The Secret of the Pulsars

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STELLAR ABERRATION

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Abstract. Stellar aberration, discovered nearly three centuries ago by Bradley, was immediately recognized as a phenomenon owing to the velocity of the earth in its orbit around the sun. Einstein provided an explanation of aberration in his famous 1905 paper using his new relativity theory, and his explanation remains essentially without modification in many modern textbooks. Herein, we show that his explanation was very much in disagreement with measurement.

[This paper will be published in *Galilean Electrodynamics* 4, #5 (1993). The essence of Prof. Hayden's main argument is that, if stellar aberration depended on the relative velocity between source and observer (as Einstein maintained), then each component of a spectroscopic binary star would have drastically different stellar aberration, contrary to observation. Because of its importance, the attention of MRB readers is directed to this paper.]

SETTING MISSION PRIORITIES FOR NASA'S MARS OBSERVER

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Subtitled "A failure of executive, congressional, and scientific responsibility", and available from North Atlantic Books, this important 178-page document was written before the Mars Observer spacecraft signal loss. It makes a well-documented, quote-by-quote and letter-by-letter case that NASA chose scientifically inappropriate responses to the issue of Martian anomalies in the Cydonia region and the testing of the hypothesis that they might be artifacts. It is highly critical of the scientists and administrators involved.

The report consists of an Executive Summary, ten sections, extensive references and an Appendix with biographical sketches. The ten sections of the main body of the report are:

1. Background and Purpose (including spacecraft description, Cydonia region description, and changes in NASA policy affecting this mission)
2. NASA's Current Position (documenting the absence of research by NASA on the Cydonia artifacts hypothesis, and questioning the motivation for changes in the data release policy)
3. Evaluation of Independent Research Data: I. The Face (the "trick of light and shadow" claim, comparison with other familiar shapes in solar system features, and the objective fractal analysis testing for artificiality)
4. Evaluation of Independent Research Data: II. The "City"
5. Evaluation of Independent Research Data: III. The D&M Pyramid
6. Evaluation of Independent Research Data: IV. The Cydonia Complex
7. The Meaning of the Cydonia Complex
8. The Ethical Question: Scientific Responsibility
9. The Ethical Question: Public Responsibility (addresses the Brookings report recommendations to Congress that NASA keep the discovery of artifacts secret from the public)
10. Recommendations

Meta Research exists because of the problem that the major funding sources do not sponsor research into scientific hypotheses that may be in conflict with mainstream theories. It seems clear that such over-investment in paradigms of unproven merit is likely to cause a stagnation of scientific advancement in favor of the unnecessary multiplication of hypotheses that accompanies data interpretation with incorrect models. Some would argue that we are already experiencing such a stagnation and unnecessary multiplication of hypotheses.

Prof. McDaniel draws our attention to another symptom of this philosophy. Certain hypotheses, such as the existence of artifacts from interstellar travelers on other planets, have probabilities that cannot be reliably assessed. For what little we know of such things, that probability might actually be high. These hypotheses become important when a simple test becomes possible, as in the case of Mars Observer and its high-resolution cameras. This is because the impact of verification of the hypothesis is so great that no simple, unique opportunity to test such ideas should be overlooked. In any case, testable, falsifiable, scientific hypotheses should be treated as such. Ridicule (which has been used by NASA spokespersons in connection with the Martian anomalies) should always be out of bounds in a scientific context.

THE SECRET OF THE PULSARS

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Abstract. This article presents a revolutionary new theory to explain the observed characteristics of neutron star pulsars found both alone and in close binary systems and their relationship to supernova events. The main points of this article are the following:

- Conventional stellar evolution theory[1,2] fails to account for the observed properties of pulsars and supernova events, thereby requiring a new process to be hypothesized.
- The new hypothesis is that neutron stars in close binary systems destroy their companions, which is observable as supernova explosions.
- This new hypothesis leads to the conclusion that the origin of a neutron star in a close binary is the result of the neutron star being captured by its companion after a collision that occurred when it was passing in the vicinity of its companion.
- To account for the pulsar population using the capture mechanism, there must exist at least 10 times as many neutron stars as there are normal stars in the galaxy.
- To explain the large population of neutron stars required by the capture theory, it is hypothesized that the origin and existence of neutron stars is independent of the origin and existence of normal stars.
- The large number of neutron stars and the capture process can then be used as a basis for explaining supernova events and pulsars, the x-ray background, gamma ray bursters, galactic rotation, and possibly the missing mass of the universe.

