Comparison of the solar system orbit and the evolutionary process of the earth's biology

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Abstract: Based on a model of a huge white hole in the Galactic Center, this article analyzes the orbit of the solar system in the Milky Way. It is pointed out that the motion of the solar system in the Milky Way can be divided into two parts. The first part lasts about three to four billion years. During this time, the solar system made elliptical movements in an elongated bar structure at the Galactic Center. A large number of galaxies perform elliptical motion around the Galactic Center, forming the elongated bar structure near the Galactic Center. When the solar system gradually moves away from the Galactic Center and reaches a certain distance, the solar system will be ejected from the elongated bar structure of the Galactic Center and enter the spiral orbit outside the Milky Way. Moving outside the Milky Way, the Solar System flies away from the Milky Way following a parabolic trajectory. For simplicity of calculation, this article uses a straight line instead of this parabola. Calculation shows that the solar system has been flying for at least 600 million years after flying away from the elongated bar structure of the Galactic Center. Comparing these 600 million years with the evolutionary process of life on Earth, it can be found that this period is the time when a large number of higher organisms on the earth evolved. Including the emergence of fish, the concentrated evolution of dinosaurs, and the emergence of humans. This article points out that this is related to the fact that the entire Earth's environment is more suitable for the growth of higher organisms after the solar system flies from the elongated bar structure of the Galactic Center. Since the earth has obtained biological prosperity and the development of human civilization in this way, it is believed that galaxies similar to the solar system are ubiquitous in the Milky Way. Therefore, there will also be extraterrestrial civilizations similar to Earth civilization on the periphery of the Milky Way. This article analyzes some areas in the spiral structure of the Milky Way that require attention, and points out that the development of civilization in these areas may exceed the development of human civilization on Earth by more than millions of years. If we can obtain important information about these civilized societies, it will help us better grasp the destiny of human civilization on earth.

Keywords: Galactic Center; Milky Way; Solar system; Extraterrestrial civilization; Biological evolution

1 Introduction

I have thought about the spiral structure of the Milky Way these days, and I feel that this spiral structure should be caused by a large amount of mass ejected from the Galactic Center [1]. Because if there is a huge black hole in the center, it will attract solar system, so it is difficult to maintain the mass of the Milky Way galaxy around the Galactic Center. The actual observations also show that the planets around the Milky Way are moving too fast and can easily escape the gravitational constraints of the Galactic Center. Another more puzzling thing is that the outer galaxies moves at

the same speed as the inner galaxies, which is difficult to explain with circular or elliptical motion. I also noticed the dark matter theory, but I feel that the current difficulty of the dark matter theory lies in the lack of direct evidence. Another problem is the spiral structure of the Milky Way. I also noticed the density wave theory. But density wave theory is difficult to explain the structure of flocculent spiral galaxies like NGC 4414.

If we think that the galaxy's mass distribution in the Milky Way is continuously generated by the central white hole, the material produced by the white hole will first continue to make elliptical motion with increasing radius in the Galactic Center, which will form the elongated bar structure of Galactic Center. After reaching a certain distance, these planets that make elliptical motion in the Galactic Center bar structure will be ejected from it. Continued material ejection will form the spiral structure of the Milky Way and even other spiral galaxies.

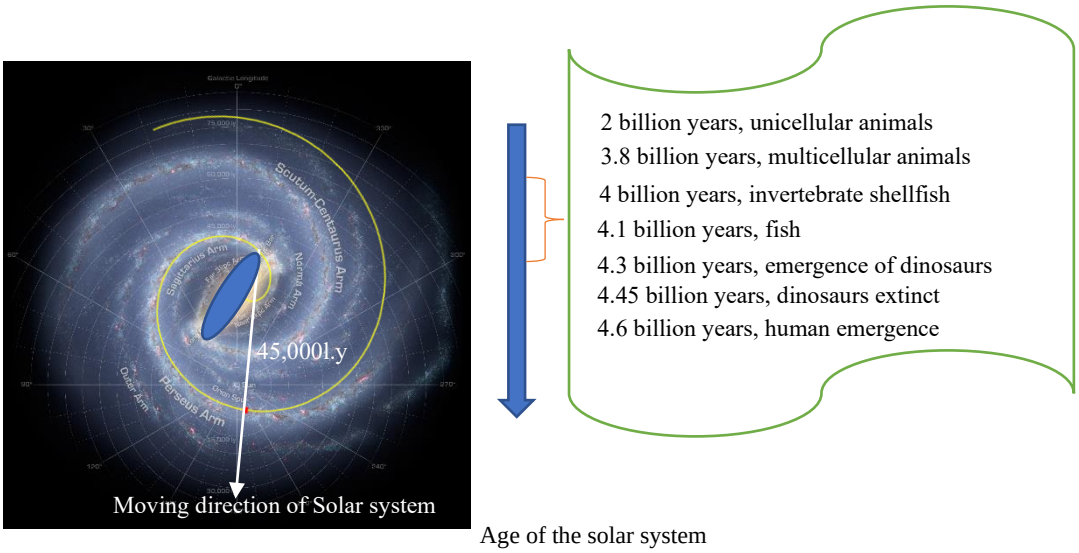
In my previous article, through a simplified model, that is, without considering the gravitational effect of the Galactic Center, a good calculation result can be obtained that coincides with the spiral structure of the Milky Way. It is believed that after proper modification, a model fully compatible with the Galactic Center bar structure and external spiral structure can be obtained.

So what is the application value of this white hole model of the Milky Way? My article attempts to use this model to analyze the existence of biological civilization in the Milky Way and the specific conditions of biological civilization in different areas of the Milky Way. It also gives some important areas, pointing out that these areas are worthy of our attention when exploring extraterrestrial civilizations in the future.

2 The trajectory of solar system movement and the evolution of life on Earth

From my previous work, after the solar system was ejected from the Galactic Center, it would stay in the bar-shaped area of the Galactic Center for a long time. During this time, the solar system made elliptical movements around the Galactic Center. After billions of years, the solar system will travel to the periphery of the bar-shaped area and have sufficient capacity to escape from the area.

