Cosmology: Newtonian Alive - Modern At Bay.

By Ed Dellian, Berlin. 11.01.2018. – 10.02.2018.

Abstract: Cosmological hypotheses common to old ("classical") and modern ("relativistic") theory, undisputed to this day, are shown to fail because they ignore and contradict Newton's Laws of Motion and the Corollary 4 to the laws, deduced from experience. There is no "universal" law of gravitation. Orbits about barycenters of many-body systems are not elliptic but circular. The Solar System is stable (no "chaotic" devolution). There are no "black holes" in the centers of galaxies. There is no "dark matter" and no "expansion of the universe". There was no "Big Bang". There is no "spacetime" to be disturbed by physical action (there are no "gravitational waves"), and the "Age of the Universe" remains unknown.

I On Newtonian Cosmology.

1. What is "Newtonian Cosmology" according to common belief? It is the theory of gravitation based on one and the same law, said to be valid in the whole universe: "Newton's law of universal gravitation", also called "the inverse-square law".

But Newton's cosmology is not what it generally is supposed to be. It is not based on just one law. And, not on the inverse-square law in the form which is introduced in textbooks as "Newton's law".

There is no "Instantaneous Action at a Distance".

2. It is a basic assumption of textbook writers that Newton's theory of gravitation would imply the absurd concept of "instantaneous action at a distance". This argument is generally used in order to put modern cosmology (general relativity) ahead of Newton's. But the argument fails.

   Historians of science at least know that the "inverse square law of gravitation" - the law of two bodies (masses) attracting each other instantaneously by forces proportional to the product of these masses, divided by the square of their distance – is not Newton's. One cannot find it in Newton's Principia. It is rather a construct of the

late 19th century. Actually this formula contradicts the laws Newton derived from reality: the First Law on the passivity of matter (there exists no attracting "active gravitational mass" in nature); the Second Law on the *proportionality* of cause and effect (the Galilean-Newtonian principle of *interaction in space and time;* there is no Leibnizian "equality of cause and effect", so there is also no "instantaneous action at a distance"); the Third Law on the mutuality of action to generate a "common center of gravity"; and, last not least, the nearly unknown Corollary 4 to the laws (on motions in a many-body system about that common center).

As to "action at a distance", which is a principle of Cartesian-Leibnizian origin, Newton says in a well-known letter to Bentley, dated Feb. 25, 1692/3: This concept

"is so great an absurdity, that I believe no man who has in philosophical matters a competent faculty of thinking, can ever fall into it".

In the next edition of his Principia (1713) he inserted a paragraph that clarifies in detail the causal space-time interaction of gravity with matter in order to unmistakably dismiss the absurd:

"When a body falls, uniform gravity, by acting equally in individual equal particles of time, impresses equal forces upon that body and generates equal velocities, and in the total time it impresses a total force and generates a total velocity proportional to the time" (Principia 1713, Book I, Scholium following Corol. 6).

There is no "Universal" Law of Gravitation.

3. Newton deduced from nature not just a "theory of gravitation" but a "theory of centripetal forces". The *gravitational* force, or "gravity", which controls the motions of planets and comets *in the Solar System*, and which is also known to make heavy bodies tend to the center of the earth, is *just one kind of* centripetal force. As another kind Newton mentions the force that makes the iron tend to the loadstone. And again another one is the force that draws a stone whirled in a sling back towards the hand and keeps it in orbit. For all this, see Principia, Book I, Definition 5–8 (see Newton's own explanations to these definitions).

If not $F = GmM/r^2$, what then is Newton's true "Law of Gravitation"?

4. The gravitational force, by which *the planets of the Solar System* are compelled to revolve in closed conic sections about a center, appears, *as a special case* among others, in Newton's Principia, Book I, Prop. 4.

4.1. In Prop. 4 Newton first describes the *general* law of centripetal force of several bodies in circular (not *elliptic*!) motion as follows:

"The centripetal forces of bodies that describe different circles with uniform motion tend towards the centers of those circles and are to another as the squares of the arcs described in the same time divided by the radii of the circles".

