On Viktor Ambartsumian

The Principle of Continuing Creation Is the Way Forward in Science and Culture

by David Cherry

Aug. 14—If an enthusiastic layman—inspired by the accomplishments of the Hubble Space Telescope and now the Webb—wishes to make his or her own investigation of the cosmos, where should he or she begin?

The serious layman must confront the fact that the fields of astrophysics and cosmology have their own dogmas, which obscure certain anomalies and contradictions that should be the stepping-stones to scientific advances, just as they were for Johannes Kepler in the 17th Century. But acceptance of these obscuring dogmas is today obligatory for obtaining any standing in the field.

Since the 1930s, the overarching paradigm has been the Big Bang theory of the universe. It is not coincidental that this theory is in good alignment with the Malthusian ideology prevailing in much of the world. According to the Big Bang theory (or at least, some versions of it), the universe originated in "the initial singularity," a super-dense ball containing all the energy and space-time of the universe, and (in *all* versions) has been expanding *entropically* ever since. The major processes in the universe are understood to be governed by gravity—collision, accretion, and collapse. In recent decades, the big debate has been:

1. Whether the universe will continue to expand indefinitely, with potential energy dissipating in the process (this is called "heat death" because there will eventually be no heat differential anywhere—all will be cold—the Great Green Reset taken to its limit by Nature itself), or,
2. Whether the expansion of the universe will eventually become weaker than the countervailing gravity of the system, leading to gravitational collapse. In other words, death in the "Big Crunch."

"Face the facts!" they tell you, "Whether it is the one or the other, the human species is but a temporary speck in a meaningless universe."

But if we are to get to the heart of the matter, it is not sufficient to say that astrophysicists have their dogmas.

LaRouche's 'Higher Hypothesis'

Lyndon LaRouche explained successive revolutions in scientific thought as a succession of sets of assumptions, each set constituting a manifold in the mathematical sense. Each can be called an *hypothesis*. We proceed from one manifold to another through technological advance, by which at various historical moments our then-prevailing manifold is seen to have intolerable insufficiencies and contradictions. And so, employing our poetic faculty, and in "dialogue" with all the evidence, we conceive of a higher manifold, that is, a *higher hypothesis.* The concept that continuing technological advance must continue to produce a succession of successively higher hypotheses, LaRouche called the *hypothesis of the higher hypothesis.*[1]

Today we can see the need for a higher hypothesis. There are several courageous astronomers and astrophysicists who have discovered and studied the anomalies—that is, anomalies with respect to the prevailing manifold—Halton Arp, William Tifft, Jack Sulentic, Geoffrey and Margaret Burbidge, Jayant Narlikar, and Viktor Ambartsumian, among others. But no higher hypothesis so far.

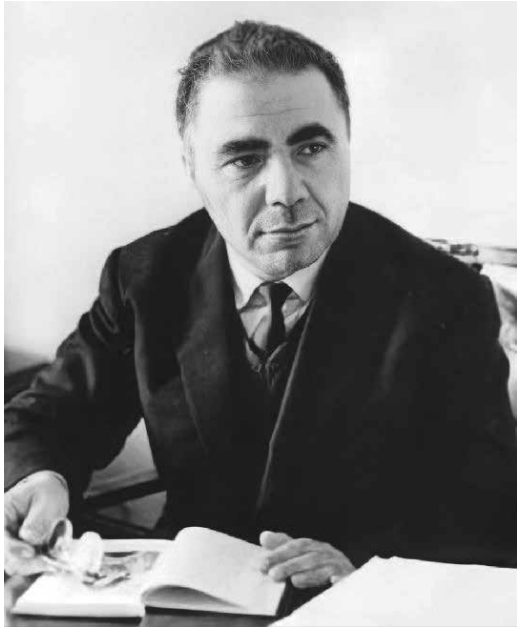
The higher hypothesis would have to embrace both

Editor's Note: This article is a revision and expansion of the author's talk as part of the Sare for Senate Campaign's "Conversation on the James Webb Telescope," July 15, 2022.