Once the solar system leaves the bar-shaped area, it will fly directly into space. Its motion trajectory generally shows a parabolic motion. This is because although the gravity of the bar-shaped area is relatively weak, there is still a strong enough gravity to attract the solar system to do curve motion. Of course, in order to simplify the analysis process, the left side of Figure 1 shows that after the solar system flew out of the bar-shaped area, it flew away from the Galactic Center in a linear motion.



The yellow spiral is the result of the calculation, and the length of the spiral is 8 billion years. The red dot is where the solar system is located. (Source: NASA/JPL-Caltech/R. Hurt. https://solarsystem.nasa.gov/resources/285/the-milky-way-galaxy/)

Figure 1. Schematic diagram of Galactic Center's ejection masses and the calculation results (For comparison, the Milky Way picture and the calculated spiral are rotated and scaled respectively)

The trajectory of the solar system is plotted on the left in Figure 1. The time at which the Sun was completely ejected from the Galactic Center's elongated bar structure can be approximately calculated from the Sun's distance from Galactic Center by 26,000 light years. The position of mass escaped from the bar-shaped structure of Galactic Center is the position of the top of the ellipse in Figure 1. Therefore, the position of the solar system at this point to the present can be estimated in about 45,000 light years.

Assuming that after the solar system is thrown from the bar-shape of Galactic Center, it will no longer be affected by the gravity of the Galactic Center.

$$\frac{4.5 \times 10^4 \times 10^{16}}{2.4 \times 10^5} \approx 1.9 \times 10^{15}(s) \approx 6.2 \times 10^7(year) \qquad (1)$$

That's about 62 million years. This time is quite short. Therefore, the motion of the solar system after being separated from the Galactic Center is more likely to be a spiral shape. It is found by calculation that the orbit after the solar system is separated from the center of the Milky Way is shown in Figure 2.

In Figure 2, the solar system has been ejected from the center of the Milky Way for about 1.8 billion years. The red dot is the location of solar system. Far from the center of the Milky Way, the orbit of the solar system has become very sparse, lasting about 600 million years.

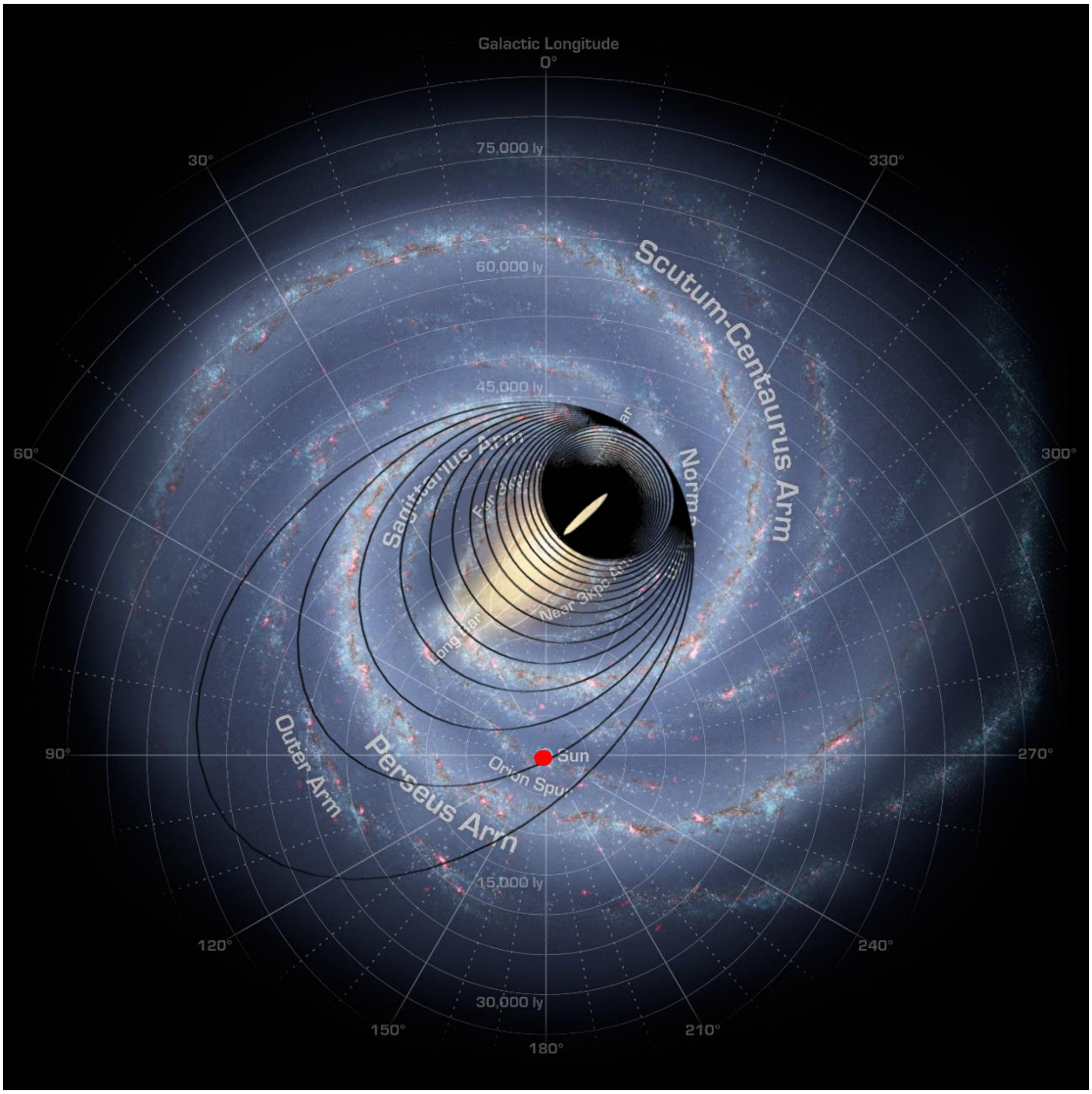


Figure 2. Superposition of calculation results with actual graphics of the Milky Way

From the bar-shaped structure of the Galactic Center shown in Figure 1, it is estimated that the longest radius of this structure is about 5,000 light-years, so even if the solar system moving within this range, there can still be enough conditions on the earth to meet the needs of biological evolution..

