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Preinertia And Accelerated Motions

Antonio León Sánchez

Retired Professor. Independent researcher in the foundations of science.

Abstract.-The universality of the non-rectilinear trajectories followed by virtually all celestial bodies and the irrelevance (or even nonexistence) of uniform motions in the observable universe serves as the starting point for a new redefinition of preinertia, which also demonstrates the absolute nature of all motions of all celestial bodies through the same real and absolute physical space.

Keywords: uniform motion, accelerated motion, real physical space, absolute motion, preinertia.

1. On the actual motions of real celestial bodies

Since I first addressed the concept of preinertia in 2022[1] [5], I have always done so by referring to the inheritability of uniform motion (rectilinear and at a constant speed). I dealt with that unquestionable universal property of all physical objects, discovered and published by Galileo in the year 1632, due to its consequences on the nature of motion: it makes absolute motion undetectable and opens a new formal pathway to demonstrate the absolute nature of the motion of all physical objects (including subatomic particles and photons) THROUGH THE SAME PHYSICAL SPACE [5]. A double reason why preinertia is a universal mechanical property of extraordinary importance. Although, despite my efforts, it remains ignored by contemporary physics, and I fear it will remain so for many more years, given my scientific irrelevance against the hegemonic relativistic current (special relativity).

On the other hand, I hope the reader agrees that practically all natural motions of all celestial bodies in the observable universe are motions with non-rectilinear trajectories. The vast majority of them, if not all, are motions composed of several rotations around internal axes and external centers (foci) of rotation, as occurs, for example, with planets orbiting stars. Rectilinear motion is practically non-existent in real cosmic objects and, at least for the moment and due to preinertia, in objects artificially set in motion from those real cosmic objects, such as the Earth. Under these conditions, it is necessary to rethink some of the fundamental laws of mechanics; I will do so in a forthcoming article. In this one, I rethink the definition of preinertia from the standpoint of non-uniform motions—those that follow non-rectilinear trajectories, the only ones worth considering in the natural objects of our observable universe (and that of all objects set in motion from them).

It is highly remarkable that practically all contemporary general physics textbooks continue to state Newton's first law as one of the fundamental laws of mechanics, when in fact the uniform motions featured in that law—non-accelerated motions with rectilinear trajectories—are, as just indicated, highly improbable (if not non-existent) in the observable universe we inhabit, which is our sole source of empirical knowledge about the nature of motion. This effectively demonstrates that the development of mechanics has been carried out completely with its back turned to preinertia, a universal property of all physical objects

[1] In reality it was in 2013, but I do not retain the corresponding publication to be able to provide its bibliographic reference.

that is anything but irrelevant, and which contemporary physics continues to ignore 394 years after Galileo. I cannot resist re-including his words in this section [2, p. 228]:

> Sagredo. If it is true that the impetus with which the ship moves *remains imprinted on the stone after it has separated from the mast*, and if it is also true that this motion does not hinder or slow down the straight downward motion natural to the stone, *it is bound to follow a marvelous effect in Nature*.

This *marvelous effect in Nature* is, in fact, preinertia.

As has just been recalled, accelerated motion, especially that due to centripetal acceleration, is practically universal in almost all objects in the observable universe, from subatomic particles to planets, stars, planetary systems, galaxies, etc. This brief article is limited to taking into account that universal reality of natural motions to redefine preinertia and reaffirm its reality and universality from a new perspective: that of non-uniform motions, probably the only real motions of all natural physical objects. The article concludes with a brief reflection on the absolute nature of the motion of all physical objects through the same absolute and real physical space, a reality that stems directly from space's ability to vibrate (gravitational waves), transmit its vibrations, and interact with the physical instruments that detect them (interferometers).

2. Preinertia and accelerated motions

Although they remain almost ignored, I have written several articles on preinertia (for instance [6, 7, 8, 9, 10, 11, 12, 1, 13, 4, 3, 15, 14]), including preinertia and rotational motions [15]. Here a further step is taken, a fundamental step in which it is considered that in the observable universe practically all motions follow non-rectilinear trajectories, most of them rotations around internal axes of rotation and external centers (foci) of rotation—for instance, all (6) motions in the case of the Earth. One might then wonder what use there is for a law that, like Newton's First Law of Mechanics, only refers to motions that are practically non-existent in the observable universe. And practically impossible in artificial motions unless all the real motions of the real object from which those objects are artificially set in motion are known.

We may wonder about the usefulness of a law regarding motions that practically do not exist in the observable universe. And at the same time, we may also wonder how it is possible that a property so fundamental as the preinertia of all physical objects is absent from contemporary physics. As was just recalled in the precedent section, almost all (or all?) objects in the universe are subjected to different types of rotations, about internal axes and external centers (foci) of rotation, so that their real motions include the combination of all those rotations. Consequently, rectilinear trajectories are practically non-existent in the observable universe. And that real, non-uniform motion is what is inherited (preinertia) by any object set in motion from any natural object, such as our planet or the Moon—the only natural objects from which we have set, and continue to set, other objects in motion.

If it were not so, if an object set in motion from another object, for example the Earth, did not inherit all the motions of the Earth, it would never move with the initial supplied velocity; it would always do so with the vector sum of the supplied motion and the opposite of the non-inherited one. Which, apart from violating the Principle of Conservation of Energy, has never been observed in any of the trillions of times that an object is set in motion from the Earth, as would be the case of the trillions of times an object falls naturally or

artificially onto the Earth's surface itself: it always does so below the point from which it began its fall. That inheritance is preinertia, a universal property of all known physical objects, without which the aforementioned Principles of Conservation of Mechanical Energy would be impossible. We can, therefore, redefine preinertia in the following terms:

Definition 1 (of Preinertia) *The capacity of a physical object to inherit the absolute velocity vector of the physical body from which it is set in motion.*

It remains to establish its universal reality; thus far we have done so by slightly modifying the Principle of Inertia:

Principle 1 (of Inertia) *Every physical object is preinertial and remains at rest or moves with uniform motion if no external force acts upon it.*

But for the reason already pointed out (the irrelevance of uniform motions), that existence will be established in a forthcoming article that proposes certain modifications to the laws of mechanics, the first of which will also include preinertia.

On the other hand, there does not appear to be a universal mechanism common to all physical objects—from galaxy superclusters to atoms—that transmits each of their particular velocities to the objects that can be set in motion from them, six in the case of our planet. Therefore, it seems reasonable to assume that only a unique velocity is inherited: the absolute velocity, through the real and absolute physical space, of the object from which any other object capable of being set in motion is set in motion. Therefore, preinertia can be considered empirical proof of the absolute nature of the motion of all physical objects in the observable universe.

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