1. LaRouche spelled out these concepts very fully in discussing epistemology in his 1982 paper, "Toward a New Science of Psychology" (unpublished), pp. 57–70. He used the Big Bang hypothesis as his example.

astrophysics and physics, within which astrophysics is embedded: There is a widespread assumption among orthodox astrophysicists that the laws of physics we use, developed from our experience in the solar system, *must* hold good everywhere in the universe. How strange! You might think, rather, that terrestrial physics could well be a special case of more general laws, but valid under local conditions—the definition of "local" being not yet definable (the solar system, the Home Galaxy, the Local Group of galaxies, or something else?).

Other hypotheses of the universe have been put forward over the past decades. A "steady-state" cosmology was proposed in 1948 by Hermann Bondi, Thomas Gold, and Fred Hoyle, according to which the density of matter in the universe remains constant even while the universe expands, thanks to the creation of new matter. This universe has no beginning and no end. Then in 1993, an improved version of the theory, called the "quasi-steady-state" cosmology, was proposed by Fred Hoyle, Geoffrey Burbidge, and Jayant Narlikar. The "quasi-steady-state" condition appears to have been imposed on the model from the outside—that is, it does not appear to have come from rigorous observational data, if that were even possible.



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Viktor Amazaspovich Ambartsumian, 1908–1996, astrophysicist of Soviet Armenia.

Meanwhile, Hannes Alfvén, a Swedish expert in magnetohydrodynamics and Nobel Prize winner in physics, developed a cosmology that emphasized plasma flows—entailing magnetic fields and electrical currents—as a more powerful force than gravity on very large scales.[2]

The most useful critic of all of the cosmologies has been the astrophysicist Viktor Ambartsumian of Soviet Armenia (1908–1996), who doubted that we know enough about the universe at present to formulate a cosmology. For a time, he would not even use the expression "universe," preferring to refer to everything beyond our galaxy as "the meta-galaxy." But his empirical work was a guided empiricism, as he made clear in 1980, when he wrote:

> From the very beginning of my work in astrophysics I have been interested in the problems of the origin and evolution of stars and galaxies. It was clear to me that the old approach by means of global cosmogonic hypotheses could hardly bring serious results. It was clear that one must proceed from empirical data.
>
> The evolutionary processes in the Universe are of an exceedingly complicated and diverse nature. Therefore, there is no chance of understanding them using a small number of speculative models or hypotheses. Instead of making more or less arbitrary assumptions, we must patiently analyze the empirical data and try to deduce from them conclusions on existing links between the evolutionary chains.
>
> My idea was to find cases where it is relatively easy to deduce from the present state of an astronomical body or system the direction of its changes. In other words, I tried to find cases where we can conclude from simple considerations the evolutionary trend at a given phase without the knowledge of all other phases. Of course, I do not claim this approach to be my invention. But I decided to follow this approach as strictly as possible.[3]

2. Alfvén's concept is presented in Eric J. Lerner's 1991 book, *The Big Bang Never Happened* (New York: Times Books), especially in Chapter 6, "The Plasma Universe." Lerner had a good deal of contact with Alfvén. Lerner's book is also valuable for its clear explanations of some flaws in the Big Bang hypothesis, such as the invention of dark matter to "make the accounts balance," so to speak, in measurements of mass and gravitational force in galaxies.

Another, more technical statement of some shortcomings of the Big Bang hypothesis is found in *Factoring the Gravitational Redshift of Active Galactic Nuclei* (Montreal: Apeiron, 2018) by Robert Gnaski Burton, pp. 25–59.

3. *A Life in Astrophysics,* pp. 271–279. This and some other references in the footnotes are given in full in the "For Further Reading" section.

Who Was Viktor Ambartsumian?

Ambartsumian is considered the founder of theoretical astrophysics in the USSR. In 1994, he was also officially named a National Hero of Armenia. Despite the Iron Curtain, he was always able to travel abroad. He addressed meetings of the International Astrophysical Union (IAU) in San Francisco and elsewhere, and read papers at Solvay conferences in Western Europe. He served terms as vice president and president of the IAU.

He was also the first Soviet scientist to become a foreign honorary member of the American Academy of Arts and Sciences (1958) and foreign associate of the U.S. National Academy of Sciences (1959).

Ambartsumian (left) with Jan Oort, director of the Leiden (Netherlands) Observatory, at an IAU symposium, Byurakan, Armenia, 1966. Oort once wrote, "I have ceased to be surprised at how all of Ambartsumian's hypotheses, which he prophetically put forward many years ago, are confirmed one after another."