The right side of Figure 1 shows an overview of the evolution of life on Earth. It can be seen that fish began to appear on the earth 500 million years ago, and animal dinosaurs on land began to appear in large numbers 300 million years ago, proving that the temperature of the earth at this time is very suitable for animals to survive on land.

Although the earth is only a small part of the interior of the solar system, changes in the geological structure and environment of the earth are also related to the position of the sun in the entire galaxy.

The emergence of fish in the ocean 500 million years ago and the concentrated evolution of dinosaurs 300 million years ago also explained to a certain extent the overall environment of the entire solar system during this period.

However, Figure 1 shows a relatively simple and easy calculation. If the gravitational influence of the huge mass bar-shaped around Galactic Center area is taken into account, the orbit of the solar system thrown away from the it may also be a parabola. As shown in Figure 2. Then the time it takes for the solar system to move outside the Galactic Center to its current position may be longer. Therefore, the estimation error of formula (1) may be around ± 500 million years.

Figure 3 shows the temperature change of the earth over 550 million years.

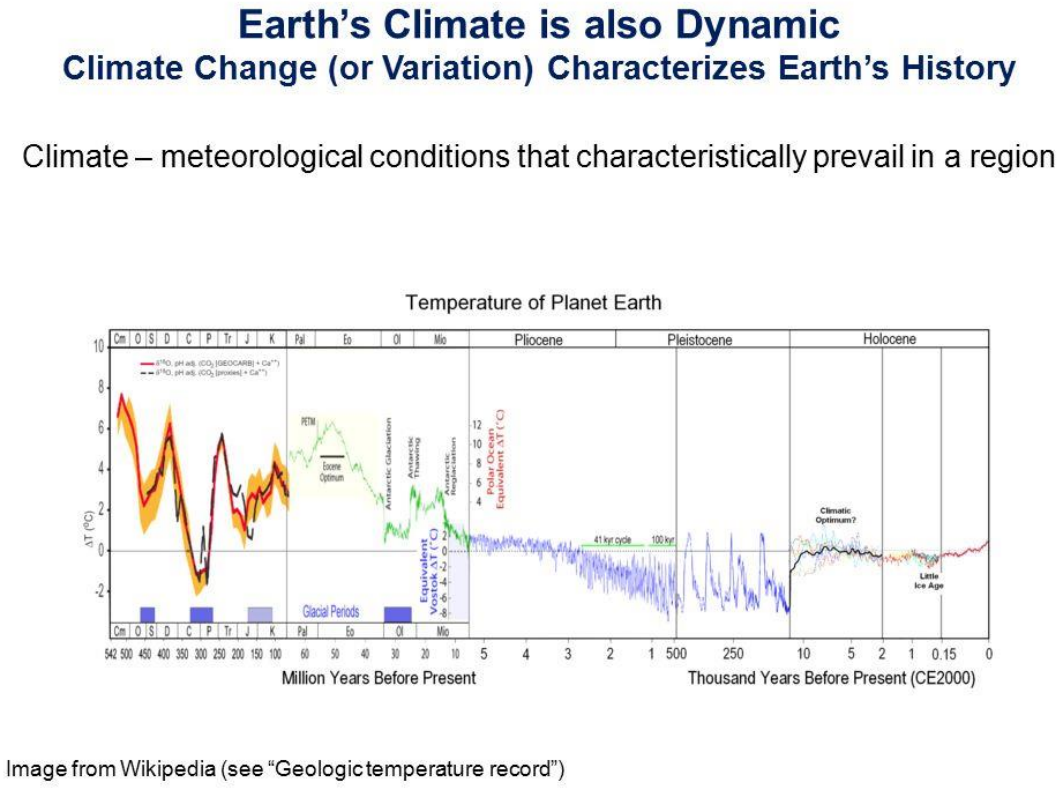


Figure 3 Changes in the average surface temperature of the Earth over 600 million years （Source: https://slideplayer.com）

It can be seen from Figure 3 that, starting from 600 million years, the earth's surface temperature has shown a downward trend. Of course, during this period, the earth's surface temperature also experienced drastic fluctuations. This may be related to the different positions of the solar system in the galaxy.

3 Discussion on the existence of extraterrestrial civilization

Considering that the farther the galaxy is from the Galactic Center, the older the galaxy is, so in the possible extraterrestrial civilization areas where is farther away from the Galactic Center, the possibility of more advanced extraterrestrial civilizations than Earth civilization is relatively large.

Some areas that can be focused on are marked in Figure 4.

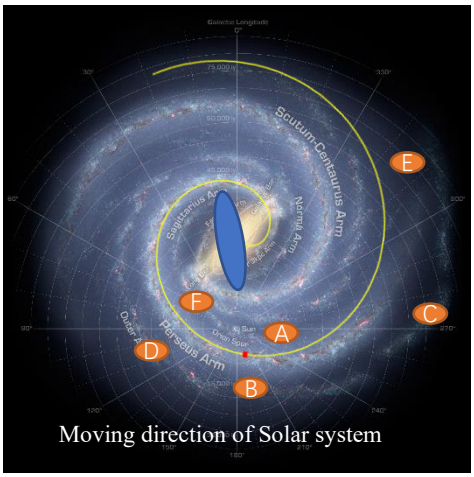


Figure 4. Areas where extraterrestrial civilizations may exist

Region A is closest to the solar system, but its galaxy material is ejected for a longer time. According to the distance estimated on the map, the distance between point A and Galactic Center is about a little longer than the distance between the sun and Galactic Center, which is about thousands of light years away. In terms of age, the galaxies in this region are about several million years older than the solar system. Therefore, in this region, if a star system has the same environment and conditions as the Earth, and the same biological evolutionary history, the civilization of the region may be hundreds of thousands of years ahead of Earth. So if civilizations in this region had developed more advanced electromagnetic signal transmission technology tens of thousands of years ago, their signals from thousands of years ago could be transmitted to the earth. If a more regular signal is detected in electromagnetic waves or other signals in this direction, it is likely to be evidence of the existence of a highly developed extraterrestrial civilization in this area.

