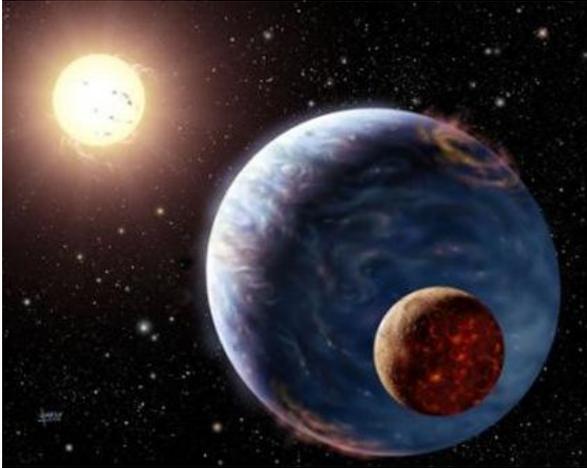


## THE EVOLUTION...

### EXOPLANETS:

We call EXTRASOLAR PLANET one which surrounds a star opposite the sun, so we are talking about another star that does not belong to our solar system.

The discovery of such planets has happened very fast.



All these extrasolar planets are bigger than Jupiter. Their orbits are near their star and are also known as hot jupiters.

### WHAT IS THE EXTRASOLAR PLANETS CHART? (Kepler)

In the year 1992 they found many planets similar to the SOLAR ones orbiting the PULSAR PSR B1257+ 12.

In February 2014 NASA communicated that the Kepler Telescope has added

715 EXTRASOLAR PLANETS to a list of thousand of planets that orbit stars at a distance that makes it possible the existence of water and so that life.

The technique that scientist have used for years to find EXTRASOLAR PLANETS that can not be seen directly is the REDUCTION OF THE BRIGHTNESS that happens when an object goes in front of a star and causes a reduction of the light.

Among the 150.000 stars examined by KEPLER only about two thousand have lowered the lighting by the movement of an object.

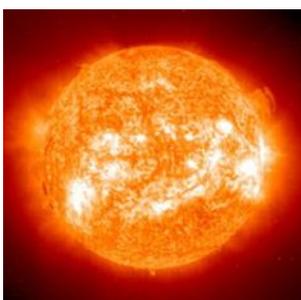
The first EXTRASOLAR PLANET was found by KEPLER on the third day of his scientific studies in the year 2010, but the discovery was declared on 5<sup>th</sup> December 2011.

### HOW THE PLANETS ARE BORN:

A planet is born after a dwarf star dies.

The different features of the dwarves and the star systems help to form the different kinds of planets. Their surfaces, structures and atmospheres: gas, solid or liquid.

### YELLOW DWARVES:



They are totally covered by solar matter.

When all the black holes are covered by solar matter the original black holes system turns into a star system.

Owing to their smaller size, the yellow dwarves lose their brightness because of the space cold temperature and

because of the consumption of their solar matter their surface goes from yellow to red.

### RED DWARVES:



The yellow dwarf turns into a red dwarf, which displays all its magma to the space.

### BROWN DWARVES:

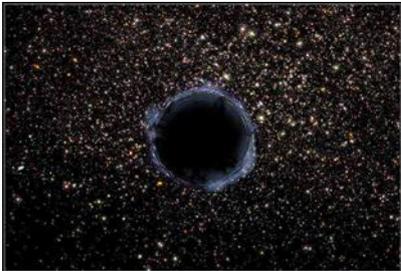


The red dwarf hot surface gets cooler and cooler as the result of the interaction with the cold space temperature where it is placed.

Some sections of the star outer layers get solid and begin to float above and around the magma sphere.

The solidification makes the star brown. The star is turning into a planet.

### BLACK DWARVES:



They can be called as new planets. They combine the star nature with the planet nature and they have a starting atmosphere composed by gases from the cooling process.

The new crust insulates and protects the nucleus and the magma from the space cold.

The volcanoes of the surface release materials to balance the magma inner pressure. The original dwarf star nucleus stays as the planet nucleus.

A typical planet system is composed of a planet and moons, dust or particles orbiting around the centre of the system. The Earth, Saturn, Jupiter are good examples of planet systems.

### ORIGIN OF THE PLANETS:

Any theory that intends to explain the formation of the solar system has to take into account that the sun rotates slowly and it only has 99,9 per cent of its mass, while the planets have 99 per cent of the angular moment and only 0,1 per cent of the mass.

There are five logical theories:

- ✚ The ACCRETION THEORY says that the sun went through an interstellar cloud and emerged surrounded by gas and dust.
- ✚ The PROTO-PLANET THEORY says that there was a thick interstellar cloud that shaped a cumulus. The big stars had slow rotation speed. On the contrary the planets formed in the same cloud had faster speed when they were captured by the stars, included the sun.
- ✚ The CAPTURE THEORY says that the sun interacted with a nearly proto-star taking some matter from it. The slow sun speed rotation is a consequence of having been formed before the planets.
- ✚ The MODERN LAPLACES THEORY says that the sun used to have solid dust grains that because of the rubbing in the centre, the solar speed rotation slowed down. Later the sun temperature increased and the dust disappeared.
- ✚ The MODERN NEBULA THEORY is based on the observation of young stars, surrounded by thick dust discs.

## HOW WOULD THE EARTH FORMED?

While we know that our universe is something tremendously unimaginable huge, amazing and completely unknown, and while many will undoubtedly say that the Earth is no more than an insignificant and small point on it. That its performance in the fully overridable, it is essential to understand its origin and development, for us, inhabitants of this planet.

For this reason, want to try to decipher the process of formation of the terrae investigate more even about the origin of our planet, is extremely awesome. The formation of the Earth in the Solar System

Let us know how the Earth was formed, it is necessary to locate it makes more than 4,500 million years time, in an era where the Solar system was in full training. Clearly, we cannot separate the Earth from the Sun and other planets in the system, because its origin is closely related to them, such as their movements on the day of today.