But in the international arena, the praise was almost always limited to his observational accomplishments. Certainly, his conclusions that challenged the Big Bang hypothesis were not welcome. The seemingly comprehensive work, *Active Galactic Nuclei,* by Julian Krolik of Johns Hopkins University (1999), has no entry for Ambartsumian in the bibliography or index, despite his founding of the field.

The same is true, but with a difference, of *Quasars and Active Galactic Nuclei* (1999) by two Indian astrophysicists, Ajit Kembhavi and Jayant Narlikar. Their final chapter, "Problems and Controversies," provides a succinct summary of findings that challenge the Big Bang hypothesis, and there one reads the unnamed Ambartsumian between the lines repeatedly. (When this author met Prof. Narlikar—the senior of the two authors—at a conference some 25 years ago, he refused to discuss Ambartsumian.) It was the American astronomer Halton Arp, and his contemporary, the British astrophysicist Geoffrey Burbidge, who were stimulated by Ambartsumian's ideas *and* used his name, and didn't care who didn't like it. Both men have now passed on.

Ambartsumian built the Byurakan Astrophysical Observatory near Yerevan, the Armenian capital, in the 1950s, and developed his school of thought among his students. He died in 1996.

'Stellar Associations' and Stellar Origins

As mentioned, Ambartsumian's idea "was to find cases where it is relatively easy to deduce from the present state of an astronomical body or system the direction of its changes." An early example was his work on "stellar associations."

In the 1930s and 1940s, Ambartsumian discovered the existence of stellar associations—groups of small numbers of associated young stars—and developed the implications of his discovery. To study their motions, he realized that for each star, he had to combine three measurements (in technical terms, the radial motion, the stellar parallax, and the proper motion). It was necessary to make these measurements for many stars.

He found that stellar associations have "positive energy," meaning that they are flying apart. In a 1949 article in *Soviet Astronomy* titled, "Stellar Associations," Ambartsumian developed that conception:

> [T]he density of this system of stars is so low that it could never be identified by direct observation as a cluster, even if it were situated several times nearer to us.
>
> The discovery … became possible solely because the stars belong to a definite class of vari-

able stars. An important characteristic of this system is its low spatial density.…

The forces of [gravitational] interaction between the stars in an association are smaller than the tidal action of the general force field of the Galaxy. Therefore, at least for peripheral members of associations, the interaction forces can be neglected.

Considering the dynamics of stars of an association under the Galactic force field, it should be noted that the differential effect of Galactic rotation implies growth of distances between members of the association.

He goes on to say that if the galactic force field were the only influence, we would observe a flattening of the associations toward the plane of the galaxy, but this is not observed. He concludes:

> that each individual association came into existence rather recently and that it consists of stars which diverge from some primary volume where they have originated….
>
> Expansion of an association begins without delay after the birth of its star members, since the assumption that the system spent considerable time in a stationary state before the expansion began contradicts stellar dynamics. This implies that the age of stars in the associations is measured by millions or at most by tens of millions of years….
>
> Some astronomers [Sir James Jeans, Sir Arthur Eddington —ed.] have been putting forward a hypothesis that all stars in the Galaxy were born simultaneously or almost simultaneously several billion years ago; i.e., together with the formation of our Galaxy. The above facts cause this hypothesis to collapse. The birth of stellar associations and formation of stars within the latter from some other form of matter go on continuously almost before our eyes.[4]

The Anglo-American establishment had to accept the existence of stellar associations, but it did not accept the argument about stellar genesis that Ambartsumian built upon his discovery.

From these studies, Ambartsumian calculated that the age of our Milky Way galaxy is less than 10 billion years. At the time, Jeans claimed that the galaxy was 10 thousand billion years old, based on statistical studies of binary star systems, but today, the current establishment view is close to Ambartsumian's.

NASA/COBE/Edward L. Wright

Bright lights in downtown Milky Way. Since our Solar System is in the galactic disk, albeit in the suburbs, we always see our galaxy edge-on, and call it the Milky Way. Ambartsumian studied fluctuations of surface brightness (energy-flux density) along the Milky Way—one of his very many interests.

