SOLVING EIGHTEEN COMPLICATED SCIENTIFIC MYSTERIES:

Supernova, Dark Matter, Quasars, Astronomical Jets and more Explained by Using Relativistic Modifications, and Tornado, Gyroscope, Moon and more

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D.Sc. Mechanics

ONLY 3 OF 18 CHAPTERS

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Overview: *Solving Eighteen Complicated Scientific Mysteries*
Supernova, Dark Matter, Quasars, Tornado, Gyroscope and more
by Netsivi Ben-Amots

This book includes 18 chapters on solutions to scientific mysteries, 13 of which involve rotation. From these, 5 are in the framework of relativistic rotation and 8 are in the framework of Newtonian rotation. 3 Newtonian rotation mysteries were solved by the late Professor Dino Bousso. One of the other 5 Newtonian solutions presents the rotation dynamics that govern the tornado and its source of energy, while 3 others describe the rotation dynamics of the formation of the Moon.

A few chapters include new solutions to a few mysterious phenomena and observations in astrophysics in the framework of relativistic rotation, including supernova explosions, the structure of quasars and their source of energy, astronomical jets, dark matter, the structure and evolution of galaxies, galaxy clusters and superclusters, the large cell-structure of the universe, helium abundance, and more. This book uses fundamental well accepted and proven Einstein's special relativity and P. Franklin's (1922) relativistic rotation. A few paradigm shifts are derived, which replace the paradigms of the black hole, singularities, big-bang, linear Hubble's Law, Newtonian rotation $v = \omega r$, dark matter, dark energy and more with P. Franklin's relativistic rotation $v = c \tanh(\omega r/c)$, and embedding gravitational energy into Einstein's general relativity theory, and with exponential expansion of the universe that extends the age of the universe six-fold. These extensions obey the conservation of angular momentum, as well as the accepted Einsteinian special relativistic equations $v \leq c$, and $E = mc^2$,

$$v = \frac{v_1 + v_2}{1 + v_1 v_2/c^2}$$

$$m = \frac{m_0}{\sqrt{1 - v^2/c^2}}.$$

$E = mc^2$ means that $m = E/c^2$. Before deriving the general relativity theory, Einstein (1912) considered the rest mass to be constant, i.e., not dependent on the distance to another mass. Einstein's limitation means that the rest mass $m = E/c^2$ includes many types of energy, but E does not include gravitational energy. However, when this constraint is removed, the rest mass will include also the gravitational energy, and is dependent on the distance to another mass. The improved theory in this book predicts that the β_{PPN}-1 accepted criterion is different from the prediction of zero by Einstein's general relativity, but well below 8×10^{-8} for the perihelion shift in the solar system. Precise observations of perihelion shift in the solar system allow for $\beta_{\mathrm{PPN}} - 1 < 8 \times 10^{-5}$. However, in extreme conditions, the differences are large and explain a few astrophysical mysteries.

This book deals with these questions and others by simple mathematics through step-by-step derivations, with applications mainly in astrophysics. The results fit all the present observations and measurements as well as most of the predictions of Einstein's theory of general relativity. In extreme cases, new predictions are obtained, including a new set of electron orbitals around a proton – a process that exists in extreme pressure in quasars and supernova explosions. In these formulations, the known paradoxes of astrophysics such as black holes, big-bang, singularities, dark matter, dark energy, and zero radius of the electron vanish because they are solved without resorting to any exotic concepts. A few chapters describe additional solutions, including the origin of life, and tinnitus.

1. RELATIVISTIC ROTATION

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We are used to the addition of velocities:

$$v = v_1 + v_2 \tag{1}$$

However, when deriving special relativity in 1905, Einstein found that the maximal velocity is the speed of light c (that is equal to 299792.458 km/sec). Eq. (1) may lead to v larger than the velocity of light c. Therefore, special relativity includes a more accurate formula without this disadvantage for the addition of velocities:

$$v = \frac{v_1 + v_2}{1 + v_1 v_2 / c^2} \tag{2}$$

that always gives velocity v smaller than the speed of light c.