The approach taken in this article is the following:

I. Review the well-known characteristics of pulsars.

II. Explain why conventional theories of stellar evolution are inadequate to explain the pulsar and supernova characteristics.

III. Discuss predictions of the new theory and compare to a variety of current observations, as well as showing how the theory could be falsified.

Appendix. Describe how the capture theory is used to describe a variety of observed pulsar systems at all stages of their evolution.

I. <u>Characteristics of Pulsars and the New Theory:</u>

Pulsars have been studied for the past 25 years and there is a rich body of literature describing their detailed characteristics. It is generally agreed that pulsars are neutron stars of mass 0.5 - 1.5 M-sun and radius approximately 10 km. Neutron stars would not be visible except for the fact that they are sometimes found rotating with their magnetic axis perpendicular to their axis of rotation. The sweeping around of the magnetic polar axis causes regular electromagnetic disturbances, which we receive as a pulse every time the magnetic polar axis sweeps across our line of sight.

As a basis for discussion, the major properties of pulsars are listed in stand-alone and binary categories, subdivided by fast and medium spin rates.

1. Pulsars found alone
   - A. Fast stand-alone pulsars
     - Periods typically range from 0.01 s - 0.1 s.
     - They are slowing down.
     - They are often found in the midst of supernova (SN) remnants.[3]
     - They travel through the SN remnants with velocities ~200 km/s.[4]
   - B. Medium stand-alone pulsars
     - Periods typically range from 0.1 s - 5.0 s.
     - They are slowing down.
     - They are not found in the midst of SN remnants.
2. Pulsars found in binary systems
   - A. Medium binary pulsars
     - Periods typically range from 1 s - 1000 s.[1,5,6,7]
     - They are speeding up.
     - They are found in close binary systems where the neutron star pulsar is in direct contact with the atmosphere of its companion.
     - The orbital velocity of the pulsar around its companion is ~200 km/s, and the orbital period is 1-2 days.
     - The orbit is very circular (eccentricity < 0.01)
     - The orbital radius is shrinking, i.e. the neutron star is being drawn in closer to its companion.
     - The expected lifetime of these binary systems is 10^5-10^6 years.
     - Energy is emitted from these systems in the form of X-rays with an intensity 10,000 times greater than the energy intensity emitted by the Sun.
     - The source of this energy emission is from radiation emitted as the neutron star sucks in matter from the companion star's atmosphere. The neutron star is effectively consuming its companion (accretion).
   - B. Fast binary pulsars
     - Periods typically range from 0.001 s - 1.0 s.[4]
     - They are slowing down, although not as rapidly as the stand-alone pulsars.
     - They are found in close binary systems where the companion is a white

dwarf with no atmosphere.

- The orbits are either very circular or very eccentric.
- The orbital period is 1/2 day or less.

II. Problems with conventional stellar evolution theory:

The cause of supernova explosions

This section gives an overview of the problems with conventional theory,[1,2] which suggests that pulsars are produced as the result of supernova explosions. Analysis of the pulsar characteristics, listed above, leads to the opposite conclusion: pulsars are the cause of supernova explosions.

The following abbreviations will be used for entities in the logical process descriptions below: NS = Neutron Star, RS = Regular Star, FP = Fast Pulsar, MP = Medium Pulsar, SNE = SuperNova Event.

For the purposes of this article, conventional theory will be defined as the hypothesis that a normal star evolves in such a way that it undergoes a supernova event and produces a rapidly rotating neutron star (a pulsar), where a neutron star did not previously exist. This hypothesis may be represented by the following process description:

Process A: RS -> SNE -> FP -> MP -> NS

This may be read as follows: A Regular Star evolves such that a SuperNova Event occurs, which produces a Fast Pulsar, which then slows down over several thousand years to become a Medium Pulsar, and after several million years finally stops pulsing and becomes a quiescent Neutron Star.