This proposition compares several different centripetal forces of different bodies describing different circles about one and the same center with uniform motion. Note that Newton speaks of "circles", not ellipses. "Circular motion" (and therefore *uniform* motion, with invariant velocity) *is a general precondition* of this proposition.

4.2. Next in Prop. 4 Corollaries 1 and 2 Newton gives some general properties of circular motion. Corollary 1 explains that "the centripetal forces will be in a ratio compounded of the squared ratio of the velocities directly and the simple ratio of the radii inversely". This is the well-known measurement of centripetal force by the ratio "velocity squared over radius", that is, v^2/r.

Corollary 2 derives from Corollary 1 the relation of centripetal forces to the radii and the periodic times: "The centripetal forces are in a ratio compounded of the ratio of the radii directly and the squared ratio of the periodic times inversely", that is, r/t^2.

Note to Corollaries 1 and 2 that (Corol. 1) $v^2/r = r/t^2$ (Corol. 2). Since velocity v is itself a compound of "space", r, over "time", t, the *basic* relation is r/t^2. It shows that in circular motion *the centripetal forces are to each other in the ratio of the radii as described in Corol. 2,* that is, they are to each other as the radii of the circles.

4.3. In a further step, in Corollaries 3 to 6 Newton compares the measures of the centripetal forces of several bodies circulating about one and the same center, under different conditions:

4.3.1. Corollary 3: Under the condition that the bodies perform their periods in "equal periodic times", the centripetal forces will be to each other as the radii, and inversely.

4.3.2. Corollary 4: Under the condition that the "periodic times and velocities are as the square roots of the radii", the centripetal forces will be equal to one another, and conversely.

4.3.3. Corollary 5: Under the condition "periodic times are as the radii, and therefore the velocities are equal", the centripetal forces will be to each other inversely as the radii, and conversely.

4.3.4. Corollary 6: Under the condition "the periodic times are as the 3/2 powers of the radii, and therefore the velocities are inversely as the square roots of the radii", the centripetal forces will be to each other inversely as the squares of the radii, and conversely.

A Special Case: "Gravitation" - restricted to the Solar System.

4.4. To Corollary 6 Newton adds the following explanation in a "Scholium":

"The case of Corol. 6 holds for the heavenly bodies (as our compatriots Wren, Hooke and Halley have also found out independently)… With the help of this proposition and its corollaries the proportion of a centripetal force to any known force, as that of gravity, may also be determined. For if a body revolves by the force of its gravity in a circle concentric with the earth, this gravity is its centripetal force".

5. One should note that the case of Corol. 6 holds for the gravitational force and the motions of the "heavenly bodies". These heavenly bodies are for Newton the Sun and planets of the Solar System. The law of centripetal or gravitational force does not refer to the fixed stars, nor to other bodies in deep space such as stars in the galaxies (which, by the way, were not yet known in Newton's time).

Corollary 6 introduces as a law of gravitation the example of "centripetal forces inversely as the squares of the radii, and conversely". This is "the inverse-square law"

which textbook writers believe to be the only one "gravitational law" valid *universally*. The following however is notable:

5.1. As the inverse-square law of Corollary 6 only "holds for the heavenly bodies" of the Solar System, it is evident that Corollaries 3, 4 and 5 describe *different* laws of centripetal force which may perhaps *hold elsewhere in the infinite universe*.

Therefore, the belief of physics textbook writers in the universality of the inverse-square law is unfounded. Says Newton:

"God is able to create particles of matter of several sizes and figures, and in several proportions to space, and perhaps of different densities and forces, and thereby to vary the laws of Nature, and make worlds of several sorts in several parts of the universe. At least, I see nothing of contradiction in all this" (Newton, Opticks 1717, Query 31, the last but two paragraph).