Region F is also relatively close to the current position of the solar system. However, the age of the galaxies in this position are shorter than the solar system. About tens of millions of years short. Therefore, if the planet at this location has the same evolutionary conditions as the Earth, it is now about the age of the dinosaurs, and it is extremely unlikely that the signals emitted by the intelligent

civilization will be obtained.

Region B is located on the periphery of the Milky Way and is a zone on the other spiral arm Norma Arm. From Figure 4, the position of the spiral arm in this area is much longer than that of area A, which is about 100 million years older than the age of the solar system. Therefore, if there is extraterrestrial civilization in the region, it is more likely that it will far exceed human civilization. However, the area is relatively far from the solar system, about 20,000 light-years long. There is also a major mass gathering area in the Perseus Arm separated from the solar system. Therefore, if there is a civilization signal emitted from area B, it will take tens of thousands of years to reach the earth, and the possibility of being absorbed by the dense material of the planet in the middle is very high.

Region D is about the same age as the solar system, but is farther from the solar system.

Regions C and E are the furthest from the solar system. Of course, civilizations in this area may have existed for hundreds of millions of years longer than the solar system. If the entire galaxy is constantly away from the Milky Way center, the planets inside it will always be able to maintain a stable state. Unless the intelligent organisms cause themselves extinction, the development of science and technology should be unimaginable by humans on Earth. Therefore, this area should be able to emit enough powerful signals to be received by the earth. It's just that it can be as long as 100,000 light years away from the solar system. So it may take hundreds of thousands of years for the signal to reach Earth.

Since the galaxies in regions C and E are hundreds of millions of years older than the solar system, or even longer, will this region launch a traveler spacecraft like Earth? It should be possible. Just on the scale of the Milky Way, the solar system is too small. Therefore, even with such a spacecraft, the possibility of reaching the solar system is extremely small. This is like searching and rescuing on the sea. Without advanced navigation measures, it is difficult to find the target.

In addition, we can also notice that the emergence of human civilization on the earth has a certain suddenness. The earliest human beings in archeological discoveries have appeared 2 million years ago. And the human civilization that can be confirmed is not ten thousand years. Compared with the evolution process of animals such as dinosaurs, human civilization can be evolved in such a short period of time. Perhaps there is some genetic control factor. We can even assume that there is a highly developed wisdom that can guide the evolutionary process of animals on the earth through technologies such as microwaves, causing mutations in genes, which in turn can lead to the evolution of humans. Of course, this is only an assumption, and it is estimated that at least it is difficult to find sufficient evidence to support such a conclusion.

4 Conclusion

From the above analysis, if there is a white hole in the Galactic Center, it means that it will continuously eject the mass outward, and then form various galaxies. The formation of the Milky

Way galaxy mainly occurred in the Galactic Center bar structure. In the bar-shaped structure of the Galactic Center, there are a large number of galaxies similar to the solar system in which they perform elliptical motion. However, because the bar-shaped area is thousands of light years long, many galaxies have a high enough speed when they reach the apex of the bar-shaped structure, so that they can fly away from the limit of the gravity of the Galactic Center and fly to space. Then the spiral structure of the entire galaxy mass distribution is formed.

The solar system has been in the galactic bar-shaped region for billion years. During this period, the earth's climate and geological structure have undergone major changes. As the solar system gradually moved to the periphery of the bar-shaped area, life evolution began to appear on Earth. When the solar system broke away far from the Galactic Center bar-shaped area, high-level creatures such as fish and dinosaurs began to evolve on the earth. In this way, the evolution of life on Earth can be related to the position of the solar system in the Milky Way. It can provide some inspiration for us to find advanced extraterrestrial civilizations.

Considering that the rapid evolution of Earth's life occurred mainly after the solar system broke away from the Galactic Center bar region. There will be many planets in the Milky Way that are similar to the intelligent civilization of Earth. At present, the civilization of the earth can emit microwave signals that are detected in space, such as the microwave signal of a traveler spacecraft. Other similar extraterrestrial civilizations should also emit such signals. If these signals reach Earth, they can be detected by us.

Combine the distance of these galaxies from the Galactic Center. In the future, when we detect extraterrestrial civilizations, we can focus our attention on a few more important areas in the Milky Way. The area A in Figue 2 is the best choice. This area is relatively close to the solar system, and the signal attenuation is not much. The degree of civilization in the region should be developed millions of years before the earth. If the region emits microwave signals tens of thousands of years ago, it can be more easily detected by the earth.

Another area to consider is area C. This area is relatively far from the solar system. But its biological evolution time is more than a billion years faster than the earth. Such a long period of biological evolution may exceed our expectations and evolve a more advanced level of civilization that is unpredictable by Earth's civilization. Naturally, the extraterrestrial civilizations in this area may use new communication methods to connect with other galaxies, and even control the evolution of other galaxy organisms.

Reference

[1] Cheng, Z. (2019) The Galactic Center may be a White Hole. http://vixra.org/abs/1912.0264.