The well-known formula for rotation is

$$v = \omega r \tag{3}$$

where ω is the angular velocity and r is the radius, that is the distance of a point on a rotating body from the axis of rotation. However, for a sufficiently large angular velocity ω or a sufficiently large radius r the circumferential velocity v according to equation (3) may exceed the velocity of light c, which violates the special theory of relativity.

Therefore, Philip Franklin (1922) derived a more accurate formula for rotation:

$$v = c \tanh \frac{\omega r}{c} \tag{4}$$

in which the circumferential velocity v always results smaller than the speed of light c.

Others followed him and derived the same formula (4). The first follower was Trocheris (1949). Other scientists derived the same formula (4) using a different proof: Takeno (1952) and Cao et al. (2003).

Others derived different formulas that also solve the same problem. The first to find a different appropriate formula was Rosen (1946) who obtained:

$$v = \frac{\omega r}{\sqrt{1 + (\omega r/c)^2}} \tag{5}$$

Later on, others obtained the same formula (5) as Rosen: [11], [12], [3], [16] and [2].

Other scientists suggested different appropriate formulas. See review [5] (excluding Franklin (1922)).

According to relativity the mass of a body moving with velocity v is:

$$m = \frac{m_0}{\sqrt{1 - (v/c)^2}} \tag{6}$$

Therefore, calculations were made to find the enlarged mass of a sphere of radius r rotating with an angular velocity ω according to formulas (3), (4) or (5). MacGregor (1972), (1974), (1990) and independently Leonard (1984) obtained the maximal enlarged mass for a sphere rotating according to formula (3). Ben-Amots (2003), (2017) obtained the maximal enlarged mass for a sphere rotating according to formula (4). Ben-Amots (2017) also obtained the maximal enlarged mass for a sphere rotating according to formula (5).

They calculated the maximal enlarged angular momentum as well. All the results in this chapter are summed up in Table 1. Table 1 compares the results of the calculations of the fraction of the quark mass as the kinetic energy of rotation for three types of rotations. For rotations (4) and (5) naive quark spheres are assumed. See also more details in the next chapter 2 in this book, and in ref [1], and in the appendix A of ref. [2] and *its* chapter 4.

Table 1: Kinetic energy of rotation of quarks **up** and **down**

Rotation type	Not relativistic	Rosen [13]	Franklin [6]
Rotation formula	$v = \omega r$	$v = \frac{\omega r}{[1+(\omega r/c)^2]^{1/2}}$	$v = c \tanh \frac{\omega r}{c}$
Fraction of quark mass as kinetic rotation	1/3	96.5%	99.3%
Calculated by	MacGregor [8] [9] [10] Leonard [7]	Ben-Amots [2]	Ben-Amots [2] [1]

Remark: In 1990, when I described to Professor Nathan Rosen the computerized simulations of rotating quarks that I had already completed in 1986 (see the next chapter 2 in this book, and in ref [1], and in the appendix A of ref. [2] and *its* chapter 4,) he interrupted before I told him my results, and said that the kinetic energy of Franklin's rotation of the quark would be the major component of the mass of the quark. Only then I told him my results that the

kinetic energy of rotation resulted in larger than 99% of the mass. Professor Rosen (then 81) conceived and predicted this immediately without a computerized simulation.

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13. PRECURSORS OF LIFE

Netsivi Ben-Amots

Life is still an unsolved puzzle. Scientists found that life involved characteristic organic compounds such as proteins. Proteins consist of amino acids, which include nitrogen, in addition to carbon, oxygen and hydrogen. The accepted assumption is that these compounds were formed before life. Therefore, these compounds are also called *precursors of life.* Also, nucleotides and nucleosides are considered as precursors of DNA and RNA. The unsolved problem of how life was formed was replaced with an easier but still complicated problem: How were *precursors of life* formed?

Air includes nitrogen, but adding nitrogen to carbonaceous compounds does not occur easily. A few suggestions were made.