Never and nowhere did Newton claim that the inverse-square law (that governs the Solar System under the very special condition "periodic times are as the 3/2 powers of the radii") would hold *everywhere in the whole universe*!

Validity of Kepler's Laws also restricted to the Solar System.

5.2. Newton's precondition of Corollary 6 (referring to the Solar System only), that is, the relation "force inversely as the radii squared", implies a relation of periodic times, velocities and radii that corresponds with what is known as "Kepler's third law". Accordingly this law is also restricted to the conditions of the Solar System.

Since Prop. 4 presupposes "circular motion" for all ensuing Corollaries, it follows moreover that Kepler's third law "proportionality of the third power of the great semi-axis of an ellipse to the square of periodic time" is not only valid for ellipses but also for circles (which are 'ellipses' with *eccentricity zero*, of course). Actually the period of *uniform* motion in a *circle* is equal to the period of *variable* motion in an *ellipse*, provided only that the great axis of the ellipse is equal to the diameter of the circle (Newton, Principia, Book I, Corol. to Prop. 15).

It should also be noted here that Kepler's second law – the law of description of equal areas in equal times – as well does not hold for elliptical orbits only. Rather, Newton proves in the Principia, Book I Prop. 1 the general validity of this law for motions of bodies about a center under the action of a force that is directed to that center (a "centripetal" force), independently of the shape of the orbit.

Summing up, one should note: Kepler's First law, which says that the planets re-volve about the Sun not in circular, but in elliptic orbits, the Sun being a focal point of the ellipse, is based on presupposing the Sun to be the immovable center and reference point of these motions. In this case the law correctly mirrors what the astronomers see when they observe and calculate the motions of the planets *with relation to the Sun.* Cf. Newton, Principia, Book III, Prop. 13.

Closed orbits about an immovable center – always elliptic?

All in all, one cannot say (as some experts do) that Newton had demonstrated the *universal validity* and truth of Kepler's three laws, and, basically, the *always elliptic shape* of closed orbits. Actually Newton *demonstrated mathematically* the general characteristics of motions under the action of several centripetal forces. Only one special case (Principia, Book I Prop. 4 Corol. 6) refers to motions in the Solar Sys-tem, from which system Kepler, presupposing the Sun to be the true reference point at rest, had gained observational data (many of which collected over years by the Danish astronomer Tycho Brahe) to base his laws on. Nothing ever forced the astronomers to believe (as they do) that Kepler's laws would be valid *indepen-dently of the chosen reference system*, and for all revolving bodies in many-body systems *everywhere in the infinite universe*.

5.3. The said relation that implies Kepler's "third law", that is the relation: centripetal forces being "inversely as the squares of the radii", holds for *several* bodies with respect to each other, when rotating about a center according to the above presup-position "the periodic times are as the 3/2 powers of the radii, and therefore the velocities are inversely as the square roots of the radii" (which is the case of the planets in the Solar System). The "inverse square law" accordingly *compares the relations of periodic times and radii of several bodies* with one another, finding them

to be equal: $r_1^3/T_1^2 = r_2^3/T_2^2$ etc.

The inverse square law, however, does not assert a same constant relation of periodic times and radii of *one single rotating body.* In other words: The relation of radii r and the square of the periodic times, T^2, *of one single body moving in a closed orbit* is not a case of "Kepler's third law", because this relation is *a variable* in this case, not *a constant* as with Kepler's formula, when correctly applied *to several bodies compared with one another*. This point must be stressed here because it is often ignored in celestial mechanics, as we shall see next.

A basic mistake: How mathematicians make circular orbits appear elliptic.

6. Theoretical celestial mechanics believes that essentially closed orbits under the action of centripetal forces *are always elliptic*, the force pointing from the orbiting body to a focal point of the ellipse. This view is based on the false hypothesis of "universal gravitation", that is, of the validity of the inverse-square law, and of Kepler's laws, not only in the Solar System, but everywhere in the universe, and on the idea to use Kepler's third law as a means to determine the shape of orbits, which accordingly should always be elliptic.