Simple logic will show that this is process is inadequate and unnecessary to explain the observed properties of neutron stars and supernova events. Let us consider the following model:

- There is an observed mechanism that spins up neutron stars into fast pulsars. The mechanism is accretion of the atmosphere of a normal star by a neutron star in a close binary system (see pulsar characteristics, 2A, above).
- By accretion, the neutron star effectively consumes and disperses the atmosphere of its companion star causing it to spin faster, while being inexorably drawn closer to the companion's core, thereby systematically destroying the companion, and becoming a fast pulsar rotating around the remaining stellar core (2B).
- It would seem that the obvious destiny of the close binary is that the companion will eventually destabilize and explode, leaving a fast pulsar traveling through the exploded remnants with a velocity inherited from its close binary orbital velocity (equivalent to 1A).

Observations of close binary X-ray pulsars (2A) and millisecond pulsars (2B) match this model and may be described by the following process description:

Process B: RS+NS -> RS+MP -> RS+FP -> X

This may be read as follows: A close binary containing a Regular Star and a Neutron Star has its Neutron Star spun up by accretion to become a Regular Star plus a Medium Pulsar and it further accelerates to become Regular Star plus a Fast Pulsar, and its ultimate fate is unknown and represented by X.

Let us now consider the problem of how a giant star might spontaneously explode in a supernova event. We have the following two choices:

- Conventional theory (Process A) assumes that a giant star standing alone goes through an evolutionary process whereby its internal structure collapses into a neutron star having the spin and proper motion characteristics described above (1A).
- The new hypothesis (Process B) is that a giant star, that has a spinning up neutron star disrupting and consuming its atmosphere (2A->2B), goes through a destabilization process resulting in the supernova explosion leaving a pulsar with the same spin and proper motion characteristics described above (1A).

Given these two choices, it is obvious that the latter is the preferred mechanism, since the neutron star is already there and no process need be invented to explain its existence. Furthermore, an observed mechanism is in place for spinning up the neutron star into a fast pulsar. Finally, when the companion explodes, the fast pulsar will be traveling through the remnants.

Conventional stellar evolution theory (Process A) requires us to invent new mechanisms[8] to explain each of these three extraordinary phenomena. The latter choice (Process B) has all the components and mechanisms in place, and it resolves outcome of the close binary Fast Pulsar by asserting that X = SNE.

We now simply apply the principle of Occam's Razor[9], "Invent no unnecessary hypotheses", to rule out conventional stellar evolution as a mechanism for explaining the existence of pulsars in supernova remnants.

The origin of neutron stars in close binary systems

This section examines the origin of neutron stars in the context of the results of the previous section that showed that fast pulsars are the preexisting cause and not a created product of supernova explosions.

Let us consider the origin of the neutron star in Process B, above. Since logic tells us there is only one way to create a neutron star, then conventional stellar evolution theory requires us to use process A. Therefore, conventional theory tells us that the origin of the initial state in Process B must have been a pair of regular stars, one of which experienced a supernova as follows:

Process C: RS+RS -> RS+SNE -> RS+FP -> RS+MP -> RS+NS

However, we see that the last two steps (RS+FP -> RS+MP -> RS+NS) of process C are impossible, because they violate the observations described by process B. In particular the SNE in Process C cannot create a fast pulsar, because it cannot then slow down. Therefore, we are led to conclude that process C must be modified to have a new kind of supernova, SNE', that creates a non-rotating neutron star, as follows:

Process C': RS+RS -> RS+SNE' -> RS+NS

Let us examine the implications of this result. Conventional theory forces us to assert the following:

1. There must be two distinct outcomes of a SuperNova Event depending on whether the Regular Star is stand-alone or in a close binary: in the stand-alone case, SNE -> FP, as in Process A, whereas in the close binary case, SNE' -> NS, as in Process C'.
2. There must be two distinct mechanisms for accelerating a Neutron Star to become a Fast Pulsar, depending on whether the SuperNova Event occurred in a stand-alone or close binary system: in the stand-alone case, SNE -> FP, as in process A, whereas in the close binary case, RS+NS -> RS+MP -> RS+FP as in process B.

Since we have already shown in the previous section that conventional theory does not work for the creation of fast pulsars (SNE -> FP), this leaves us with the requirement that to account for neutron stars in close binary systems that there must be a new kind of supernova event that creates non-rotating neutron stars from regular stars (SNE' -> NS).

One would then assume that if such a mechanism existed to produce neutron stars in close binary systems that this mechanism would logically apply to all such close binary systems.