One of them is lightning. Experiments with electric sparks in the assumed ancient atmosphere that included nitrogen resulted in amino acids. Stanley Miller (1953) tested this idea in an experiment, and found that amino acids (building blocks of proteins) were formed when an environment of methane, NH_3, hydrogen and water was subjected to electric sparks that represented lightning.

Another is micro-meteorites: Bar-Nun et al. (1970) made experiments in which "a mixture of gases roughly simulating the primitive terrestrial atmosphere has

been subjected to shock heating followed by a rapid thermal quench." The temperatures in their experiments were 1000-3500ºK. They found that amino acids were formed. They interpreted this finding by assuming that thermal shocks in an atmospheric entry of cometary meteors and micrometeorites and from thunder may have been the principal energy sources for prebiological organic synthesis on the primitive earth.

After sonochemistry experiments, Anbar (1968) suggested that the implosion of bubbles in sea waves (called cavitation) produces shocks of extreme heat and pressure and could form precursors of life as well. Ben-Amots and Anbar (2007) calculated the production of precursors of life by the implosion of bubbles in present ocean and sea waves as approximately a thousand times larger than by lightning or micrometeorites. Consequently, Dharmarathne and Grieser (2016) confirmed this possibility by cavitation experiments. Using sonochemistry and various primordial materials they formed amino acids. Their successful results drew attention among scientists.

Unfortunately, Michael Anbar passed away in 2014 before their confirmation. Stanley Miller and Akiva Bar-Nun are also not among us anymore.

Kalson et al. (2017) conducted exact computer simulations with higher values than were obtained by Ben-Amots and Anbar (2007), also confirming this possibility. Consequently, Patehebieke et al. (2021) conducted appropriate cavitation experiments

using higher sonochemistry power, and formed purine nucleosides, the precursors of RNA, thus further confirming Anbar's (1968) predictions.

In chapter 16 of this book, Ben-Amots calculates the energy made available by *primordial* ocean tide waves, showing that it was much higher than assumed in all the previous research works mentioned above, because the primordial tide waves were then much higher than at the present time.

It was found that the Murchison meteorite contains amino acids ([8] (1970), [9] (1971), [10] (1998), [11] (2004) and others). This means that nature knows how to produce amino acids out of Earth in unknown ways. The Murchison meteorite is older than Earth, meaning that amino acids might have been in the materials from which the Earth was formed. However, the formation of Earth involved relatively high temperatures that decomposed the original amino acids. Therefore, amino acids were produced later on the surface of Earth after it was cooled sufficiently.

How precursors of life became life is still a subject of research. Various necessary stages are studied extensively. However, it is not yet clear what combination of the stage(s), feature(s) and processes is sufficient to make a living creature, or how, when or where the first living creature was created. This chapter briefly reviewed the solution to the formation of *precursors of life* on the surface of Earth before life existed.

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Earth and hence have been involved in the abiogenesis[1] of life."

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http://pubs.acs.org/doi/pdf/10.1021/acscentsci.7b00325
Citing a few sentences: "Our values are 4-5 orders of magnitude larger than the value used by Ben-Amots and Anbar. (14)...
Synthesis of biologically important species in primordial earth by cavitation is examined using computer simulations. We find it plausible that this mechanism could contribute to the origin of life. ...
The suggestion that cavitation had a significant role in the development of life on earth was raised over 60 years ago. (14, 15)...
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Citing one sentence: "These results suggest that cavitation could be a plausible driving force that contributed to the prebiotic synthesis of canonical nucleosides."
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Some responses:

1. "I am pleased that you saw our article, as the study was inspired by your and Anbar's publication in Ultrasonics Sonochemistry. I was aware of Anbar's Science work but the paper with you, really addressed the idea in an interesting conceptual form. I was very pleased that we could confirm the hypothesis." 5th July 2016, Prof. Franz Grieser (University, Australia)

2. "No doubt, my father would have been pleased." July 2016
Prof. Ariel Anbar (Professor in university, U.S.A.)