Ambartsumian then applied a similar approach to two or more galaxies in close proximity, and reached a tentative conclusion, which relied in part on statistical considerations. Systems of multiple galaxies, he said, may not be in the process of collapse and collision. Instead, the component galaxies may have been a single object which then broke up and is spreading apart. While the establishment finds it necessary, even today, to confidently state that such galaxies are merging, Ambartsumian preferred to hold the question open.

Active Galactic Nuclei and the Birth of New Galaxies

Ambartsumian was the founder of the systematic study of activity in galactic nuclei. The American, Allan

4. Reprinted in translation in *A Life in Astrophysics*, pp. 127–136.

Sandage, very much an establishment astronomer, once wrote, "today, not one astronomer would deny the mystery surrounding the nuclei of galaxies or that the first to recognize the rich reward held in this treasury was Viktor Ambartsumian."[5] As we have seen, times have changed. The prevailing view in the 1940s was that galactic nuclei were simply quiescent and could be ignored.

In a 1958 Solvay conference, Ambartsumian spoke on active galactic nuclei (AGN) and defined a galactic nucleus as "active" if any of the following features were present:[6]

1. Ejection of gaseous matter as jets or clouds from the nucleus.
2. Continuous efflux of relativistic particles or other agents which produce high energy particles, so that a radio-wave halo can develop around the nucleus. ("Relativistic" means travelling at an appreciable fraction of the speed of light.)
3. Bursts of radio emission.
4. Eruptive bursts of relativistic plasma.
5. Eruptive bursts of gas.
6. Ejection of compact blue condensations with an absolute magnitude on the order of that of dwarf galaxies.

Halton Arp relates that he was told about Ambartsumian's presentation by senior colleagues who said that "this select group of the best known scientists in the world had either been completely baffled or laughed privately at these crazy ideas."[7]

Today, AGNs and the study of AGN spectra are prominent subjects. The field of AGN research and its history are very rich, and cannot be adequately represented here.

Ambartsumian developed the idea that the tremendous energies seen in AGNs are intrinsic. He noted the occasional association of a galaxy that has an AGN, with a nearby quasar (a kind of standalone AGN without a surrounding galaxy), sometimes with a bridge of luminous gas between them, and concluded that quasars are newly created matter ejected from AGNs, which will become new galaxies. The evidence is fascinating, and Ambartsumian's thought about the birth of new galaxies is also fascinating. There is a partial convergence here with the work of Halton Arp.

The establishment's answer is that no, the great energies of AGNs are not intrinsic. Instead, there is a (hypothetical) black hole in the nucleus, and the energy (luminosity) derives from the accretion of matter onto it. Khembavi and Narlikar in *Quasars and Active Galactic Nuclei* confirm that what astronomers see are ejections and outflows, not inflows. Moreover, they and others point out that there are limits to how much energy can be obtained from the accretion scenario. They calculate (pp. 408–409) that the maximum luminosity that can be sustained by an accreting source, given the observed time variations, is 10^{44} ergs per second, while the most luminous quasars are at least a hundred times more powerful than that.

This report has provided only a keyhole view into the work of Ambartsumian. He worked in numerous fields that are not even touched on here.

Toward a Higher Hypothesis

We do not yet have a higher hypothesis. But we do have, thanks to Ambartsumian, leading ideas for one. A key feature of his work is the ever-present idea that the universe is anti-entropic, even though he did not use that expression. The question of entropy or anti-entropy is also the question of what is *life* in the universe. The Anglo-American establishment insists that life is an anomaly, and a temporary anomaly. But in an anti-entropic universe, life is comprehensible—and it is imaginable that the explosive expansion of life and intelligent life could come to dominate the universe, becoming a power greater than millions of supernovae.

Will the discoveries of the James Webb Space Telescope trigger more work toward a higher hypothesis? We shouldn't have to wait until we are engaged in travel beyond the Solar System for that to happen.

