Analysis of ground facilities for detecting electromagnetic signals from extraterrestrial civilizations

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Abstract: This article analyzes the existing facilities for exploring ground radio telescopes for extraterrestrial civilizations. Although many extraterrestrial civilization exploration programs have been implemented, judging from the existing radio telescope facilities, these facilities have not been aligned with the area where advanced extraterrestrial civilizations are located. This is also the reason why nothing has been obtained for a long time in the past. Based on my previous work, this article proposes areas where advanced extraterrestrial civilizations may exist, and points out that according to the current orbital information of the solar system in the Milky Way and the location of the Earth's orbit, the radio telescope installed in the North Pole of the Earth is the best location to receive advanced extraterrestrial civilization signals. Therefore, the Greenland radio telescope on the earth is currently the best choice for receiving advanced extraterrestrial civilization signals. It is suggested that existing extraterrestrial exploration projects such as SETI@home should pool all resources to analyze the data obtained by the Greenland Radio Telescope.

Keywords: Extraterrestrial civilization; Radio telescope; Greenland radio telescope; FAST

Аннотация: В данной статье анализируются существующие средства для исследования наземных радиотелескопов для внеземных цивилизаций. Хотя многие программы исследования внеземных цивилизаций были реализованы, судя по существующим средствам радиотелескопа, эти объекты не были приведены в соответствие с районом, в котором находятся развитые внеземные цивилизации. Это также причина, по которой ничего не было получено в течение долгого времени в прошлом. На основании моей предыдущей работы в этой статье предлагаются области, в которых могут существовать развитые внеземные цивилизации, и указывается, что в соответствии с текущей орбитальной информацией Солнечной системы в Млечном Пути и в точке расположения орбиты Земли радиотелескоп, установленный на Северном полюсе Земли, является лучшим местом для приема сигналов передовой внеземной цивилизации, поэтому в настоящее время радиотелескоп Гренландии на Земле является лучшим выбором для приема сигналов. развитая внеземная цивилизация Предполагается, что существующие внеземные исследовательские проекты, такие как SETI @ home, должны объединить все ресурсы для анализа данных, полученных радиотелескопом Гренландии.

1 Introduction

Some people may think that it is irrelevant whether the Galactic Center is a white hole or a black hole. After all, humans have now accumulated a lot of knowledge about the Milky Way. However, whether the Galactic Center is a white hole or a black hole directly affects the structure of the entire galaxy and the movement of matter.

If the center of the Milky Way galaxy is a huge black hole, all matter may always move elliptical around the center of the Milky Way galaxy, or there may be a tendency to converge toward the center. And if the Galactic Center is a huge white hole, the white hole continuously ejects material, which will cause the entire galaxy to continue to expand, and the galaxies in it will continue to spread to the outside.

According to the assumption that the Galactic Center is a white hole, I analyzed the spiral structure around the Galactic Center [1 ~ 5]. Preliminary calculation results found that the farther away from the center of the galaxy, the older the galaxy contained. And the more stable the planets in the galaxy. Therefore, it can be concluded that galaxies that are farther away from the Galactic Center are more suitable for the development of extraterrestrial civilizations.

These extraterrestrial civilizations, which are more advanced than earth civilization, may be more advanced than earth civilization for millions of years, or even hundreds of millions of years. During such a long period of civilization development, science and technology that are hard for humans on earth to develop will surely develop. If extraterrestrial civilizations use these advanced science and technology to communicate with other galaxies in the galaxy, they can achieve the following purposes:

1. Basic information transfer. That is, like the "traveler" spacecraft launched by the earth in the past, it is used to convey part of the information contained in the civilization of the earth to promote mutual understanding between galaxies.

2. Control the development of civilization in backward areas. There are now theories and technologies that prove that radiation can change the genetic structure of organisms and affect their evolution. Therefore, in order to promote the development of civilizations in galaxies near the center of the Milky Way, advanced extraterrestrial civilizations may affect the development of backward civilizations by transmitting such signals as microwave signals.

3. Affect the way of thinking of other galaxy creatures. At present, there is some evidence to prove that there is a kind of over-range action such as "quantum entanglement". If extraterrestrial civilizations have made major breakthroughs in this direction and can achieve arbitrary controllable large-scale quantum entanglement, they can influence the way of thinking of other galaxy creatures through appropriate technical means, and achieve the role of indirect transmission of civilization information.

4. Interstellar travel. Although there is no scientific theory to prove the feasibility of interstellar

travel, it is difficult to say that there is no such interstellar travel technology.

5. Explore their own sustainable development needs. Even for very advanced extraterrestrial civilizations, there is a need for its own development to be able to maintain its sustainable development capabilities. By understanding the development of other galaxy civilizations, it will help solve many of their own problems.

