

# "The Golden Ratio in the Milky Way"

## CACHT A STAR

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### **Abstract**

First we discovered Fibonacci's sequence so that we could get number 1.6 (number  $\Phi$ ). Then we built a golden rectangle in order to draw the spiral that comes out from Fibonacci's regularity and compare it with the spiral arms of our Milky Way. In this way we have been able to understand the perfection of our galaxy and the differences it shows compared to other galaxies.

### **1. Celestial Body:**

The Milky Way

### **2. Features:**

The Milky Way is our galaxy.

The Milky Way is a spiral galaxy, with several spiral arms that are around a central core with a thickness of about 10,000 light years. The core stars are closer together than those of the arms. The diameter of the disk is about 100,000 light years. The Milky Way contains more than 2 billion times the mass contained in the Sun.

The Milky Way has five arms (Fibonacci series number). One of them is the Orion Arm where the solar system is placed.

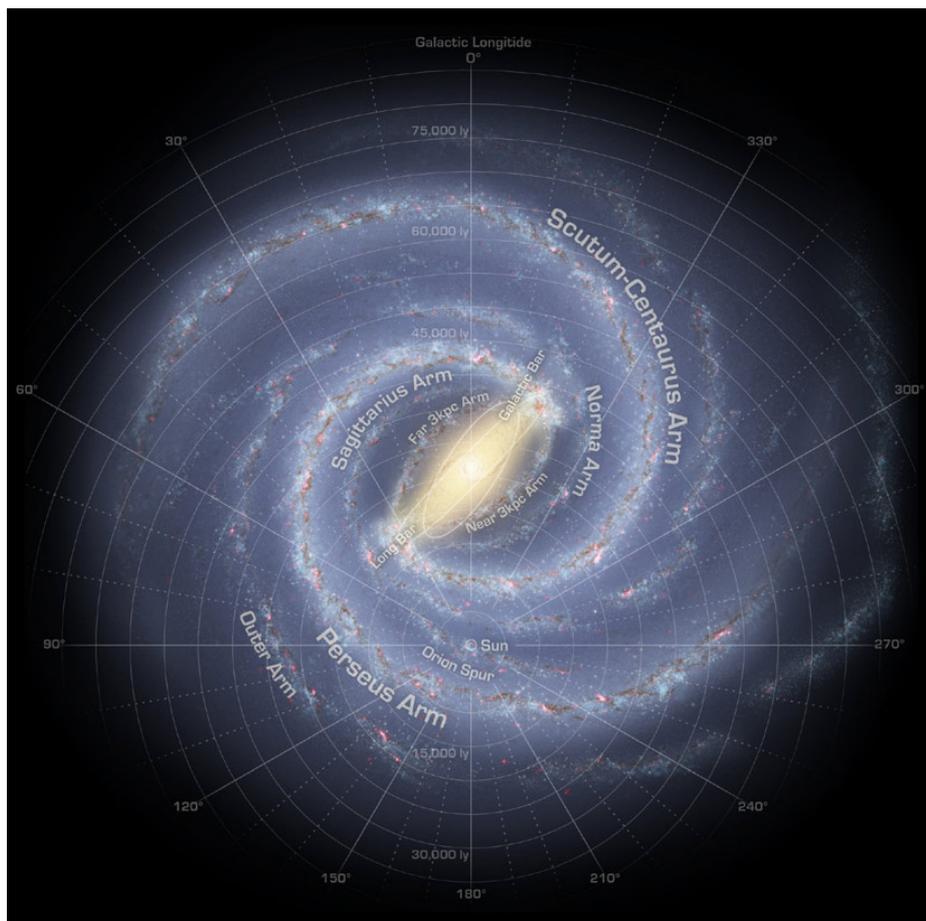
### 3. How scientists got this information:

Astronomers discovered that there is a symmetrical shaped mirror between the spiral arms of our galaxy (the Fibonacci series up and down).

Herschel Space Telescope shows the high temperatures in the centre of the Milky Way and scientists use this telescope to investigate our Galaxy.

### 4. Pictures:

The Milky Way, here you can see that there is a symmetrical shaped mirror between the spiral arms of our galaxy (the Fibonacci series up and down).