太阳系运行的轨道位置与地球生物进化过程的对比

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摘要：本文在银河系中心存在巨大白洞的模型基础上，分析了太阳系在银河系中的运行轨迹。指出太阳系在银河系中的运动可以分成了两个部分。第一个部分持续大约三十到四十亿年时间。在这段时间中，太阳系在位于银河系中心的棒状结构中做椭圆运动。大量星系在银河系中心周围做椭圆运动，形成了银河系中心附近的棒状结构。而当太阳系逐渐远离银河系中心达到了一定的距离之后，太阳系将被抛射出银河系中心的棒状结构，并进入银河系外部的螺旋轨道。在银河系外部的运动，太阳系遵循一条抛物线的轨迹飞离银河系。为了计算的简便，本文使用了一条直线来代替这条抛物线。计算结果表明，太阳系在飞离银河系中心的棒状结构之后，到目前为止，已经运行了至少 6 亿年的时间。将这 6 亿年的时间与地球上生物进化过程进行对比，可以发现这期间正是地球上高等生物大量进化的时间。包括鱼类的出现、恐龙的集中进化以及人类的出现等。本文指出这同太阳系飞离银河系中心的棒状结构之后，整个地球环境更适合高等生物生长有关系。既然地球通过这种方式获得了生物的繁荣以及人类文明的发展，相信与太阳系类似的星系在银河系中是普遍存在的，因此银河系外围也会存在与地球文明类似的地外文明。本文分析了银河系螺旋结构中的一些需要重点关注的区域，指出这些区域的文明发展可能会超出地球人类文明发展几百万年以上。如果能够获得这些文明社会的重要信息，将有助于我们更好地掌握地球人类文明的命运。

关键词：银河系中心；银河系；太阳系；地外文明；生物进化

Аннотация: На основе модели огромной белой дыры в Галактическом Центре в данной статье анализируется орбита Солнечной системы в Млечном Пути. Отмечено, что движение Солнечной системы в Млечном Пути можно разделить на две части. Первая часть длится около трех-четырех миллиардов лет. В течение этого времени солнечная система совершала эллиптические движения в виде удлиненной планки в Галактическом Центре. Большое количество галактик совершает эллиптическое движение вокруг Галактического Центра, образуя удлиненную структуру стержня возле Галактического Центра. Когда Солнечная система постепенно отходит от Галактического Центра и достигает определенного расстояния, Солнечная система будет вытеснена из структуры удлиненного стержня Галактического Центра и выйдет на спиральную орбиту за пределами Млечного Пути. Выходя за пределы Млечного пути, Солнечная система улетает от Млечного пути по параболической траектории. Для простоты расчета в этой статье вместо этой параболы используется прямая линия. Расчеты показывают, что солнечная система летела не менее 600 миллионов лет после того, как улетела от удлиненной структуры галактического центра. Сравнивая эти 600 миллионов лет с эволюционным процессом жизни на Земле, можно обнаружить, что этот период является временем, когда эволюционировало большое количество высших организмов на Земле. Включая появление рыбы, концентрированную эволюцию динозавров и появление людей. В этой статье указывается, что это связано с тем, что вся окружающая среда Земли более подходит для роста высших организмов после того, как солнечная система вылетит из удлиненной планки Галактического Центра. Так как Земля достигла биологического процветания и развития человеческой цивилизации таким образом, считается, что галактики, подобные Солнечной системе, повсеместно распространены в Млечном Пути. Следовательно, на периферии

Млечного Пути также будут существовать внеземные цивилизации, подобные цивилизации Земли. В этой статье анализируются некоторые области спиральной структуры Млечного Пути, требующие внимания, и указывается, что развитие цивилизации в этих областях может превосходить развитие человеческой цивилизации на Земле более чем на миллионы лет. Если мы сможем получить важную информацию об этих цивилизованных обществах, это поможет нам лучше понять судьбу человеческой цивилизации на земле.

1 导言

我这些天思考了一下银河系的螺旋结构，感觉到这种螺旋结构应该是由银河系中心向外抛射出大量质量而造成的[1]。因为如果是中间存在一个巨大的黑洞，如同太阳那样对太阳系内的各大行星产生吸引力，这样很难维持银河系那么大量的质量绕银河系中心的运动。而实际的观测结果也表明，银河系外围的行星运动速度太快，可以轻而易举逃离银河系中心的引力的束缚。另一个更让人不解的是银河系外围的星系运动速度和内围星系运动速度是相同的，这很难用圆周或者椭圆运动来进行解释。我也注意到了暗物质理论，但我感觉暗物质理论目前的困难在于缺乏直接的证据。另一个问题就是银河系的螺旋结构，我也注意到了密度波理论。但是密度波理论很难解释如同 NGC 4414 等絮状螺旋星系的结构。

而如果我们认为银河系中的星系质量分布是由中心的白洞不断产生的，则白洞产生的物质首先在银河系中心不断做半径越来越大的椭圆运动，这将形成银河系中心的棒状结构。在达到了一定的距离之后，这些在银河系中心棒状结构中做椭圆运动的行星将被抛出棒状结构。持续的物质抛射将形成银河系乃至其他螺旋星系的螺旋结构。

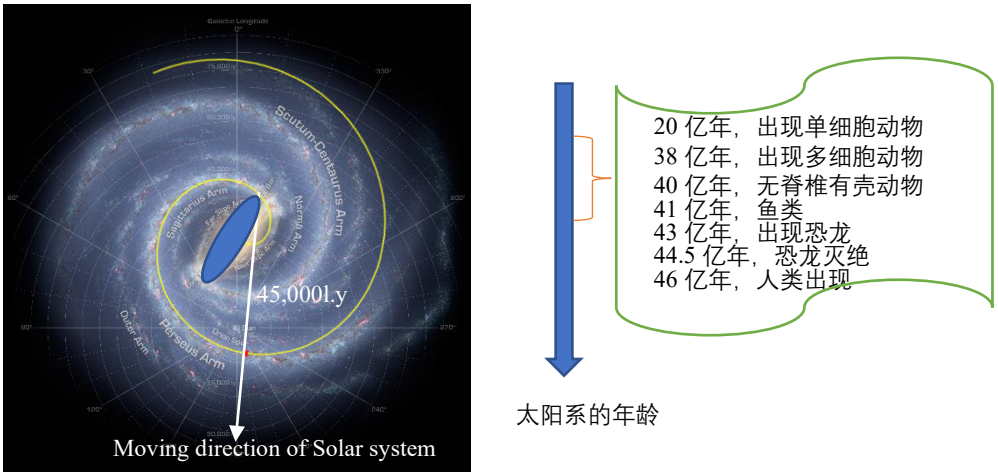
我上篇文章通过一个简化的模型，即不考虑银河系中心所产生的引力作用，可以获得一个与银河系螺旋结构重合的很好的计算结果。相信经过适当的修正之后，可以获得跟银河系中心棒状结构和外部螺旋结构完全符合的模型。