At present on the earth, although there have been considerable achievements in the development of science and technology, at least according to the existing scientific theory and technical conditions, there is not enough evidence to show that the signals of extraterrestrial civilizations and even living things have reached the earth. But at the same time, from a statistical point of view, since the earth can evolve human civilization, the galaxy has hundreds of billions of planets, and the existence of planets similar to human civilization on earth is extremely possible. After all, as long as sufficient material conditions are guaranteed, living things will definitely evolve. At the same time, we can't see what is special about the human neural network system, which limits its ability to grow and develop on the earth.

So why hadn't we received the signal of extraterrestrial civilization before? There are several possibilities:

1. The technical capability of our receiving equipment is insufficient. Such as insufficient sensitivity.

2. We already have enough precision equipment, but the receiving direction is wrong. This is also possible. If our radio telescope is aimed at backward extraterrestrial civilization planets, it is inevitable that we cannot receive signals transmitted by extraterrestrial civilizations. In addition, although our radio telescope is aimed at areas where advanced extraterrestrial civilizations may exist, the extraterrestrial civilization is in another extremely distant spiral galaxy, the signals of these extraterrestrial civilizations are too weak, and our existing equipment is also difficult to distinguish from. Therefore, clarifying the structure of the Milky Way and its evolution will help us detect the signals of extraterrestrial civilizations more purposefully.

3. Perhaps there is no signal of extraterrestrial civilization. This is the most pessimistic possibility. If it can indeed be proved that no signal of extraterrestrial civilization exists, it is enough to prove that our existing physics theory is already the ultimate theory. Then humans, including other extraterrestrial civilizations, will always live and develop on their own planets alone.

4. The signals of extraterrestrial civilizations do not want to be detected by earth civilizations. This may be a possibility. But the possibility is relatively small. After all, there are so many extraterrestrial civilizations, there may be some extraterrestrial civilizations that are unwilling to share science and technology with earth civilizations, but I believe that a large part of them are developing smoothly and are willing to share society development, scientific and technological achievements with other civilizations.

This article attempts to analyze from our existing ground microwave receiving equipment. It is pointed out that most of the current ground equipment does not take into account the requirements

for receiving information from extraterrestrial civilizations. Ground radio telescopes basically do not point to the region where there may be highly developed extraterrestrial civilizations, so until now we have not received sufficiently clear signals of extraterrestrial civilizations for a reason.

2 Basic principles

The first step is to determine the area where the advanced extraterrestrial civilization is located. According to the assumption that the Galactic Center is a white hole, the distribution of all galaxies is basically closer to the center of the galaxy, the more backward civilization develops. The farther away from the Galactic Center, the more advanced the development of civilization.

After a certain calculation, we can find that in the area about one hundred light years away from the direction of the solar system, there is a greater possibility that there are extraterrestrial civilizations similar to the earth, and that these extraterrestrial civilizations are more advanced than the earth's civilization that spans hundreds of thousands to millions of years, so if they have evolved a sufficiently advanced civilization, it is likely that they have been continuously sending microwave signals that can carry information to the earth. If our existing radio telescope can target this area, the possibility of receiving signals from extraterrestrial civilizations will be very high.

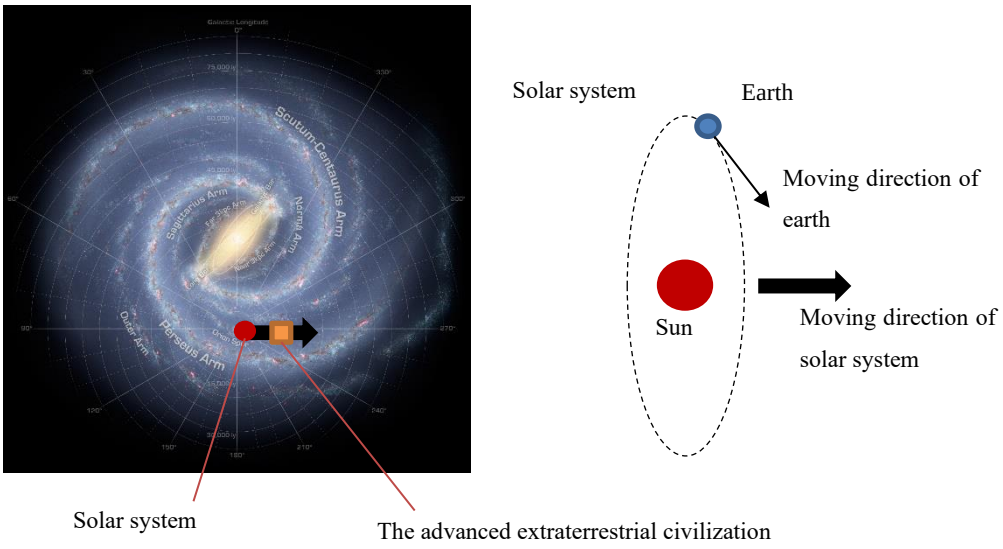

Figure 1. Direction of solar system moving around GC

Figure 1 shows the position of the solar system in the Milky Way and the direction in which the solar system as a whole move. At the same time, the position and movement direction of the earth in the solar system are also marked. The earth moves on a plane perpendicular to the direction of the solar system.