6.1. How do theoreticians derive a general law of *elliptic* orbits? It is known that Newton's general law of centripetal force holds for *circular motion* (on condition "equal periodic times"). As has already been shown, it is *a relation between centripetal force and the radii of the circles* (Prop. 4 Corol. 1 - 3): centripetal force = r/t^2; centripetal force over r = $1/t^2$. On condition "t^2 = invariant, since the periodic times t are equal", the centripetal forces of several bodies are *to each other* as the radii of the circles, r.

In order to obtain an *elliptic shape* of celestial orbits, theoreticians instead of f = r/t^2 take the equivalent formula v^2/r and combine it with Kepler's "third law" r^3/t^2 = constant. This relation *between several bodies* in orbits, when applied to the orbit of a *single revolving body*, insinuates "elliptic orbit". And, this is the basic mistake.

Mathematically this result is gained by changing the relation between force f and radius r, That is, f = r/t², or the relation of force f and radius r belonging to *circular* motion, into "f is inversely as r squared", belonging to *elliptic* orbits. This happens as follows:

(1) f = r/t²   (that is, *the force f is as the radius r*); transformed into
                        the apparently equivalent term f = v²/r, combined with v = 2πr/t
                        (that is, the velocity is the circumference 2πr over time t), yields
(2) f = 4π²r/t².   Now taking from Kepler's law r³/t² = C as constant (that is, by
                        erroneously applying Kepler's third law to a single orbit), this
                        relation transformed into r/t² = C/r², and then substituted in (2),
                        one gains
(3) f = 4π² x C/r² , or 4π²C x 1/r² .

Next, by taking 4π²C as given (expressed as a constant k), it seems that
(4) f = k x (1/r²) - this is the required and desired alleged inverse relation between
                        centripetal force f *and radius r squared.* It is the formula that, in
                        contradiction to (1), inevitably entails *elliptic orbits.*

As we see, the mathematicians obtain what they have presupposed: a formula insinuating that celestial orbits *must always be elliptic*.

It has been shown above, however, that applying Kepler's third law to find the true shape of orbits means to commit a math error. It happens between steps (2) and (3): It means to misuse the Keplerian relation r³/t² in a context where it is not valid. Logically seen it is a case of "begging the question", because the said law presupposes "elliptic orbit", that is, if misused to describe the shape of one individual orbit, it presupposes exactly what had to be proven. Some theoreticians obtain the same false result when they, analytically, substitute the equation of a central gravitational field (which implies the inverse-square law) into the equation describing the path of a single moving body, similar to what happens between (2) and (3) above; cf. for example Landau/Lifschitz, I Mechanics, § 15 "The Kepler Problem".

6.2. According to Newton, the problem of the geometric shape of closed orbits – circular or elliptic – has nothing to do with the inverse-square law, nor with any other law of centripetal force, nor with Kepler's third law. Rather the alternatives depend only on the direction of the centripetal force that bends a body's straight-lined path so that it must orbit in a curved line about a center: If the force is directed from the revolving body to the geometric center of the orbit, the centripetal force will be as the body's distance from the center (ceteris paribus), which distance is the invariant radius of a circle. In this case, the body will revolve *in that circle*, which is an "ellipse with eccentricity zero". If the force, however, is directed not to that center, but to an *eccentric point*, the centripetal force will be inversely as the varying distances between the revolving body and the eccentric point, and the body will revolve *in a true ellipse* (no longer a circle) with eccentricity $\neq$ zero, the eccentric point now being a focal point of the ellipse.

For both cases see Principia, Book I, Prop. 10 (circular orbit) and Prop. 11 (elliptic orbit). The theory corresponds with what is taught in analytical mechanics: eccentricity e = 0 = circle; 0 < e < 1 = ellipse).

On circular orbits in the Solar System.