那么这种银河系的白洞模型有什么应用价值呢？我这篇文章尝试用这一模型来分析在银河系中生物文明的存在方式以及不同的银河系区域所存在的生物文明的具体情况。并给出了一些重要的区域，指出这些区域是值得我们今后在探索地外文明的时候需要重点关注的。

2 太阳系运动的轨迹及地球生命的进化

从我上一次的工作来看，太阳系从银河系中心被抛射出来后，会在银河系中心的棒状区域内停留相当长的一段时间。在这段时间中，太阳系围绕银河系中心做椭圆运动。持续了几十亿年之后，太阳系将运行到棒状区域的外围并具备了足够的能力脱离该区域。

一旦太阳系脱离了棒状区域，就直接飞向宇宙太空。其运动轨迹一般来说呈现抛物线的运动，这是由于虽然棒状区域的引力已经比较弱，但是仍然存在足够强的引力吸引太阳系做曲线运动。当然为了简化分析过程，图 1 的左边显示了太阳系飞出棒状区域之后，直接采用直线运动的方式飞离银河系中心。



The yellow spiral is the result of the calculation, and the length of the spiral is 8 billion years. The red dot is where the solar system is located. (Source: NASA/JPL-Caltech/R. Hurt. https://solarsystem.nasa.gov/resources/285/the-milky-way-galaxy/)

Figure 1. Schematic diagram of Galactic Center's ejection masses and the calculation results (For comparison, the Milky Way picture and the calculated spiral are rotated and scaled respectively)

图 1 中左边画出了太阳系运行的轨迹。太阳被完全抛出银心棒状结构的时间可以由太阳离银心的距离 2.6 万光年来近似计算出来。由于质量抛出银心棒状结构的位置是图 1 中椭圆顶端位置。因此该点到现在太阳系的位置可以用大约 4.5 万光年来进行估算。

假设在太阳系从银心被抛出后，不再受到银心引力的作用，则太阳系将按照直线运动方式以 240km/s 的速度运行，一共需要运行

$$\frac{4.5 \times 10^4 \times 10^{16}}{2.4 \times 10^5} \approx 1.9 \times 10^{15}(s) \approx 6.2 \times 10^7(year) \qquad (1)$$

也就是大约 6.2 千万年。这个时间是相当短的。因此太阳系在脱离银河系中心之后的运动更可能是螺旋形状。通过计算发现太阳系脱离银河系中心之后的轨道如图 2 所示。

在图 2 中，太阳系被抛射出银河系中心之后还运行了大约 18 亿年。而在远离银河系中心的位置，太阳系的轨道变得非常稀疏，持续时间大约为 6 亿年左右。

从图 1 显示的银河系中心的棒状结构来估计，这个结构最长的半径大约有 5000 光年，因此即便是太阳系在这个范围之内运行，地球上还是可以有足够的条件满足生物进化的需求的。

图 1 的右边显示了地球上生物进化的大致情况。可以看出 5 亿年前地球上开始出现鱼类，到了三亿年前陆地上的动物恐龙开始大量出现，证明这个时候地球的气温已经非常适合动物在陆地上生存。

虽然地球只是太阳系内部的一个很小的组成部分，但是地球地质结构和环境的变化也是跟太阳在整个银河系中的位置有关系的。在五亿年前海洋中鱼类的出现以及三亿年前恐龙的集中进化，也在一定程度上说明了整个太阳系在这一时期整体环境出现了巨大的变化。从公式（1）的计算来看，这可能跟太阳系在这一时期脱离银河系中心的棒状结构有关系。