It can be seen from the picture that the North Pole of the Earth is heading towards the more advanced extraterrestrial civilization than ours.

In the picture on the left, the galaxies in the orange block area are formed hundreds of thousands to millions of years longer than the solar system. It is therefore highly likely that extraterrestrial civilizations more advanced than Earth will exist in this region.

Considering that civilizations on the earth have been able to use microwave technology to communicate very flexibly, it can be speculated that advanced extraterrestrial civilizations in the orange block area in the figure should also be able to flexibly use microwave technology to communicate. Considering that the speed of photons is much faster than the speed of galaxies, the extraterrestrial civilizations in the orange region should be microwave signals emitted at an era that is hundreds of thousands of years more advanced than earth civilization, and should be able to take into account the ability of the earth to receive these signals .

From the situation in Figure 1, the orange square area is located in the north pole of the earth.

If it is assumed that the microwave signals emitted by these extraterrestrial civilizations are basically not affected by the cosmic environment, these signals propagate to the earth in a straight line, and those who can receive these signals on the earth should be radio telescopes facing the north pole.

3 Large radio telescopes already exist on Earth

Let's take a look at some of the more typical ground radio telescopes and their locations.

3.1 China’s FAST

Figure 2. China’s FAST (Source: http://fast.bao.ac.cn/upfile/photo/FAST-pic2.html#p=2)

China's FAST radio telescope is located in Guizhou Province, China, and its appearance is shown in Figure 2 [6]. The location on the earth is shown in Figure 3.

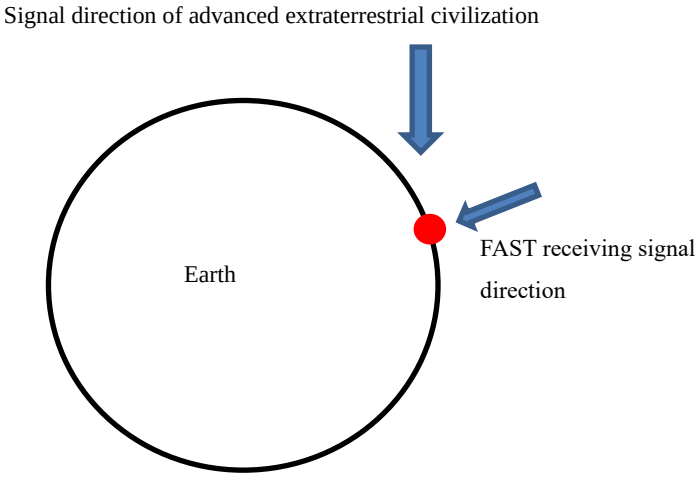

Figure 3. FAST receiving signal direction

Figure 3 shows that there is a large difference between the direction of the FAST received signal and the direction of microwave signals that may exist in advanced extraterrestrial civilizations. Therefore, FAST may have difficulty receiving the microwave signals transmitted by the advanced extraterrestrial civilization of the Milky Way. Of course, if FAST can place the microwave receiving sensor at a position with a large inclination angle, which is the focal point of the microwave signal

transmitted by advanced extraterrestrial civilizations, there should still be a certain chance to receive these signals.

However, if the radio telescope is tilted in the existing position to the possible direction of advanced extraterrestrial civilizations, a very difficult problem will be encountered, which is the interference of ground microwave signals. With the development of earth civilization, various civilian and military equipment will radiate a large number of microwaves. These microwave signals are easily received by mistake, and these signals carry a large amount of information, which will result in distinguishing the true signals of extraterrestrial civilization becomes very difficult.

3.2 Australia Telescope Compact Array (ATCA)

Figure 4 shows the appearance of ATCA [7]. Figure 5 shows the location of ATCA on Earth. It can be seen from Figure 5 that the location of ATCA is the southern hemisphere of the earth. If the direction of the solar system's movement shown in Figure 1 is viewed, the radio telescope faces relatively backward extraterrestrial civilizations, and even these areas may be in the age of dinosaurs. Facing this direction, the signals sent by more advanced extraterrestrial civilizations may be very far away, and the natural signals are more attenuated. Therefore, the possibility of receiving advanced extraterrestrial civilization microwave signals in this direction is very small.