A mechanism has been shown to exist in the case of neutron stars in close binary systems found in globular clusters. Because the stars in globular clusters are so old (10^{10} years), and the process to create a neutron star requires a massive star of life expectancy no more than 10^8 years, it has been determined that the only possible origin of these close binary systems in globular clusters is through the capture of a neutron star by one of the old stars in the cluster.[10]

Therefore, we may again apply Occam's Razor to rule out any other hypothesized mechanism to explain the origin of similar close binary systems that are found in the galactic disk and not associated with globular clusters.

The result of this analysis is that pulsars are created by the following process, which we shall call the "capture theory":

Process D: RS -> RS+NS -> RS+MP -> RS+FP -> SNE -> FP -> MP -> NS

Process D may be read as follows: A Regular Star has a close encounter with a passing Neutron Star, which is captured forming a close binary consisting of the Regular Star plus the captured Neutron Star. The Neutron Star spins up to become a Fast Pulsar. The combination of the Fast Pulsar buried deep in the Regular Star causes the Regular Star to destabilize and explode in a SuperNova Event, leaving a Fast Pulsar immersed in the Supernova remnants.

The basic process is that a passing Neutron Star may encounter a Regular Star and through a process lasting a few hundred thousand or million years destroy the Regular Star, highlighted by a SuperNova Event and then quietly disappear back into a sea of Neutron Stars.

The capture mechanism works as follows: The neutron star became associated with its companion by simply passing close enough to have enough energy exchanged through a tidal interaction combined with an interaction with the neutron star's intense magnetic field, such that it no longer had escape velocity. This would lead to subsequent encounters where more energy was exchanged, inexorably bringing the neutron star closer and closer to the core of its new-found companion. The result of this process is the close binary x-ray pulsar systems with their well-known characteristics described above (2A).

This capture mechanism has been shown to work for neutron stars in close binary systems in globular clusters, and, in fact, has been shown to be the only possible mechanism to explain their existence.[10]

This result leads to an interesting problem:

If neutron stars are not created by supernova explosions, and if the neutron stars in close binary systems are there as a result of capture (Process D), then where do the neutron stars come from in the first place?

They certainly cannot be the result of earlier supernova explosions, since we would then have to assert that neutron stars are the result of the very process that they cause!

We cannot say they were always part of the close binary systems, because the process of spinning up and consuming the companion's atmosphere takes only 10^6 years.

The capture theory requires the assertion that a population of neutron stars coexists with normal stars, and that these neutron stars are not the product of stellar evolution, but are an inherent part of the galaxy. Furthermore, whatever mechanism creates galaxies produces both neutron stars and normal visible stars, and the two types of stars are generally unrelated except through capture interactions that result in supernova events.

Now that we have determined that the neutron stars come from a population interspersed with normal stars, the next logical question is:

How many neutron stars must there be interspersed among normal stars in order to account for the observed population of pulsars?

Preliminary estimates have been made based on conventional theories of stellar encounter rates as a result of normal random stellar motions. These estimates indicate that the density of neutron stars throughout the galaxy is probably 10-100 times the density of normal stars. Whatever the exact number turns out to be, it is very large.

This result rules out any other known stellar evolution process as the origin of neutron stars, because the number of neutron stars required for the capture theory is far greater than the number of regular stars observed in the galaxy.

Other problems solved by the capture theory

In addition to the problems described above, there are specific problems that the stellar evolution theory has not satisfactorily explained without resorting to ad hoc hypotheses, which the capture theory solves.

- Conventional theory predicts that only red giants experience supernova events that produce neutron stars, whereas the supernova event, 1987A, had a blue giant (O-star) progenitor.[11] The capture theory removes this problem since all giant stars are subject to capture regardless of whether they are blue or red.
- Conventional theory requires that a fast pulsar be created in a close binary system be given a chance to slow down. In a system such as Cen X-3, where the companion is a young O-star, the pulsar could not slow down, because of the accretion observed that is speeding it up, and yet it has a very slow, 4.8 sec, spin period. Again, the capture theory implicitly solves this problem.
- There are no fast pulsars observed with normal companions. All the companions of fast pulsars are white dwarfs or helium stars, whereas the companions of the slow pulsars are normal stars. The problem here is that the late evolution companions of the fast pulsars are already past the point where they can expand as red giants and so there are no systems observed that could logically be the progenitors of the x-ray binaries. The capture theory solves this problem, since it is only after that the companion's atmosphere is consumed that the pulsar is in its fast state, thereby explaining the fast pulsars having stellar core (hydrogen-removed) companions.