Richard Thomas's Plan

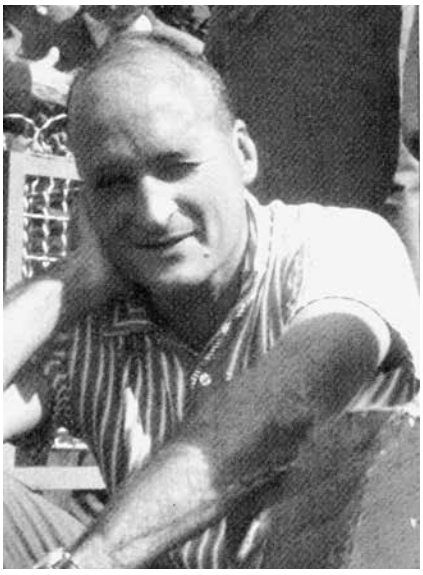
Some of Ambartsumian's students have remained committed to his concepts that implicitly point to an anti-entropic universe. Among these, Prof. Haik Harutyunian is prominent. Some other students have shed his view; perhaps they felt the burden of international ostracism was too great.

But there is still another, untold chapter. An unconventional and audacious—but influential—theoretical astrophysicist in the United States, Richard

5. Quoted by E. Ye. Khachikian in *Ambartsumian's Legacy,* p. 161.
6. See E. Ye. Khachikian in *Ambartsumian's Legacy*, pp. 162–163.
7. Quoted in *Ambartsumian's Legacy*, p. xvi.

Nelson Thomas, had set out in the early 1990s to "redo Eddington," and Ambartsumian came into his field of view. (That's Sir Arthur Eddington, died 1944, who had been, as it were, the final word on stellar thermodynamics for decades.)

Thomas—who had been a co-founder of the Joint Institute for Laboratory Astrophysics in Boulder, Colorado—thought that Ambartsumian's ideas about the appearance of new mass in quasars and stars were a real possibility. The possible creation of new mass was to be a focus of this new phase of Thomas's work.



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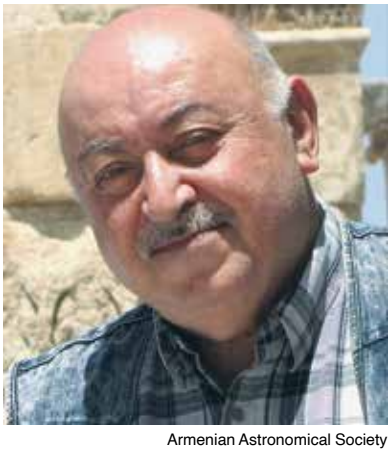
Richard Nelson Thomas of Boulder, Colorado and Paris, France (1921–1996) was, like Ambartsumian, a thinker of great originality. His plans to carry Ambartsumian's ideas forward were interrupted by his premature death.

He was planning a new international center (Armenia-United States-Mexico) for this work and held an initial seminar in Washington toward this end. He suffered a debilitating stroke in 1992, but worked on the idea fitfully until his death in 1996. He had become a friend of the author, and told him he wanted Ambartsumian to be the chairman of the board, with Halton Arp (the American at the Max Planck Institute for Astrophysics), Cornelis de Jager (Utrecht University), and himself as members of the board. But his idea did not go forward without him.

Today, none of those figures, apart from Prof. Harutyunian, is still with us. But there are others in Armenia, as mentioned.



Armenian Astronomical Society

Prof. Haik Harutyunian, current director of the Byurakan Astrophysical Observatory. The study of star-forming regions is just one part of the array of his astrophysical interests, inspired by Ambartsumian's work.

What To Do?

It is now in your hands, to understand and propagate Ambartsumian's ideas in the English-speaking world and beyond, to help the world escape the Malthusian trap constraining science and culture. If Ambartsumian's work is too difficult for you to master, you can at least identify the lack of authority of the reigning paradigm—and the deception involved in imposing it[8]—and point to Ambartsumian as having worked toward a scientifically grounded hypothesis that recognizes that power can grow in the universe, making it anti-entropic, implicitly including the power of life and of intelligent life.

But what do you have to work with, if you don't read or speak Russian?

First and foremost, there is the possibility of contact with the astronomers and astrophysicists at the Byurakan Astrophysical Observatory in Armenia.

In late 2014, Ben Deniston, Meghan Rouillard (now Ogden), and the author visited retired astronomer Nora Andreasian Thomas, widow of Richard Nelson Thomas, in Boston. She had been one of Ambartsumian's students. Nora Thomas introduced us to Professor Harutyunian by way of a Skype call to Armenia. He was the Director of the Byurakan Astrophysical Observatory, as he is today. Unfortunately, we did not then (or later) have any work underway along Ambartsumian's lines, for which we could invoke his help.

