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# Proofs of Absolute Motion 3/3 (Links to part 1/3, 2/3)

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**Abstract**.-After the introduction of the Galilean concept of preinertia, a preinertial argument is developed here, the conclusion of which is the absolute nature of motion.

**Keywords**: Galileo Galilei, preinertia, inertia, relative motion, absolute motion.

## 1 Preinertia

In his famous thought experiment of the stone dropped from the top of a ship's mast in uniform motion [1, p. 216], Galileo argues that the stone falls parallel to the mast to the base of the mast, which was against the prevailing Aristotelian view. Galileo was right. And now we can explain why: before being released, the stone, and any other object on the ship, moves with respect to the dock with the same uniform velocity $\vec{v}$ of the ship; once released, the stone is no longer mechanically attached to the ship, but when released it inherits the velocity $\vec{v}$ of the ship (we will call this inheritance PREINERTIA), and maintains it while falling (inertia) because no other force acts on it than the gravity that makes it fall. Thus, as it moves downward it will continue to move in the horizontal direction with the same velocity $\vec{v}$ as the ship, the ship's mast, and anything in the ship. For this reason the observers on the dock note that the stone follows an inclined trajectory while the crew notes that the stone follows a vertical trajectory.

But no matter how fast the ship moves, all observers, inside and outside the ship, will observe the same detail: the stone always falls parallel to the ship's mast, a mast that is fixed for the observers on the ship, and mobile for the observers on the dock. And for the stone to always be observed to fall parallel to the mast, regardless of the ship's velocity, it is necessary that:

1. When opening the hand and dropping the stone from the upper end of the mast, the stone must inherit the velocity vector $\vec{v}$ of the ship with respect to the dock (preinertia).
2. While falling, the stone maintains the velocity vector $\vec{v}$ of the ship with respect to the dock (inertia).

Regarding the first point Galileo wrote (the text in straight brackets is mine) [1, p. 228]:

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

That wonderful effect is preinertia: the ship imprints its movement on the stone. A concept that, unfortunately, will not be considered again by any other author until the year 2022 [2]. Although absent from physics, preinertia is a very simple concept, very easy to define, and as we shall see, anything but irrelevant. It can be proved that even supposedly massless particles are preinertial and inertial [2]. Preinertia can be defined as follows:

**Preinertia**: property of all physical objects by virtue of which they inherit, as part of their own velocity vector, the relative velocity vector, with respect to any other reference frame, of the reference frame from which they are set in motion.

On the other hand, preinertia have an enormous empirical evidence for all material objects: every time that on the Earth, whose translational motion is 30 km/s (108000 km/h), a material object falls to the ground at the vertical of the point where the fall started, the reality of preinertia is being proved: the falling object inherits the motion of the Earth and maintains it during the fall. This empirical evidence and its importance in the fundamentals of physics suggest its inclusion in the First Law of Mechanics:

**Principle of Inertia**: Every physical object *is preinertial* and maintains its state of rest or uniform motion as long as it is free of external forces.

Actually, a good part of the arguments developed in classical and relativistic mechanics make an implicit (it would be more accurate to say unconscious) use of preinertia. A very important consequence of preinertia is that if absolute motion existed, it would be impossible to detect it (but the fact that it cannot be detected does not mean that it does not exist). This was also advanced by Galileo, in this case referring to a stone dropped from the top of the tower of Pisa (the text in straight brackets is mine) [1, p.

250]:

> But that part of all this motion which is common to the stone, the tower and us [the motion of the Earth] is imperceptible to us, and as if it did not exist, and only that part [of the motion] of which neither the tower nor we are partakers is observable, which in short is that with which the stone, in falling, traverses the height of the tower.

Or in somewhat more modern terms: due to preinertia, it is impossible to detect within a train the velocity of the train dropping an object to the ground: the object will always fall in the same place (just below where it was dropped) regardless of the velocity of the train, including a null velocity.

## 2 Preinertia and absolute motion

Before starting, let us not forget that although the modulus of the relative velocity vector of a photon with respect to any reference frame is always the same (299783.458 Km/s), this vector can undergo changes in its direction and sense due to different mechanical (reflection, refraction) and electromagnetic interactions. Therefore, its relative velocity vector is not constant. For each of the rest of the physical objects we will say that its relative velocity vector with respect to a reference frame has changed, if one or more of the three components of this vector have changed: module, direction or sense. In the discussion that follows only uniform motion will be considered.