7. How do Sun and planets move in the Solar System? Current astronomy (astrophysics) teaches that (according to Kepler's First law) revolutions in the Solar System show not circular but always elliptic orbits about the Sun, which is a focal point of the "Kepler ellipses", and at rest.

On condition that the Sun is put at rest and taken for the center of revolutions, this view corresponds with Newton's teaching on the basis of the same condition (cf. Principia, Book III, Prop. 13). Here the Sun, arbitrarily put at rest, is taken as the "reference system".

But, is the Sun *really* at rest?

7.1. The Solar System is a many-body system. All bodies of such a revolving system are moving, none is at rest, because the actions of the gravitational force are always

mutual (Newton, Principia, Third Law "actio" = reactio"). All these bodies move about one and the same "common center of gravity" (Newton, Principia, Book I, Corol. 4 to the laws of motion). Therefore, the Sun is also never at rest, but is always "engaged in continual motion" (Newton, Principia, Book III, Prop. 12):

"Since the earth, Sun and all the planets gravitate toward one another and therefore are constantly put in motion according to the laws of motion, their mobile centers cannot be considered the center of the universe, which is at rest" (Newton, ibid. Corollary to Prop. 12).

Therefore, the true center of revolutions is not the Sun but the common center of gravity of the Solar System.

On the stability of the Solar System.

One should note here, by the way, that Corol. 4, which is generally ignored in astrophysics, guarantees to a great extent the stability of the Solar System, thus contradicting the "chaos theory" of Poincaré and the popular horror scenarios deduced therefrom ("big impact" etc.). Since all the bodies revolve about the same center, their orbits do not intersect, and the bodies will not collide. Only from the outside the system can be disturbed, for instance by comets. On principle, the system in itself is stable. This is true for every many-body system. Therefore, the idea that binary stars revolving about each other could end up merging into one (sending out "gravitational waves" when merging), is absurd.

7.2. As we have seen, the "center of the universe at rest" (Newton's terminology), that is, the true center and reference system of the rotations of all bodies in the Solar System, is their common center of gravity, the so-called "barycenter". The place of this center is composed by the centers of gravity of two bodies respectively, which lie on the straight lines that connect these centers, and is determined by the masses of the involved bodies, as Newton explains in Corol. 4 to the laws. In the Solar System the common center lies quite near to the Sun, sometimes even falling inside the Sun's circumference, but always more or less distant from the center of the Sun. For details see Newton ibid.

7.3. The fact that the reference point at rest of the revolutions in the Solar System is not the Sun but the barycenter was already known to Copernicus. Cf. "De revolutionibus" (1543), Book I Chapter 10. This truth is often ignored in textbooks which erroneously are teaching Copernicus had put the (center of the) Sun in the center of the revolutions. Galileo (1638) also was aware that the center of the revolutions is *not* the center of the Sun, even though he knew for true that the planets "revolve about the Sun": Actually this is true because the Sun occupies the innermost of the planetary orbits about the barycenter. Accordingly all the orbits of the planets, which lie concentrically about and outside the Sun's orbit, always must lead the orbiting body "about the Sun".

7.4. According to the theory of the common center of gravity the true reference point of motions in a many-body system is always a nonmaterial geometric point in space; never does it coincide with the center of one of the material bodies of the system.

Johannes Kepler's view, however, was different. He held that the (center of the) Sun herself would be the source of a force, or power, that "grabs" at the planets, drawing them continually to her center, akin to the action of a magnet. So he computed the positions of the planets relatively not to the barycenter but to the Sun as the apparently relevant reference point. This had been generally done by astronomers in former times, and also by Tycho Brahe, whose most accurate measurements of planetary positions (relative to the Sun) Kepler was allowed to use.