Today Prof. Harutyunian is open to collaboration with anyone who wants to do some hard work—to study and write about Ambartsumian's work, and help to take it forward.

Also, there is some literature in English (see "For Further Reading," below).

The Optimism of Ambartsumian

A few words about Ambartsumian's optimism of outlook. When the poet Aramais Sahakyan interviewed him, their dialogue (as reported by Ambartsumian's biographer), included these questions and answers:

Saakyan: Are we alone in the Universe?

8. A particularly obnoxious example of a Big Bang propagandist—hostile to the spirit of science—is Ethan Siegel in his article, "Cosmology's Only Big Problems Are Manufactured Misunderstandings," *Forbes,* May 7, 2019.

Ambartsumian: I'm certain that we are not. The Universe is a vast organism, and it is naïve to think that life exists only in that infinitesimally small part of it called the Earth.

Saakyan: What *is* man in the Universe?

Ambartsumian: Man himself is a micro-universe within the Universe. This is both poetic and scientifically accurate.

Nicholas of Cusa, I believe, and certainly Leibniz, would agree.

Saakyan: What is the meaning of life?

Ambartsumian: To be useful through one's ideas and one's activity. Those people are unfortunate who are incapable of doing good, … who think only of their personal advantage. The life of such people lacks the great purpose contained in the meaning of the word "life."

Saakyan: Do you have any opponents?

Ambartsumian: Many. When a new idea is born, it has at first only one supporter—its author. When the theory on the activity of galactic nuclei was formulated at Byurakan, many scientists around the world rejected it. Recognition came later. In short, he who has no opponents in science has no individuality.

Saakyan: What do you think about love?

Ambartsumian: Human warmth is as necessary to us as the vital warmth radiated by the Sun. Unfortunately, however, people are increasingly unwilling to share the warmth of their hearts. And when hearts grow cold, wars begin.

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The statue of Ambartsumian in front of the Yerevan State University Observatory.

And speaking of sharing, on another occasion Ambartsumian observed that what you share also remains your own, but what you withhold, is simply lost.

So, get to work on what Viktor Ambartsumian has shared with us—do what you can!

For Further Reading

Envoy of the Stars: Academician Victor Ambartsumyan, by Ashot Arzumanyan (Moscow: Progress Publishers, 1987). A popular biography with interview material. It touches on many of his discoveries and hypotheses. Very rich. Although out of print, find a copy here: bookfinder.com.

A Life in Astrophysics: Selected Papers of Viktor A. Ambartsumian, edited by Rouben V. Ambartsumian (New York: Allerton Press, 1998). The papers were selected by Viktor Ambartsumian himself, with an eye to ones which he thought especially pointed the way forward.

Ambartsumian's Legacy and Active Universe, edited by Haik Harutyunian et al. (Berlin/Heidelberg: Springer, 2012). A collection of papers by 13 astrophysicists. It opens with a sketch of Ambartsumian's life in science. Two key papers in this rich collection are Haik A. Harutyunian, "Ambartsumian's Paradigm for the Activity of Galactic Nuclei and the Evolution of Galaxies," and E. Ye. Khachikian, "Ambartsumian's Concept of Active Galactic Nuclei."

"The Origin and Evolution of Stars: An Observational Approach," by Ludwig V. Mirzoyan, *21st Century Science & Technology,* Winter 1991, pp. 43–51.

"The Problem of Protostellar Matter," by Ludwig V. Mirzoyan, *21st Century,* Fall 1994, pp. 68–74.

"Victor Ambartsumian's most important scientific achievements," by A.M. Mickaelian, *Communications of BAO* [Byurakan Astrophysical Observatory], Vol. 2 (LXV), 2018, No. 2, pp. 162–183. https://combao.bao.am/AllIssues/2018/162-183.pdf

"Hubble's Quasar Images: A Moment of Truth," by David Cherry, *EIR,* March 3, 1995, pp. 22–25. See here.

In addition to these, a few of Ambartsumian's papers were published in English in conference proceedings. His book, *Problems of Modern Cosmogony,* first published in Russian in 1968, was translated into French and German, but not English. The 1976 edition in German, revised and expanded, is titled, *Probleme der modernen Kosmogonie.* The 1971 French edition is V. Ambartsoumian, *Problèmes de Cosmogonie Contemporaine.*

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