3. "Your paper sounds interesting." March 2017
Lászlo Attila Horváth (Geologist engineer, Hungary)

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[1] Abiogenesis is the science of the origin and formation of life (Coyne, 2009; Wikipedia, 2020), although Carles (1964) mentioned that this word is misleading

18. WHY WHALES GO ONSHORE

Netsivi Ben-Amots

A dolphin investigated divers with a scooter (a scooter is an undersea driving machine with a propeller). The dolphin expelled air bubbles similar to those expelled by the diving equipment of the divers, and rolled in the water similar to helices, producing helical pressure waves like the propeller of the scooter of the divers produced.

Another dolphin joined a woman diver who dived near him and followed her. Whales and most fish and dolphins lack reverse "gear." Therefore they avoid entering undersea caves, so as not to be trapped in them. I cannot forget the worried look on the dolphin's "face" when his woman friend entered an undersea cave, while he waited outside the cave.

In another case, dolphins surrounded persons swimming in the water when sharks showed up.

A whale grabbed a woman and dragged her deep into the water. She was sure that she would drown and die, because even if the whale would release her, she would not be able to reach the surface of the sea before she suffocated. But at the last minute, the whale dragged her at maximum speed to the water surface and released her.

The whale just wanted to know how much time the woman could live without breathing; when he felt

that she could not hold her breath anymore, he dragged her to the surface at full speed to save her.

These are examples of the intelligence and soul of the marine mammals.

Whales live in groups. They have a language. Each whale has a first name and a family name.

The family name is a word unique for the group, shared by all the members of the group. The first name is a special word unique for each whale.

Whales and dolphins have exceptionally good hearing.

Whales are capable of vocally communicating from a distance of thousands of kilometers. They even use "voice channels" in the oceans, produced because of differences in temperature in different regions and depths in the ocean. In these voice channels, the voice is less weakened so that their good hearing enables them to communicate even between two far ends of the Pacific Ocean.

A friend told me that he had read about British research, in which dozens of years ago measurements proved that dolphins vocally communicate from distances of 4000 kilometers.

Whales and dolphins are capable of identifying the motion of fish between stormy waves from long distances, and it is vital for them because they eat fish. Identification of the weak voices of the motion of fish, in the strong random noise of stormy waves, is quite a simple thing for whales. They use their excellent incomparable hearing.

Whales and dolphins have sonar. Using their excellent hearing they can locate fish and other sea animals by echoes from their sonar signals, even within the sand at the bottom of the sea.

Their hearing includes the ears, which are sophisticated mechanical amplification devices and sophisticated deciphering centers in the brain. Both are exceptionally developed in whales, with their hearing that includes mechanical delicate amplification devices, which amplify the weakest voices to large vibrations in the ear, before transforming them to nerve signals going to the brain for deciphering. (In this context, see the previous Chapter 17 in this book about the implications of sophisticated mechanical amplification natural devices in the ears, and sophisticated deciphering centers in the brain.)

See additional details in Downer (1989).

Some whales dive for a few kilometers undersea to search for their food. The pressure there is hundreds of atmospheres. When they rise to the surface they must take a rest, during which they are vulnerable to being hit by ships when they are recovering from the dive and cannot escape the ship. There is no whale veterinarian and they usually die later from the hard-hit and then are sometimes pushed to the shore by the sea waves.

Sometimes a whale enters a shallow small bay during the tide, and if he failed to escape in time, he is trapped until the next tide and may die from exposure to the sun and the pressure of his huge weight on his

tissues. Sometimes good people save such a whale.

But there were cases in which single whales or a few whales, or even large groups of whales, went up the shore intentionally and died.

The early cases described were apparently located at:

1. St. John's, Newfoundland, Canada, 63 whales [1], [2].

2. 9 February 1977, bay of Port George, Florida, the U.S.A., approximately 100 whales [1], [2]. It was broadcasted by American TV.