III. Predictions of the Capture Theory:

In this section we will examine if the large number neutron stars predicted by the capture theory is plausible, and if so, what are the implications.

The most important prediction for the purpose of being able to validate the capture theory, is that there must be thousands of neutron stars immediately in the neighborhood of the Sun. There may be 100 or more within a sphere of radius equal to the distance of the closest star.

1. Would the neutron stars be visible? Except for their interaction with matter, they would not be particularly visible. However, their interaction with matter, such as interstellar gas and dust should be observable as x-rays.
2. It is this author's assertion that these interactions are observed. In particular, the x-ray background is a uniform distribution of thousands of minute sources. It is suggested here that these sources are the nearby neutron stars drawing in interstellar matter.
3. Similarly with the thousands of gamma-ray sources that have been observed. These sources may line up directly with the x-ray sources, however, the bursts may be a result of a build-up of material on the surface of the neutron star that spontaneously fuses, 8 and therefore the average gamma ray burster may be

further away than the average steady background x-ray source.

4. It is also suggested that quasars may be extremely nearby neutron stars, whose "jets" are simply the activity of matter in the magnetic polar regions beyond the immediate vicinity of the core of the neutron star, similar to the jets observed in SS433.[12]

A second prediction made by the theory is that the X-ray sources and the millisecond pulsars are likely candidates for future supernova events. At some point one of them will explode and leave a rapidly rotating pulsar in the remnants, and the X-ray emissions will cease. It is also likely that the companions of the millisecond pulsars will continue to fall apart (creating high eccentricities), which will soon leave these as stand-alone pulsars, possibly without any visible supernova remnants.

An interesting attribute of this theory is that it provides a mechanism for explaining the different types of supernovae. In particular, giant stars are much more likely to be victims of the capture mechanism than normal size stars, simply because they provide larger targets for collision with the neutron stars. Similarly, this mechanism does not distinguish between young blue giants and old red giants. Preliminary calculations suggest similar numbers of giants and normal stars will experience capture, which is consistent with the population of the different supernova types.

Other items of interest include:

1. The high density of globular clusters will similarly be more likely to experience capture collisions which would explain the large number of pulsars found in globular clusters.
2. The rapid orbit high eccentricity pulsars are likely the late stages of the close binary evolution after the atmosphere has been consumed. Sporadic ejections of parts of the core may cause the high eccentricity.
3. Neutron stars with lesser magnetic fields may account for low percentage of supernova remnants containing observable pulsars, and for the existence of non-pulsing low mass x-ray binaries (LMXBs).

Another important implication is that the mass of the galaxy is 10-100 times the estimate based on that of normal stars alone. This has the following secondary implications:

1. Conventional models of galactic structure no longer support a stable rotating spiral galaxy, because the mass is too great.
2. One must assert that the galaxy is dynamic with all the mass (stars plus neutron stars) being shot out of the center of the galaxy like a lawn sprinkler. This model predicts that the stellar galactic rotation will linearly increase along the bar at the center of the spiral galaxy and then remain constant beyond the bar. This is what is actually observed.
3. This model provides for the "missing mass" required to close the universe. However, this author believes that more needs to be known about the operation of the center of the galaxy before meaningful assertions can be made about whether the universe is closed. Furthermore, cosmological models that depend on volume estimates based on the presumed distances of quasars will need to be revisited.

Finally, how can this theory be falsified? If it can be shown that the x-ray background does not come from local sources then the theory will be disproved. The presence of the neutron stars with their magnetic and gravitational fields will show low levels of interaction with any interstellar material that they encounter giving off detectable radiation as the matter is drawn in by gravity and spiraled by the magnetic field. Therefore it is a requirement that these neutron stars emit X-rays.

Conclusion:

This author understands the implications of this theory and that it is not likely to be readily accepted without thorough investigation. However, the search for the truth about the universe requires that we allow our observations to be our guide and to logically follow where they lead. It is the opinion of this author that there are several hypotheses and theories that were created before many of the modern observations were made. The spectacular nature of these modern observations warrants a revisitation of the hypotheses and theories used to explain them.

Acknowledgements:

This author recognizes that this work could not have been done had it not been for the opportunity to work with the scientists who designed and built the UHURU satellite, and who then processed the data obtained from the satellite. The results of the work in which the author played a significant role resulted in the discoveries of Cen X-3 and Her X-1 as binary, accelerating pulsars5,6,7.