The Andromeda Galaxy is a giant spiral galaxy. The object is visible at first sight farther from the earth. It is 2.5 million light years. It is the largest galaxies in the Local Group, which consists of about 30 small galaxies plus three large spiral galaxies: Andromeda, the Milky Way and the Galaxy Triangle  
It has a calculated mass of 300,000 i 400,000 million solar masses: about one and a half times the mass of the Milky Way and a diameter of about 150,000 light years



Barnard's Galaxy is an irregular galaxy in the constellation Sagittarius. It is part of the Local Group and one of the closest galaxies to the Milky Way. Distant 1.6 million light years. This consists mainly of hydrogen, and a blue arm of young stars. extending toward the upper right. Using the Hubble Space Telescope has discovered in it a nebula, dubbed Hubble V, allowing a glimpse of how it must have been the formation of ultra-hot stars and very bright in the early days of the universe. It is a polar ring galaxy



The galaxy M74 is the most similar to the Milky Way.

#### 4. Similarities and/or differences:

There are different types of galaxies:

Concentric elliptical galaxy or galaxy may be more massive than the Milky Way.



Irregular galaxy, many astronomers believe that these galaxies are absorbed by larger galaxies



Barred Spiral Galaxy, many of which have been elliptical galaxies before.



Spiral galaxy, all galaxies have typical spiral arms, but the arms of some galaxies are more closed than those of other spiral galaxies



## 6. Find information about his past and his future:

The name "Milky Way" comes from the Latin. The Romans named our galaxy without knowing it by this name that is "the way of milk", this name comes from Greek mythology (absorbed by the Romans as their own). Looking at the sky, the Milky Way appears as a white spotted way in great contrast with the dark background of the Universe. According to Greek mythology, the Milky Way was a river of milk spilled by Hera when suckling Heracles.

In the future, three new studies released in the Astrophysical Journal suggest that the Milky Way and its neighbouring Andromeda will

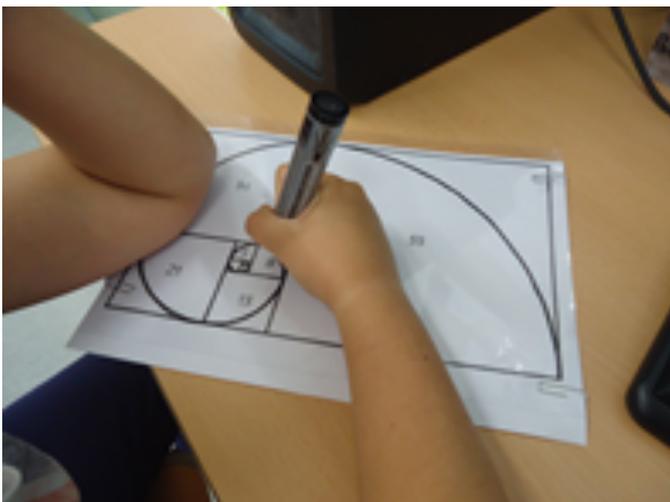
merge, giving rise to a new and giant elliptical galaxy within four billion years. It is a theory that holds that the two galaxies are mutually attracted by its gravity. Using very precise data obtained with the Hubble Space Telescope, NASA astronomers have confirmed that the collision will be a fact.

## 7. Activities

First we discovered the Fibonacci sequence from a challenge posed by the teacher so that we could discover the regularity. Then we divided the previous issue with the later, and it has gone 1.6, the number  $\phi$  phi.

Then we made a square where we got the middle of one side, and using the compass we built the golden rectangle. Then we found that the golden rectangle, if we divided the long face with short we exited the number  $\phi$ . We have also found that the smaller rectangle attached meets the golden ratio rule.

Since we have built more base rectangle golden rectangles until you reach number 55 in the Fibonacci series, so we built our own spiral.



We wanted to build the spiral on a sheet of acetate, and then look if it matches (coincide) the Fibonacci sequence in a photograph of the Milky Way. We have realized that the arms of the Milky Way meet the Fibonacci sequence.

We also discovered the galaxy M74 is very similar to our galaxy. We wanted to see if his arms met the resulting spiral of golden rectangles. In the next picture looks like it also complies with the rules from the regular Fibonacci.



Then compared with other types of galaxies and draw an elliptical galaxy, for which we had to devise a large instrument to draw a circle, in this link you can see the work done.

[http://www.youtube.com/watch?v=H41\\_JYllpeI](http://www.youtube.com/watch?v=H41_JYllpeI)

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