3. June 18th, 1979, the beach of Florence city, Oregon, the U.S.A., 41 whales [1].

Since then this was repeated on many occasions. There were theories that whales navigate according to magnetic fields that confused the whales and led them to the shore. But whale savers were astonished to observe the whales that they dragged out to the sea turning back and forcefully going on to the shore, where they died later. Therefore, this was not a navigational error.

This was a mystery. Why do the whales behave as if they were committing suicide?

On 18th November 1978, 909 people committed suicide in Jonestown, Guyana following the orders of their leader. The whales were following their leader whale. It was similarly assumed that the leader of the whales went mad, because no other explanation to the mystery was known.

Post-mortem operations found nothing, until the discovery a few years ago that all the suicidal whales had a significant hemorrhage, but only in the ears.

Only then was it found that in each of the suicide cases, submarines or other navy ships operated sonar in the vicinity.

Radio includes a device of switching off. If it fails, one can take out the plug. Whales lack this option. They cannot switch off or decrease the high amplification of their sensitive hearing. The strong sonar sounds cause very strong mechanical vibrations in the sensitive mechanical amplification devices in the ears of the whales. This results in significant bleeding in their middle ear and its vicinity. No veterinarian is around to stop the bleeding.

The whale is not a fool; he knows that he will die from this. Even if he will not die from the bleeding, he will be deaf and unable to find food and will starve to death.

But why does the whale commit suicide on the shore? Why it is so important to the whale with wounded ears to die onshore, not in the water?

It was found that the strong sonar-induced vibrations cause the whale to have a terrible pain in his ears, which he has no way to escape from, but only to go onshore. When going onshore, the whale does not hear the submarine sonar within the water. Then the terrible pain stops or weakens, which enables the whale to escape from the terrible torture of pains in his ears.

The whales do not just look as if they are committing suicide. In my opinion, the terrible truth is that the whales are indeed committing suicide. They cannot cope with the terrible pain induced by the sonar, which for them is the most terrible torture, worse than death.

The whales were not mad at all. Their actions *seemed* mysterious. The solution to this mystery is so sad: The countries that forbid and ban the hunting of whales in order to save the whale, have been killing them in masses with tortures by sonar for decades.

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Books [1] and [2] explain system madness well, but whales committing group suicide are inappropriate examples. Instead of being considered madness of the leader whale, it is better to include it as an example of hitting the Achilles's heel of the whales.

ABOUT THE AUTHOR

Netsivi Ben-Amots was born in Tel-Aviv in 1941. He is a graduate of the Technion – Israel Institute for Technology, Haifa, Israel, where he got his B.Sc. in Mechanical engineering in 1963, M.Sc. in Mechanics in 1969 (thesis subject: *The dynamical behavior of a rotor on a belt suspension drive*), and D.Sc. in Mechanics in 1976 (thesis subject: *The motion of a high-speed rotor under the influence of a moment perpendicular to the axes of precession and nutation* (Hebrew; there is a partial review in English*).

The author lives in Haifa, Israel. He is a member of the standing committee of IARD: International Association for Relativistic Dynamics from the year 2000. Dr. Ben-Amots's professional activities include mechanical engineering and software development. His expertise includes dynamics, rotations, computerized simulation, and computer programming.

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[1] Ben-Amots, N., *Basic aspect of relativistic rotation: Franklin rotation of a sphere*, Found. Phys., v. 33, pp. 1369-1372 (2003)

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The author Netsivi Ben-Amots was born in 1941, got his D.Sc. in mechanics in 1976 from the Technion, Haifa, Israel, where he specialized in dynamics, rotation, and computerized simulation. Dr. Ben-Amots was invited to the Faculty of Physics by Professor Nathan Rosen, co-author and a student of Albert Einstein. There the author studied relativity and astrophysics. Dr. Ben-Amots conducts research and develops solutions to problems involving R&R: rotation and relativity. He is a member of the standing committee of the International Association for Relativistic Dynamics (IARD) from the year 2000.