Kepler, with reference to the Sun at rest, found elliptic orbits of the planets, the Sun standing at one focal point of the ellipse. Had he already known what Newton taught about eighty years later, he would not have been very surprised. As Newton's proposition 11 of Principia, Book I shows, elliptic orbits inevitably must result if the centripetal force is understood as pointing from the moving planet not to the geometric center of the ellipse, but to an eccentric point – the focal point, in Kepler's view to the focal point "Sun" as "center of force".

Plato, Aristotle, Ptolemy, Copernicus, Galileo, and Newton against Kepler: True Orbits are *Circles around the Barycenter at rest.*

8. Applied astronomy of today knows very well that the true center of gravitational force in the Solar System is not the Sun but the non-material barycenter of that system. Accordingly engineers, when calculating the motions of bodies in this system, are using the barycentric *International Celestial Reference System* (ICRS). It follows that the revolutions about that center describe perfectly circular orbits (see Newton's Principia, Book I, proposition 10: gravitational force as the radius), because in this case the force points to the geometric center of the revolutions: the "common center of gravity" of all revolving bodies (including the Sun) – that is, the barycenter.

8.1. The mathematical theory of the motions of bodies in a many-body system, mutually acted on by centripetal forces, begins with the problem of two bodies, which are mutually "attracted" to each other. This "two-body problem" is generally solved in theoretical mechanics by reducing it to the motion of a single body in a central field, that is, about a center at rest, thus destroying the mutuality of action (contra Newton's Third Law). The paths of the bodies then are derived by presupposing at will that in the central field there acts on the body a gravitational force which is always inversely proportional to the square of the distance to the center of the body's respective orbital position. As has been shown above, this presupposition chooses from the various possibilities of central force (Newton, Principia Book I, Corollaries to Prop. 4) just one, the inverse-square law, to mathematically describe the field. As a consequence of this free mathematical choice from several options, and of the wilful "reduction" of the problem, there appears a central field extended about a central attracting body, the attractive force of the field always diminishing with increasing distance from the center according to the inverse-square law. This result is generally introduced as "Newton's gravitational law": The force f is as the square of the distance r between the attracting body M and the attracted body m: $f = k \times mM/r^2$.

8.2. But Newton's solution of the problem is different. He presents it in Principia, Book I, Section XI "The motion of bodies drawn to one another by centripetal forces". In an introduction to the propositions Newton emphasizes that due to the Third Law of motion (actio = reactio) and the rules of motion in a many-body system (Corol. 4 to the laws) in reality bodies are never attracted to an immovable central body, and the attractive forces of two bodies attracting each other do not point to the center of the respective other body, but to the nonmaterial "common center of gravity" about which

the bodies both revolve. This principle of mutual equalization has been known for thousands of years from the beam balance. Even though this example is not one of rotations, it shows that the center of two balanced weights can never coincide with the center of one of these weights (Galileo shows it in an Appendix to his 1638 "Discorsi", entitled "On the center of gravity of several bodies"). Says Newton with respect to the revolutions of bodies of the Solar System:

"Since the Sun itself moves, an immobile point will have to be chosen for that center" (Principia Book III Corollary to Prop. 12).

Accordingly this common center of gravity of the system is also the common center of the revolutions of the bodies. These revolutions then happen in circles. They happen about the said common center being the end point of the bodies' respective distances from it, and with these distances as radii they revolve in one circle about it, if the masses and therefore also the radii are equal (and opposite), or in several concentric circles if the radii differ inversely as the masses differ (cf. Principia Book I Prop. 57).

8.3. After all, Newton's law of gravitation in the Solar System teaches that the mutual attraction of bodies is directed to their common center of gravity, and that the bodies (masses) are to each other inversely as their respective distances from that center. This is Newton's true law of mutual attraction. As to the forms of the closed orbits, it is clear that they must be exact circles if the centripetal force is directed to the center of the orbit (eccentricity Zero), that is, to the common center of gravity. Therefore, if an orbit appears as an ellipse about some focal point, this demonstrates that actually the centripetal force is directed from the revolving body not to that point but to a center apart from it at a certain distance (the "eccentricity").

