

## What is a galaxy?

During the major part of our history, human beings could observe the galaxies as vague smears in the night sky. However, we know that galaxies are enormous accumulations of stars, gas clouds, planets, dark substances, dust and might be dark energy, united by gravity.

In fact, our Solar System is part of a galaxy, the only one we have seen inside: The Milky Way.

Within the Milky Way we can find diverse formations of stars and interstellar dust; the most important are the nebulas and stellar clusters. It is in consideration the existence of other galaxies.

It is speculated that dark substance constitutes the 90% of the mass in most of the galaxies. The nature of this component is not well determined. There are evidences which suggest the existence of super massive black holes in the nucleus of some galaxies. The Milky Way, which contains our Solar System, it seems to be one of these objects in its nucleus.

In the centre of the galaxies is where most of the stars are concentrated. Each object from a galaxy moves because of the others attraction.

In general, there is also, a bigger movement that makes everything spin round the centre. The quantity of stars that a galaxy has, vary from 10 million (dwarf galaxy) to 1000 million (spiral galaxy).

The Milky Way is one of the million of galaxies that exist in space. And although our galaxy is enormous comparing to our Solar System, it is a tiny part of the universe.

The Milky Way is one of the 100.000 million of galaxies that settle the universe. More than 100.000 million of stars, one of them is the Sun. Apart from rotating, The Milky Way gets around the space with a velocity of 2.200.000 km/h. To complete a full lap, it takes 230 million years; since its creation, it has done 52 laps.

The nucleus of the galaxy is red, because it is formed by giant red stars.

In the Milky Way new stars are constantly producing, each 18 days approximately a new star is born. This belongs to the Local Group made of around thirty galaxies and the Andromeda galaxy. This cumulus is situated in the limit of a super conglomeration, which is part of almost five thousand galaxies. The super cluster also belongs to another enormous concentration of galaxies reunited in compact mass.

## Size and shape of the galaxies

There are enormous galaxies like Andromeda or small ones like its neighbour M32. They are with balloon shape; lens, plain, elliptic, spiral (like ours) or irregular shape. The galaxies are group forming "galaxies cumuli".

The Andromeda can be observing at first sight and it looks like a light smear with a foggy aspect. The Arabic astronomers have already observed it, actually it is known by the following name M31 y it is situated 2.200.000 light years from us. It is double size regarding the Milky Way.

## Origin and evolution

The stars that form them have a birth, a life and a death. The Sun, for example is a star formed by elements from previous dead stars.

Many galaxy core emit strong radiation, indicative of the probable presence of a black hole. Sometimes, the galaxy movements cause violent crashes but, in general, galaxies move away from one another like dots drawn over the surface of a balloon that is inflated.

## Types of galaxies:

In 1926, Edwin Hubble, in the high of stellar discoveries made a classification that is still being used today.

Galaxies have three different configurations:

### \*elliptical galaxies:

These galaxies called elliptical, contain a big amount of old stars, usually little gas and powder, some newly formed stars. Elliptical galaxies vary greatly in size, from gigantic to dwarf.

Hubble characterized elliptical galaxies with the letter E and subdivided them into eight classes from E0, practically spherical, to E7, ursiform.

In elliptical galaxies the star concentration diminishes from the nucleus, which is small and brilliant to their edges.

### \*Spiral galaxies:

Spiral galaxies are flat disks that contain not only some old stars but also a considerable population of young stars, plenty of gas and dust and molecular clouds that are the cradle of the stars.

In general, a halo of weak old stars surround the disk there usually is a smaller nuclear protuberance that emits two jets of energetic substance in opposite directions.

Spiral galaxies are named with the letter S (spiral). Depending on the development of each arm, a letter a, b, or c is assigned (Sa, Sb, Sc, SBa, SBb, SBc).

### \*Irregular galaxies:

Irregular galaxies are represented with the letter I or IR, though they are usually dwarf or less frequent. Included in this group are those galaxies that do not have a well defined structure and symmetry. They are classified into irregular type 1 or magellanic, that contain a great number of stars and interstellar substance, and irregular galaxies type 2, less frequent and whose content is difficult to identify.

Irregular galaxies can general be found next to the biggest galaxies, and they usually contain big amount of young stars, gas and cosmic powder.

### New galaxies:

The typical spiral galaxy is born when a gigantic cloud of dust and gas starts to pleat upon itself, adopting a fairly spherical shape. The condensation forms stellar cluster. The central and denser part of the sphere flattens and forms a rotating disk. After some thousand million years spiral arms start forming; they have dense block of material that when contracting form other cumuli of unstable stars. These explode in a short time, dispersing within the young galaxy a stellar material that when it condenses gives birth to smaller and stable stars, like our sun.

As for the origin of galaxies it is thought that they were formed during the first moment of life of our universe, some 1.000 millions a after the Big Bang. In those times there were regions whose density was bigger than average; they were like gravitational whole where matter was accumulated, and with the passing of time these regions evolved until they form huge structures that we can see now as galaxies.

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### \*Stellar cumuli:

The open cumuli contain hundreds of stars and the globular cumuli can contain millions. The nebulas are clouds of gases situated among the stars. They can be dark or brilliant (if they reflect light from nearby stars). Within the Milky Way can be found different formation of stars and interstellar powder. The most prominent are the nebulas and stellar cumuli. Supposedly they also exist in other galaxies.

The galaxies rotate and move through space. They rotate around their centres, in such a way that the sectors of the galaxy that are further from the centre rotate more slowly than the material nearer the centre. The galaxies are also distancing one from the other due to the expansion of the universe as a consequence of the Big Explosion (Big Bang). A galaxy that forms part of a group of galaxies called cumulus also rotates around the centre of mass or nucleus of the cumulus.

### Observations

We visited the observatory of High School N<sup>o</sup>3 “Dámaso Antonio Larrañaga”, where we could recognise constellations and observed stellar cluster and planets trough the telescope Meade LX90.

We intended to see the galaxy M83, but due to the bad condition of the sky, particularly light pollution it could not be observed. The observation will be carried out in the future.

Our first observation was the globular cumulus called “Omega Centauri”. We could see small stars and bigger ones around giving the impression that they are nearer. It was blurred but we could see the cluster.

The second observation was another stellar cluster, an open one, called “Jewel Box”, situated in the Southern Cross next to the beta of the Cross. Stars of different colours can be seeing, owing to their different temperatures.

To finish our work we should observe the galaxies, but unless we find a more powerful telescope or darker place it will be rather difficult to accomplish.

SOURCES :

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