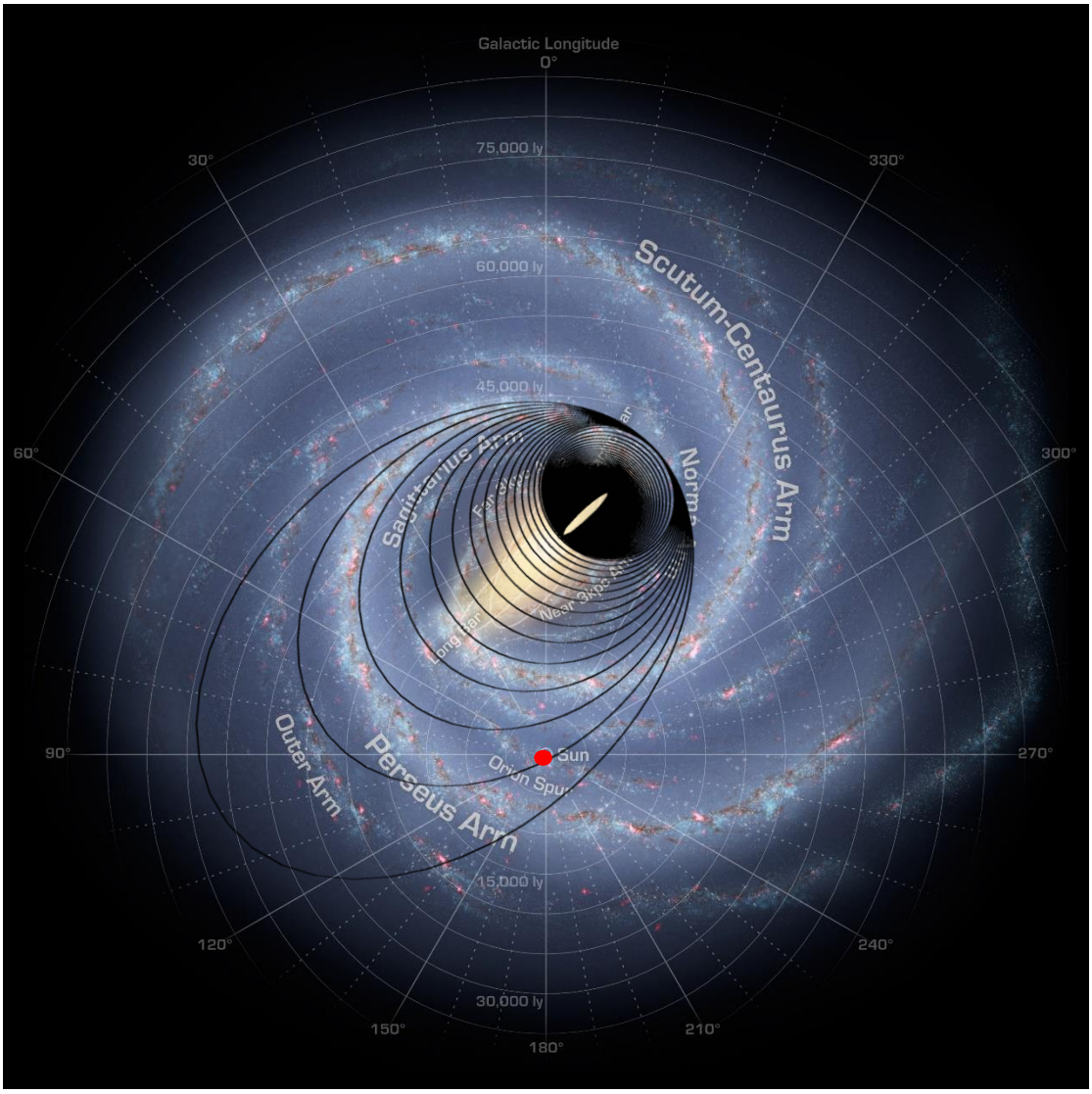


Figure 2. Superposition of calculation results with actual graphics of the Milky Way

当然图 1 显示了一种比较简单容易计算的情况。如果考虑到 5000 光年棒状银心质量密集区域的引力影响，太阳系被抛离银心的轨道也可能是一个抛物线。如同图 2 所示。则这样太阳系在银心外部运行到现在的位置所需要的时间可能会更长一些。因此公式（1）的估算误差可能会在±5 亿年左右。

图 3 显示的地球 5.5 亿年来温度的变化情况。

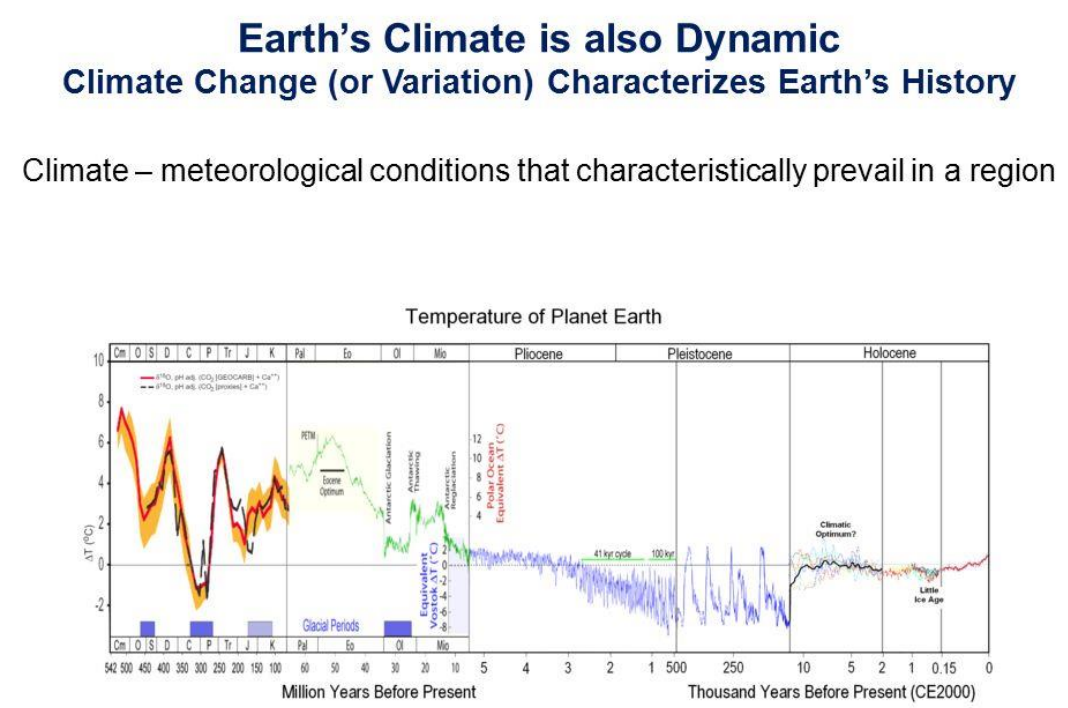


图 3 六亿年来地球地表平均温度的变化情况（Source: https://slideplayer.com）

从图 3 中可以看出从 6 亿年开始，总体上地球地表温度是呈现一个下降的趋势的。当然在这期间地球地表温度也出现了剧烈的波动。这可能跟太阳系在银河系中不同的位置有一定的关系。

3 地外文明存在区域探讨

考虑到银河系距离银心越远的地区，其星系的年龄越长，因此在可能存在的地外文明区域中，超出太阳系离银河系中心距离越远的区域，存在比地球文明更先进的地外文明的可能性比较大。

