" in galaxies. Now we think that dark matter is **scattered**, it isn't grouped in a specific shape, with a **higher concentration** around the **galaxies center**.



7

We know that dark matter **isn't antimatter** because we haven't detected signals of its **annihilation** with matter.

Dark matter isn't starless regions, neutrinos, wandering planets or gas clouds because they **don't have dark matter properties** and **don't have enough mass**.



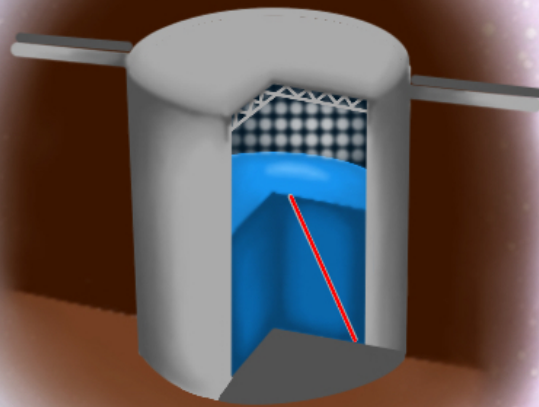
8

We have many theories about what dark matter could be. There are **a lot of particles** that we haven't detected yet and that are **beyond the standard model**, one of these particles could be a **dark matter particle**.



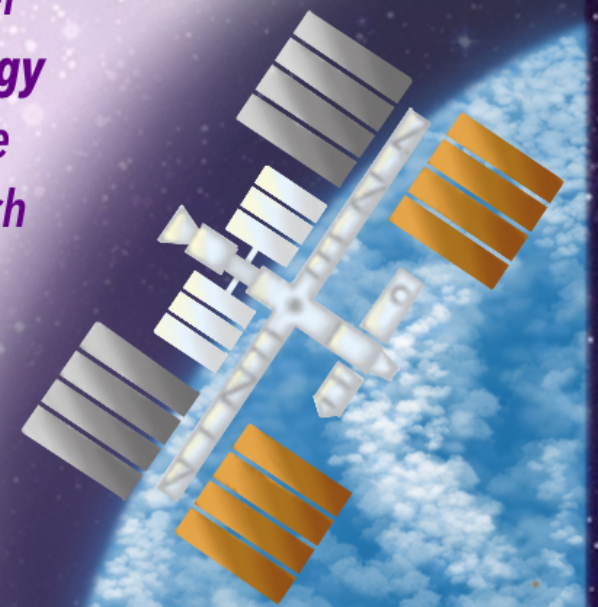
9

We have **underground detectors** designed so that the **dark matter particles** that pass through the detectors leave a **trace**; they're underground to **minimize** the number of particles of other types that pass through the detectors.



10

We think that dark matter particles emit **high energy beams of light** when the particles **collide** with each other. There are **isolated cameras** in the ISS looking for the **x rays** and **gamma rays** produced in these collisions.



11

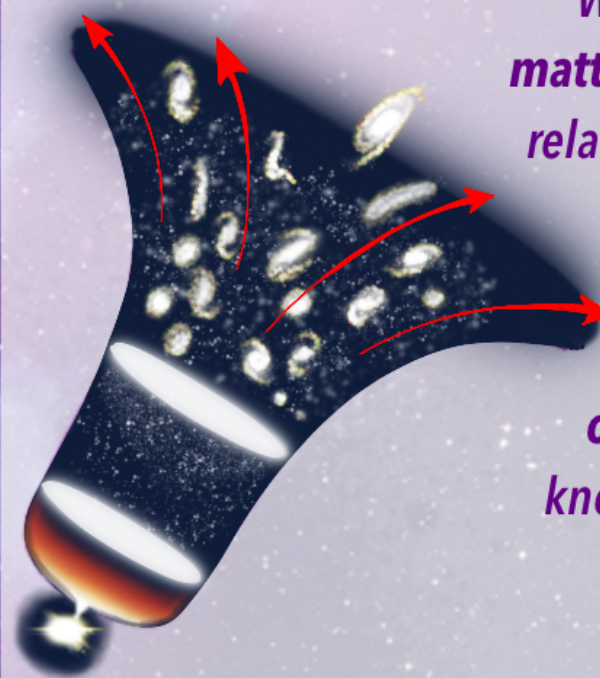
We are also trying to create dark matter by **colliding particles** at the **LHC**.



By now, these experiments haven't told us a lot of what dark matter is, but they have made it clear what **dark matter is not**.

12

We could think that **dark matter** and **dark energy** are related, but they're not. The dark energy is the responsible of the **accelerated expansion of the universe**, and we know even less about dark energy than about dark matter.



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