The enigmatic "Precession of the Perihelion of Mercury".

The fact that the true center of revolutions in the Solar System (the true reference system at rest) is not the Sun but the common center of gravity of the System (the barycenter) raises some serious questions concerning the famous calculations of the precession of Mercury's perihelion, from Leverrier (1855) to Einstein (1915). First,

one must note that the precession in question is a phenomenon observed and measured by astronomers *with relation to the Sun as reference system*, based on the hypothesis of the center of the Sun to be at rest. However, it may well be that this phenomenon only mirrors the true motion of the reference system "Sun" about the barycenter, just like on earth the apparent daily motion of the Sun from morning to evening only mirrors the true motion of the earth. Second, it is evident that precise calculations of the very minute precession must yield different results depending on whether one considers the center of the Sun at rest or in motion about the barycenter (cf. Newton, Principia, Book III, Prop. 13). Einstein in his famous paper of 1915 calculates the precession on the basis of the Sun's center serving as reference system at rest ("Es befinde sich im Anfangspunkt des Koordinatensystems ein Massenpunkt (die Sonne)". So it must be called in question that this calculation, even though it is today generally accepted as proof of Einstein's general relativity, has any probative value at all. By the way, he who wants to comprehend Einstein's calculation in detail will certainly fail, last not least because Einstein eventually refers to comparative figures which he was told by some certain Mr. Freundlich – numerical precession values of Mercury, Venus, Earth and Mars - the origin of which remaining unknown.

For all this see Newton, Principia, Book III, Prop. 13 (perihelion precessions), and generally Book I, Section XI, the introduction, and Prop. 57, 58, with Corollary 1 (centripetal forces pointing to the center of the orbit: This is the case of Prop. 10; eccentricity e = zero, therefore "circular orbit"); Corollary 2 (centripetal forces pointing to an eccentric "focal point": This is the case of Prop. 11; eccentricity e ≠ zero, that is, 0 < e < 1, therefore "elliptic orbit").

II On Modern Cosmology.

9. It should be noted here that the prevailing theories of current celestial mechanics, the "classical", misleadingly called "Newtonian", and the "modern", that is, Einstein's general relativity, both believe in attraction exerted by a central body, spread in space about that body (the gravitational field). But this mathematical concept contradicts Newton's First Law on the passivity of matter, and his Third Law, as has been shown above. It is impossible in nature, that is, it is unrealistic (absurd) and therefore unacceptable in natural science. According to Newton's laws and to natural experience

there cannot exist something material at rest in the center of revolution of bodies. This is true with the two-body system and with a many-body system as well (cf. Newton's Corol. 4 to the laws). As in many-body systems all the bodies revolve about a common center, they do not collide. As another consequence,

there are no "Black Holes"

 in the centers of galaxies, which centers are necessarily *empty* "holes", as empty as the eye of a hurricane, and as empty as the central region of the drain funnel water forms when draining off through the plughole of a bath-tube.

10. In the Solar System the speed profile of the planets is shaped according to the inverse-square law: The angular speed of revolving bodies decreases with increasing distance from the center (radius of revolution). Cf. Newton Principia Book I prop. 4 Corol. 6.

As has been shown above, this law must not hold everywhere in the universe. And, it does not. Actually, observations of revolving stars in some galaxies reveal speed profiles indicating that the angular speeds of the stars *do not decrease* with increasing radii. So scientists are seeking to explain this apparent "anomaly". Some want to explain it by assuming the existence of invisible attracting matter which should be taken into account when calculating the revolutions of the stars. This invisible matter is called "dark matter". Others want to solve the problem by modifying Newton's gravitational theory of revolutions in the Solar System, adapting it to the different revolutions observed in galaxies (the so-called "modified Newtonian Dynamics", MOND).

There is no "Dark Matter".