In this section only uniform motions are considered, i.e. motions with constant velocity in a straight line. If absolute motion is non-existent, as claimed by contemporary physics, i.e., if all motions are relative, then:

1. Each physical object, including photons, maintains billions of different relative velocity vectors, one with respect to each of the rest of the billions of cosmic objects.
2. Many of these objects are separated by distances on the order of billions of light years, and not all are quantum entangled.
3. The continuous physical interactions of the different objects with each other and with the different force fields, produce in the objects that undergo such interactions changes in their relative velocity vectors with respect to the rest of the billions of cosmic objects.
4. Consequently, there are causal changes of relative velocities in the objects, let us call them $A$, that undergo the physical interactions, and acausal changes of relative velocities in the rest of the objects, let us call them $B$, that move relatively to objects $A$, but have not undergone the interactions that objects $A$ have undergone. This is a symmetry breaking with respect to the Principle of Relativity.
5. Since most cosmic objects are separated from each other by distances of millions of light-years and are not quantum entangled, the objects $A$ that undergo causal changes in their relative velocities undergo them at the times when they undergo such interactions. But one would have to explain if the objects $B$, which move relatively to the objects $A$ and do not undergo those interactions, update or do not update their acausal changes in their relative velocities.
6. If not updated, most of the relative motions of cosmic objects would be asymmetric: the relative velocity vectors of $A$ objects with respect to $B$ objects would be different from the relative velocity vectors of $B$ objects with respect to $A$ objects. The Lorentz Transformation could not be applied between $A$ and $B$ objects. The special theory of relativity would be almost empty of content.
7. If they are updated, one would have to explain when and how that update occurs. Is it an instantaneous process? Is it a cognitive process, not a physical process? Is it a physical process, not instantaneous? If it is a physical process how is the information of relative velocity changes from $A$ objects to $B$ objects transmitted? etc.

But the main argument on the absolute nature of uniform motion is the following:

8. When from an object $X$ another object $Y$ is set in motion, the object $Y$ inherits the motion of the object $X$, but if all motions are relative, which of the billions of relative motions of $X$ does $Y$ inherit? or does it inherit all of them? If it inherits only one of them, there would have to be a mechanism that decides (even randomly) which one to inherit, which does not exist in any known object. If object $Y$ inherits all the relative motions of object $X$, all cosmic objects $X$ would have to have a vector information system (VIS) with the information of each of their relative velocity vectors with respect to each of of the other cosmic objects; a mechanism for duplicating the VIS; and a mechanism for transmitting the duplicated VIS to object $Y$. None of these exist in any known objects. Nor would any of them be necessary if all motions were absolute: $Y$ inherits the only absolute motion from $X$. Consequently, the universality of preinertia implies that all motion must indeed be absolute, although preinertia itself also implies that these absolute motions cannot be experimentally observed or detected (at

least for the time being).

Naturally, it is unthinkable that all physical objects, including electrons, protons, etc. contain a VIS and are capable of all the computational feats just indicated. Not only is it unthinkable, I would say it is impossible; it goes against everything we know about the physical world. And yet all of this would be necessary if only symmetric relative motions existed and special relativity were a meaningful theory for describing the uniform motion of physical objects in the observable universe.

And none of this would be necessary if all uniform motions were, like rotations, absolute motions through the same real and absolute physical space. But it so happens that such absolute motion is undetectable because of preinertia. We can only observe, even with the most sophisticated experiments, the relative motions of different physical objects. Relative motions that are the immediate consequence of the different absolute motions of different physical objects through the same physical space.

According to the above argument, and to the arguments of the previous papers in this series, we should assume the following conclusions about absolute motion:

**Conclusion 1** *In the observable universe all motions are absolute and through the same real and absolute physical space.*

**Conclusion 2** *In the observable universe, the only motions that can be observed are the relative motions resulting from the different absolute motions of physical objects through the same real and absolute physical space.*

Which allows us to change the definition of preinertia:

**Definition 1** *Preinertia is the universal property of all physical objects by virtue of which they inherit as part of their own absolute velocity vector the absolute velocity vector of the reference frame in which they are set in motion.*

## Bibliographical References

[1] G. Galilei. *Diálogo sobre los dos máximos sistemas del mundo ptolemaico y copernicano.* Círculo de Lectores, Barcelona, 1997.

[2] Antonio León. *Apparent relativity.* Self edition in KDP. Printed at Amazon.com. Free pdf, 2022.