Some 4,600 million years ago, the Solar system's it was forming, and was a nebula of dust and gases that had condensed on a part of the Vialactea. Part of this mass is transformed into an incandescent sphere, Sun, and other bodies were formed to our around, giving beginning to orbit around it: the planets. Among them, no doubt we find Earth.

## THE ORIGIN OF THE EARTH

In the beginning, the land was nothing more than a simply incandescent mass as the Sun. But a time along its exterior of solidifying little by little, to give rise to the Earth's crust as we know it today: the ground upon which these stood. In this the process of the formation of the Earth, volcanoes, occupied a central role, and with its eruptions were the masses of lava to increase the thickness of the cortex, at the time that generated many gases.

These gases stayed around the Earth's crust and gave way to what is known as 1 atmosphere. This atmosphere is very far from being the atmosphere that we know today, but together the impact of meteorites that came from outer space allowed the formation of water liquid. At the end of the time, amazingly evolved to form the current atmosphere. This permitted the formation of life, and even today, today protects us from the impacts of meteors, solar winds and allows us to keep the temperature and characteristic weather of our planet.

### EVOLUTION OF THE SUN:

For millions of years, the stars and the sun are in the proto-star phase until its temperature is enough to generate nuclear reaction in its centre. Later these reactions reached the principal sequence in which they started to burn hydrogen. The sun started this phase 4500 million years ago and it will stay for 5000 million years more.

Once the hydrogen ends up, the nucleus will contain only helium. The nucleus will continue growing and the layer that surrounds the sun will go on meeting the hydrogen. A contraction action starts owing to its own weight and the temperature in the centre increases and the fusion of helium starts.

The helium nuclei mix creating: C, N and O, knowing as the CNO reaction.

With this process the star gets heat. This temperature increase causes the enlargement of the surface, which is even bigger than in the common stars and the sun will go into the red giant phase. In this phase the sun radius will increase as far as the Mars orbit and it will lose a great deal of its mass.

By this time, the Earth will have ended up because as the star enlarges it becomes colder.

When the sun reaches the final phase of red giant, two million years will have passed. This is shorter than all the life of the star because the helium ends up faster than the hydrogen.

As the red giant is dying, the nucleus goes on shrinking and its central temperature will be more than one hundred million grades, and as a consequence the central pressure will be very high. This pressure will cause a great concentration of electrons. This kind of mass is known as degenerated.

The sun density is similar to the water density. The degenerated mass has a one hundred thousand times bigger density.

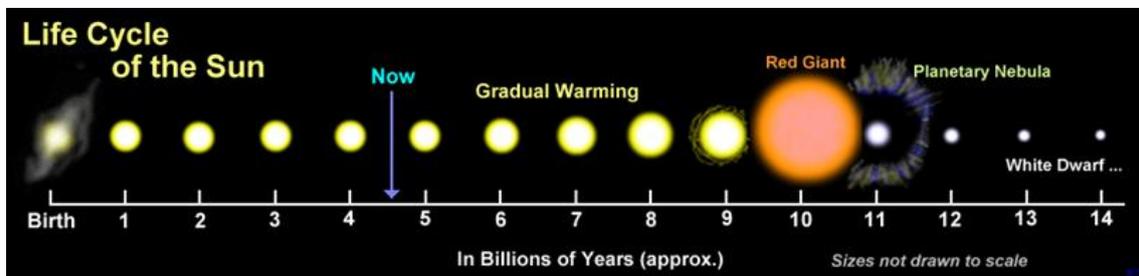
The sun main post sequence evolution is more uncertain than the present and consequently we can only make an estimation of its agony after the "Helium Flash" a massive explosion in its centre. As a consequence of this flash, the nucleus spreads quickly and starts to move. This movement is suppressed by the surrounding, which in the red giant is very large. The centre, where the helium turns into carbon and the

carbon into oxygen is surrounded by a helium layer which burns out. After the helium flash the star moves and stars to zigzag horizontally through the diagram H-R, increasing its brightness. This phase takes millions of years.

What goes on is very difficult to predict. It is thought that it will send off gas to turn into a planetary nebula. The rest of the nucleus is formed by degenerated mass of electrons. Because of this, the star can not compress more and they cool slowly turning into white dwarves. It is estimated that the sun will turn into a dwarf with the half of its actual mass. The rest will turn into hard winds and the ejection of the surface layers during the main post-sequence evolution.

At the beginning the stars cool down quickly and then slowly, during thousand millions years. The white dwarves stop shining and turn into black dwarves: a cold mass of degenerated matter.

And this is what remains of the sun.



### PROTOPLANETARY DISCS:



They are also known as PROPLYDS, and they are formed around new stars, generally from the T-TAURI type. They are essential to understand the formation of the stars and of a possible planetary system because the physical processes which form the planets are produced in them.

The protostar is formed by the material condensation of a molecular cloud composed by hydrogen. The cloud reduces gaining density and creating a protostar in its centre. In the meanwhile the outer material is borne by the centripetal force incorporated in its rotation. This phase last ten thousand years and the discs created last ten million years. The oldest disc discovered so far is about 25 million years.

The interplanetary discs which have been discovered so far are watched directly as a nebula or as an infrared emission of the central star. Their size can be of various thousand of astronomical units. They can reach radius of 1,000 au.

Their central regions temperatures can be very high while their distant zones are colder.

The younger protoplanetary discs are often accompanied by polar gushes.

Recent observations through the HUBBLE telescope have shown proplyds and protoplanetary discs that are formed into the ORION NEBULA.

Agustina Arrieta, Cecilia Caffera, Magdalena Marino.