The "dark-matter" hypothesis, however, is evidently conceived "ad hoc", meant to explain observed revolutions of stars in galaxies which do not obey the inverse-square law. But this method ignores that the inverse-square law must not work everywhere in the universe, as has been shown above. In Newton's Principia, Book I prop. 4, one finds a number of different laws (different relationships between radii, velocities, and centripetal forces), which can successfully be applied to different phenomena. There-

fore, science has to abandon the unfounded and un-Newtonian ad-hoc hypothesis of only one universally valid "gravitational law".

There is no "Expansion of the Universe".

11. On the basis of Newton's principles the universe does not expand, because it cannot. Since Newton's universe is infinite, it is "always and everywhere", so to say. As a consequence, there is no place whereto it could "expand" in time. Newton says it with his own words, in the Principia, the Scholium following definition 8.

But what about Hubble's observations?

Hubble observed redshifts of the spectra of light emitted from distant objects. Even though astrophysicists explicitly assert that Hubble had "made the landmark observation that distant galaxies are moving rapidly away from us. In other words, the universe is expanding" (Stephen Hawking, A Brief History of Time, 1988), it is not true that this has ever been *observed.* The truth is that scientists about ninety years ago pondered whether or not one could *interpret the observed redshifts* as "recession velocities", applying the Doppler principle. Hubble doubted this, but Einstein took it for granted, and from then on he taught the world the "expanding-universe hypothesis" – as an allegedly "observed fact". And so do his followers, intentionally making the uninitiated believe in the reality and truth of the "expansion" of the universe.

What is to be said against Einstein's interpretation?

As Max Tegmark has explained it recently, Hubble's "law" is nothing other than what can be observed when a car is fleeing after a bank robbery at a distance of, let's say, 2000 meters from the bank, at a speed of, let's say, 100 km/h. From these known data the observer at the bank can calculate, by applying the "rule of three", the time elapsed since the car started: A car with the speed of 100 km/h = 100 000 meters per hour will cover the distance of 2000 meters in 36 seconds. The robbers' car then started at the bank 36 seconds ago, or "back from now" ("now" is the time of observation). That is all. There is no "law", since there is no constant involved. Note that the often-quoted "Hubble constant" is no constant at all according to experimental

evidence, which is well-known among the experts; rather it measures *the variable time* elapsed since the observed object started – provided the object has been moving at constant speed all the time. (See Max Tegmark, Our Mathematical Universe, 2014, chapter 3).

Now, since the time elapsed "back from now" during the motion of a body moving straight away "from us" can be calculated from its distance and its velocity, why not calculate the "age of the universe" from the distance and the velocity of a galaxy?

This to do would require to know that this galaxy started exactly when the universe began to exist, or, that the universe began to exist at the same time when the galaxy started, that is, by equating the travelling time of the galaxy with the age of the universe. But there evidently exists no justification for this equation. The only "time" that can be deduced from the velocity and distance of a receding object is the time elapsed since its start.

True Science knows nothing about the "Age of the Universe": "The Big Bang Never Happened".

12. The Big-Bang hypothesis is based on the assertion that the redshifts and distances of galaxies (redshifts interpreted as "recession velocities") would be proportional, so that the quotient "velocity over distance" would always yield the same constant quantity, the "Hubble Constant", thus giving us one and the same time "back from now" (the alleged "age of the universe") when all the galaxies started together with a "Big Bang". But this deduction is not valid. The truth is: The said times vary from galaxy to galaxy. This has already been proven with the well known "Hubble diagram" of 1929, if correctly read. If the "times" are interpreted as "times of the galaxies' motions from the start to the time of observation", we find that they all started in the past at *different* times. Therefore, contrary to the teaching of astrophysicists all over the world, Hubble's observation gives not the slightest hint at a "Big-Bang" overture announcing the "birth of the universe". Astrophysicists, when deriving this breathtaking scenario from Hubble's observations, are teaching their students Science Fiction; fake, or absurd nonsense. And, worse: they know it.

Ed Dellian, Berlin, 10 Feb 2018.