Ten Invariant, Constant and Common Principles of Motion in the Universe: From the Smallest Particles to the Largest Celestial Objects

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Motion constitutes one of the most fundamental subjects in the study of the universe. From subatomic particles and photons to electrons, moons, planets, stars and black holes, the examination of motion and the physical properties of bodies plays an important role in understanding the structure and behaviour of nature.

In this paper, 10 proposed principles concerning the properties of motion and certain physical quantities of bodies across varying scales are set out. The purpose is to offer a unified framework for the expression of these principles and to clarify concepts associated with motion, rotation, closed paths, speed, and related matters. These 10 principles are presented as a proposed framework [1, 2].

1. All Objects, from the Smallest to the Largest, Are in Motion

Motion in nature is observed across markedly different scales. Fundamental particles, within the framework of physical theories, exhibit dynamical behaviours; planets orbit stars, and stars, in turn, move within galaxies. From this perspective, the universe may be regarded as a collection of dynamic systems.

2. All Bodies Rotate about an Axis Passing through Their Own Centre

Axial rotation constitutes one of the recognised patterns of motion in nature. The Earth rotates about its own axis; many planets and stars possess angular momentum; and other celestial bodies exhibit more complex rotational behaviour.

In classical physics, the rotation of a body may be examined by means of its axis of rotation, angular velocity, angular momentum and mass distribution. At the scale of fundamental particles, likewise, the rotation of a classical body and the quantum property termed "spin" may be regarded as one and the same.

3. The Average Rotational Speed of Bodies Is Constant under Defined Conditions

Rotational speed constitutes one of the important quantities in the description of the rotational behaviour of bodies. Under conditions in which the net torque exerted on a body is negligible, its angular momentum may be conserved. In the examination of celestial bodies and microscopic systems, the physical conditions and the particular quantity under consideration require precise specification. The constancy of rotational speed may accordingly be examined as a shared and testable property.



4. The Motion of Objects Occurs along Closed Curved Paths

The path of motion constitutes one of the principal elements in the description of physical behaviour. In many systems, the path of motion may take the form of a closed curve. Planetary orbits constitute a familiar example of this phenomenon. In the two-body gravitational model, bound orbits may be described as elliptical in form. At smaller scales, likewise, subatomic particles possess curved and cyclical paths.

5. In Motion along a Closed Path, the Geometric Path Length Is Constant

A closed path is a curve whose terminal point coincides with its initial point. The geometric length of such a path possesses a defined value. The circumference of a circle of fixed radius, for example, is equal to $2\pi r$. Where a body moves along this path, the length of one complete revolution is dependent upon the radius of the circle. In elliptical orbits, likewise, the length of one complete revolution possesses a defined value, provided the ellipse itself remains constant.

6. The Average Speed of Motion along a Closed Path Is Constant

Average speed constitutes one of the fundamental quantities in kinematics, obtained by dividing the total distance travelled by the time required to traverse it. For one complete turn within an orbit of constant length, the average speed of the path may be calculated, provided the time for one turn is defined.

In uniform circular motion, the magnitude of speed remains constant; in motion along a general closed path, however, a body may move more rapidly in certain portions and more slowly in others. In this latter case, average speed is dependent upon the total distance and time of motion, and is not necessarily equal to the instantaneous speed at any given point.

7. Rest Mass Is a Defined and Constant Property

Rest mass constitutes one of the fundamental properties in the description of many particles. For particles such as the electron, rest mass is regarded, within particle physics, as a fixed and defined value. This property extends across bodies from the smallest to the largest.

8. All Particles Possess Helical Motion

Helical motion may arise from the combination of differing motions. A helical path constitutes one of the notable geometric patterns in physics. Such a path may arise where motion in a given direction is combined with rotational motion about an axis.

A charged particle within a uniform magnetic field, for example, may simultaneously undergo rotational motion about the field lines while advancing along them. The combination of these two components produces a helical path. Helical paths are observed in fluid systems, biological structures and astrophysical phenomena.

The relationship between the number of paths of motion and the number of helical paths is likewise proposed as a subject for examination. The general relation — that where the number of paths is "n", the number of helical paths is "n-1" — is proposed as a law in this regard [3].



9. Average Kinetic Energy Is Constant

Kinetic energy is the energy associated with the motion of a body or system. In classical mechanics, the translational kinetic energy of a body of mass (m) and speed (v) is obtained from the following relation:

$$E_K = \frac{1}{2}mv^2$$

This relation demonstrates that kinetic energy is dependent upon mass and the square of speed. Accordingly, where mass remains constant while speed varies, kinetic energy will likewise vary. Given, however, that average speed is itself constant, average energy may correspondingly be regarded as constant.

10. The Physical Parameters of Bodies Are Constant and Measurable within a Defined Framework

One of the fundamental aims of physics is the identification of laws and relations capable of describing natural phenomena under varying conditions. The laws of mechanics, electromagnetism, thermodynamics and quantum theory each apply within a defined domain of phenomena and, in many cases, their results prove consistent with, or related to, one another.

This shared framework permits researchers to measure properties such as mass, energy, momentum, speed, length and time, and to examine the mathematical relations among them. By means of these relations, the behaviour of many systems may be predicted, and theoretical results compared with experiment.

Conclusion

The 10 principles set out in this paper encompass a collection of subjects related to motion, rotation, closed paths, average speed, rest mass, helical motion, kinetic energy and the laws of physics. The juxtaposition of these subjects may provide a basis for the formulation of research questions concerning the similarities and differences in physical behaviour across varying scales.

References:

[1] Saleh, Gh. “10 Permanent, Constant and Common Principles of Motion Among the Smallest Particles (Photons, Electrons, etc.) and the Largest Objects (Moons, Planets, Stars, Black Holes, etc.) in the Universe.” Saleh Theory, 11 May. 2025, https://saleh-theory.com/article/10-permanent-constant-and-common-principles-of-motion-among-the-smallest-particles-photons-electrons-etc-and-the-largest-objects-moons-planets-stars-black-holes-etc-in-the-universe

[2] Saleh, Gh. “10 Identical Characteristics in the Motion of Objects, From the Smallest (Photons) to the Largest (Galaxies).” Saleh Theory, 12 Jul. 2025, https://saleh-theory.com/article/10-identical-characteristics-in-the-motion-of-objects-from-the-smallest-photons-to-the-largest-galaxies

[3] Saleh, Gh. “A New Explanation for the Repeating Nested Helical Path of Motion; from the Smallest Particles of Existence, Photons, to Moons, Planets, Stars, Galaxies, etc.!.” APS April Meeting Abstracts. Vol. 2024. 2024.