Figure 4. Australia Telescope Compact Array (Source: https://www.narrabri.atnf.csiro.au/public/)

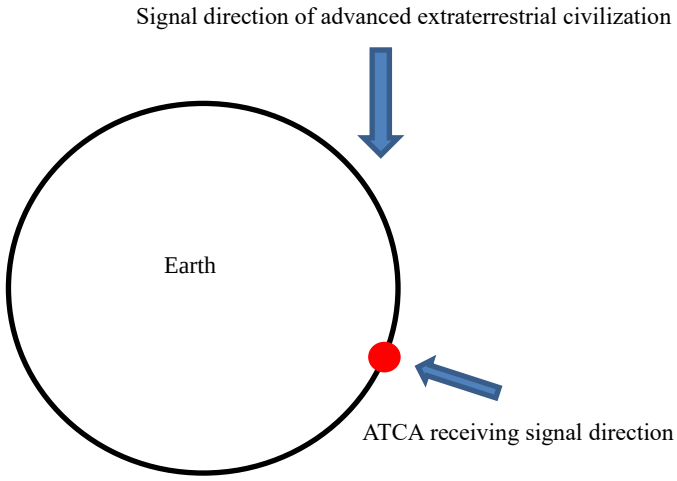

Figure 5. ATCA receiving signal direction

3.3 Greenland Telescope

Greenland is located in the Arctic Circle, so the focusing direction of the radio telescope can be more accurately aligned with the advanced extraterrestrial civilization area shown in Figure 1. An advanced radio telescope has been established on Greenland. The telescope played a very important role in the shooting of the world's first black hole photo. Because the radio telescope has a special geographical location and less ground-based microwave interference signals, it is more suitable for completing the reception of advanced extraterrestrial civilization signals.

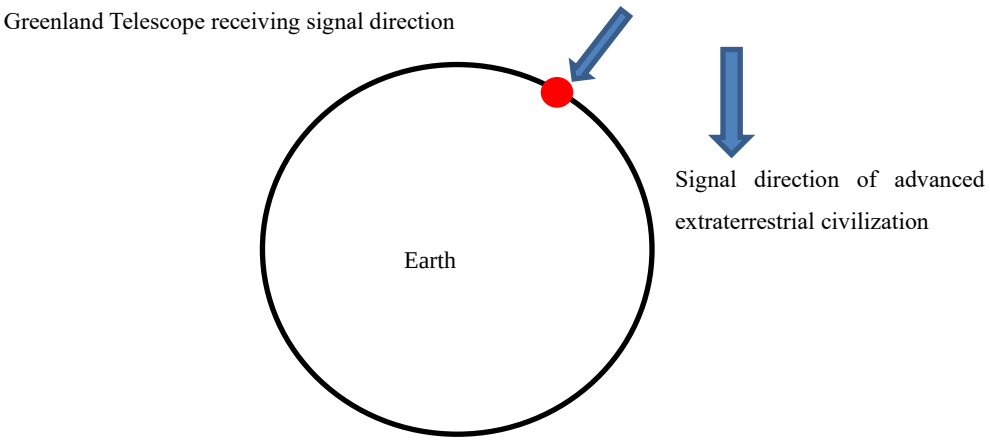

Figure 6. The location of Greenland Telescope

Figure 6 shows the location of the Greenland Telescope established in 2018. It can be seen from the

figure that the direction of the astronomical telescope is basically the same as the direction of the signals transmitted by advanced extraterrestrial civilizations. Therefore, the telescope is most likely to receive signals transmitted by advanced extraterrestrial civilizations.

Figure 7. Greenland telescope (source: https://www.cfa.harvard.edu/greenland12m/pictures/images/IMG_3170.jpg)

Figure 7 shows a physical map of the Greenland Telescope [8]. It can be seen from this figure that the telescope has a very large angle of direction adjustment. Ideal for receiving signals from extraterrestrial civilizations.

4 Summary

From the perspective of some important ground radio telescope facilities given in Section 3, with the exception of the Greenland telescope, the current ground facilities are not well suited to detect microwave signals transmitted by advanced extraterrestrial civilizations. It is necessary to make appropriate improvements.

The improved method suggests that the current SETI@home and "The Breakthrough Listen"

projects at the University of California to detect extraterrestrial civilizations focus their resources on the analysis of data collected by the Greenland Telescope. This can greatly reduce the massive data brought by the purposeless reception of signals from extraterrestrial civilizations.

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