图 4 中标记了一些可以重点关注的区域。

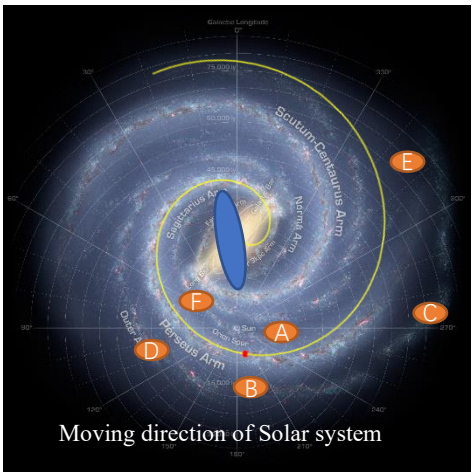


Figure 4. Areas where extraterrestrial civilizations may exist

其中区域 A 离太阳系最近，但是其星系物质被抛射出来的时间更长一些。按照图上的距离估计，A 点离银河系中心的距离大约比太阳离银河系中心的距离要远，大约几千光年距离。从年龄上来看，这一区域的星系年龄大约比太阳系多几百万年左右。因此在这一区域中，如果某个恒星系拥有跟地球同样的环境和条件，以及相同的生物进化历程，则该地区的文明可能会比地球提前几十万年左右。因此如果这一地区的文明在几万年前已经发展出了更先进的电磁信号传递技术，则其几千年前的信号将可以传递到地球上。如果在这一方向的电磁波或其他信号中检测出比较有规律的信号，则很可能就是这一区域存在高度发达的地外文明的证据。

区域 F 离太阳系现在位置也是比较近的。不过该位置的星系比太阳系抛射出来的时间要短一些。大约短几千万年。因此如果该位置的行星拥有与地球相同的进化条件，则现在大约处于恐龙时代，获得智慧文明发射出来的信号可能性极小。

区域 B 位于银河系的外围，是另一螺旋臂 Norma Arm 上的一个区域。从图 4 来看，该区域所在螺旋臂的位置远比区域 A 要长，大约会比太阳系的年龄大一亿年左右。因此如果该区域存在地外文明，其远超人类文明的可能性比较大。不过该区域离太阳系比较远，大约长 2 万光年。且跟太阳系之间还隔了 Perseus Arm 中的主要质量聚集区域。因此区域 B 如果存在文明信号发射出来，则需要经过几万年的时间才能达到地球，且中间被行星密集的物质吸收的可能性很大。

区域 D 的年龄跟太阳系差不多，不过距离太阳系更远。

而区域 C 和 E 离太阳系最远。当然这一地区的文明存在时间可能比太阳系要长几亿年时间。如果整个星系在不断远离银河系的过程中，其内部的行星始终都能够保持稳定的状态，除非智慧生物自身的因素导致其灭绝，否则其科学技术发展应该是地球上人类难以想象的。故这一地区应该能够发射出足够强大的信号被地球接收到。只是其距离太阳系可能长达十几万光年。因此信号也可能需要十几万年才能够达到地球。

由于区域 C 和 E 的星系年龄比太阳系长几亿年，甚至更长的时间，因此这一区域会否如同地球那样发射旅行者宇宙飞船？应该是有可能的。只是在银河系的尺度上来看，太阳系实在是太渺小了。因此即便有这样的宇宙飞船，到达太阳系的可能性也是极小的。这就如同在大海上搜救一样，没有先进的导航措施，很难找到目标。

另外我们也可以注意到人类文明在地球上的出现有一定的突然性。目前已有的考古发现最早的人类出现在 200 万年前。而能够证实的人类文明不过万年。相比恐龙等动物的进化过程，这么短的时间中就能够进化出人类文明出来或许其中存在某种基因控制因素。我们甚至可以假设存在一个高度发达的智慧，能够通过微波等技术指导地球上的动物进化过程，导致基因产生突变，进而引起进化出人类。当然这只是一种设想，估计至少在目前是很难找到足够的证据来支持这样的结论的。

4 结论

从上述分析来看，银河系中心如果存在白洞，则意味着会不断向外抛射质量，进而形成各种星系。银河系星系的形成主要是发生在银河系中心棒状结构之中。在银河系中心的棒状结构中，存在大量类似于太阳系的星系在其中做椭圆运动。不过由于棒状区域长达几千光年，导致很多星系在运行到棒状结构的顶点的时候，拥有了足够高的速度，从而能够脱离银河系中心引力的限制，飞向太空。进而形成整个银河系质量分布的螺旋结构。

太阳系在银河系棒状区域中，地球的气候以及地质结构发生了重大的变化。在太阳系逐渐运行到棒状区域的外围的时候，地球上开始出现生命进化。到了太阳系远离银河系中心棒状区域之后，地球上开始进化出鱼类和恐龙等高等级的生物。这样地球生命进化的过程就可以和太阳系在银河系中的位置联系在一起。可以为我们寻找先进的地外文明提供一些启示。

考虑到地球生命的快速进化主要是发生在太阳系脱离银河系中心棒状区域之后发生的。银河系中类似于地球这样的智慧文明进化的行星将会很多。目前地球文明已经可以发射出在宇宙空间中被探测到的微波信号，比如旅行者宇宙飞船的微波信号等。其他类似的地外文明也应该会发射这样的信号。如果这些信号达到地球，就可以被我们所探测到。

综合这些星系距离银河系中心的远近。我们今后在探测地外文明的时候，可以将注意力集中在银河系中的几个比较重要的区域。其中图 2 中的区域 A 是最佳选择。该区域离太阳系比较近，信号衰减的不多。而该区域文明程度应该比地球先行发展几百万年，如果该区域在几万年前发射了微波信号，就可以比较容易被地球探测到。

另一个可以考虑的区域是区域 C. 该区域虽然离太阳系比较远。但是其生物进化时间比地球要快十几亿年。这么长时间的生物进化，有可能超出我们的预期，进化出地球文明难以预测的更先进的文明程度。自然该区域的地外文明有可能使用全新的通信方法来与其他星系进行联系，甚至控制其他星系生物的进化过程。

参考文献

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