After many months of pondering the data, it was in the immediate hours after the birth of the author's son, Robert A. Levinson, on 6-Oct-74, that the theory was conceived.[13]

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Appendix. Application of the Capture Theory to Pulsar Observations:

Below is a brief description of how observed pulsar systems fit into the model proposed by the capture theory. The list gives examples of observed systems that fit in the categories identified in Process D of the previous section:

RS These are simply the regular stars of the galaxy, any one of which is subject to a capture.

RS+NS A good candidate for a recently captured NS is SS43312. In particular, SS433 may be the mechanism for transforming a quasar into a pulsar, assuming that quasars may be interpreted as nearby neutron stars.

RS+MP The X-ray binary pulsars fit this model. At this stage the neutron star is consuming the atmosphere of its companion. The Wolf-Rayet and other nova-type stars are probably more advanced forms where the neutron star is submersed in the atmosphere of the companion.

RS+FP The millisecond pulsars fit here. The neutron star has consumed the atmosphere and only a core remains of the companion. In the face of tidal force the core may partially destruct with a sudden mass loss which will introduce a large eccentricity of the orbit. Other giant stars (red and blue) may still have some atmosphere at this stage rendering the pulsar invisible.

SNE This is the moment when the companion totally destabilizes. Giant stars may have substantial atmospheres remaining at this stage producing the most dramatic supernova events, whereas normal size stars may produce fewer remnants that are quickly dispersed.

FP These are the original fast pulsars, such as the Crab, found in the first 10^3 years after the supernova.

MP These are the medium pulsars, which represent the great majority of observed pulsars after the remnants are dispersed.

NS This is the neutron star returning to the invisible sea, where it may have observed characteristics consistent with those of quasars. At this point it is indistinguishable from other neutron stars that have not been through the supernova scenario.

ON THE IMPORTANCE OF NONCLASSICAL SETI

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The all-ambitious current projects[1] of the search for extraterrestrial intelligence (SETI) are based on the postulates of G. Cocconi and P. Morrison[2]:

a) Extraterrestrial beings want to communicate with our civilization;
b) Electromagnetic waves are the most convenient mode for an information transmission;
c) Artificial emissions must be narrowband, variable, repeating, and have a point source identified with some solar-like star.

Most radio and optical (laser) SETI projects are an embodiment of these classical theses. However, the postulates reflect only one variant from a wide spectrum of possibilities. For example, intelligent life might occur near stars of any type, and can make artificial environments for life support as needed. A radio source consisting of a great number of transmitters might appear as an extended and/or broadband source. Repeating signals would be improbable in the case of an accidental interception of a narrow, transient radio beam. Moreover, a careful advanced civilization could secretly study us by radio-monitoring without reply. And finally, electromagnetic waves are neither a unique nor an especially convenient communications tool.

Many such alternative possibilities are not taken into account in most SETI programs. As a result of the hegemony of the classical approach, several expensive, risky, and endless experiments have been planned since over three decades ago. Therefore, the parallel development of nonclassical SETI projects seems reasonable and realizable. The search for alien artifacts in the solar system[3], the study of unusual radio sources[4], and investigations of unidentified cosmic sporadic radio flashes[5] seem to be promising examples of nonclassical possibilities. Unfortunately, similar alternatives are ignored by influential experts who, as a rule, are involved in well-financed classical SETI projects.

But is it not more reasonable to search for the "needle", as ETI signals are sometimes called, not in the "cosmic haystack", but rather on some sky "magnet"? The Moon, as a convenient base for monitoring our rare inhabited planet, might therefore be just such a "magnet" for alien artifacts.[6] This possibility is now being analyzed intensively at the Research Institute on Anomalous Phenomena in Kharkov, Ukraine, as the SAAM project (SAAM = Search for Alien Artifacts on the Moon).

The choice of an optimum SETI strategy a priori is hardly possible. Hence, it would be naive to depend on the classical approach only. Even supermodern equipment would be impotent if the search is conducted with unsuitable methods. Methodologically narrow approaches by grand SETI experiments could lead to a failure, with negative consequences:

- the outbreak of a new skeptical attitude toward the ETI problem in society;
- the vanishing of financial support for SETI projects, even for more methodologically correct programs;
- the social status of bioastronomical research may again fall to the low level of the late 1970s.

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