

PHYSICISTS CALCULATE BUT DO NOT EXPLAIN 7/7

THE SHAMES OF PHYSICS.

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Abstract.-After justifying the use of the word *shame* in a scientific article, this article considers two of those great shames of contemporary physics, and explains why, indeed, they should be considered real shames in the state of contemporary physics: the problem of change and preinertia. I venture to include a third shame: the null effect that public denunciation of the other two that this article points out will have.

Keywords: evolution of the universe, physical changes, preinertia, relative motion, absolute motion.

1. Justification for the subtitle of this article

Spanish is my mother tongue. It is therefore the language in which I think. I know that to many English speakers Spanish seems too direct a language, not given to more or less diplomatic detours. A language, as we say here, that prefers to call a spade a spade ("*al pan pan y al vino vino*"). In this sense, the English word that best represents the Spanish word VERGÜENZA is shame. It is used here, then, with the meaning of the feeling that arises when something bad or dishonest is done. Obviously, the shame should be for all of us who in one way or another have dedicated ourselves to doing physics or reflecting on it (as is my case).

2. First shame: The problem of change

The problem of change was raised more than 2500 years ago by Parmenides and popularized by the paradoxes of his disciple Zeno: change is impossible. Despite the fact that everything we observe in the physical world is in continuous change, for example changing position, or changing state. Later authors came to similar conclusions: change is impossible, or it is inconsistent [?] [4, p. 382]. It must, therefore, be a very acute problem, very difficult to solve [8, 9, 1, 2].

But it is also very revealing of the way in which we humans tend to face certain philosophical and scientific problems: we prefer to deny, or distort, the observed facts rather than question the philosophical and scientific foundations that lead to their denial; or we forget the problems that question those foundations, as is the case with the problem of change and physics. Because physics is, above all, the science of change, i.e. the science that studies the evolution of a universe in continuous change.

I have the impression that most modern scientists, including above all physicists, are unaware of the problem of change and its relevance in explaining the physical universe, which as just indicated is a continuously evolving (changing) object. In fact, physics could even be defined as the science of change, the science of the regular succession of events in Maxwell's words [7, p. 1]. It should therefore be the science most interested in solving the problem of change.

Among the philosophical and scientific foundations from which the impossibility of change is deduced is, as in Zeno's time (though with another name), the spacetime continuum: it can be shown that, in effect, change is inconsistent in the spacetime continuum. Basically because no point (instant) of that continuum has a following point (instant): the points (instants) do not touch each other; between any two of them there always exists the same infinite number of different points (instants): exactly 2^{\aleph_0} . That is why motion (and any other change) will always be discontinuous, although never in the history of science has it been considered in this way.

But it is also possible to examine the problem of change from a discrete perspective, replacing the scenario of the spacetime continuum by that of a discrete space and time. A scenario with contiguous units of identical non-zero extent of both space and time. A discrete scenario similar to that of cellular automata, in which it is possible to solve the problem of change [5].

But physicists insists on explaining the physical world on infinitist foundations that include the spacetime continuum as a key element.

Thus, as in the time of Parmenides and Zeno, contemporary physics is still unable to explain how a simple change of position of any moving object occurs. Or a change in the state of any physical system. But the most shameful thing is that physics has forgotten about the problem of change. As if the problem did not exist. But it does exist, and no explanation of the physical world will be satisfactory until the problem of change has been solved. It is this oblivion, which has lasted several centuries, that deserves to be considered a shame for physics. And it seems that it will remain so for a long time to come: I do not know of a single book in general physics that reminds its readers of the problem of change.

3. Second shame: Preinertia

Preinertia is a universal property of all physical objects, including subatomic particles and photons, by virtue of which they inherit the velocity vector of the reference frame (another physical object) where they were at rest and from which they are set in motion. The definition is not complete because it is not indicated whether the inherited velocity is relative or absolute, at the end of the section it will be indicated which is the case and why.

Although unknown to contemporary physics, it was discovered by Galileo and made public in one of his most emblematic works: Dialogue on the two great systems of the world: Ptolemaic and Copernican, published in 1632. The stone and the mast in the quotation refer to the mast of a ship in motion with respect to the dock:

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*[3, p. 228].

This *marvelous effect in Nature* is, in fact, preinertia. I do not know if there are precedents, but what I can say is that no one in the later history of physics has echoed this marvelous effect. So much so, that every time I talk about it I have to define it, as I have just done and will do again at the end of this section.

The empirical evidence for preinertia is overwhelming: every time that here on Earth an object falls just below the place from where it has been dropped, and not 300 m away (considering only the Earth's translational motion around the Sun) preinertia is being confirmed. Without preinertia, it would be impossible any act involving a mechanical take-off from the Earth, however brief, such as jumping, running, sweeping, watering, practicing any sport that requires throwing objects, etc. etc. etc. And yet contemporary physics has not yet rediscovered it.

It could be argued that modern physics has not echoed Galilean preinertia because it considers it irrelevant from any physical point of view. Nothing could be further from the truth: preinertia is the reason why it is impossible to detect absolute motion. And at the same time it is the reason that allows us to demonstrate in formal terms that all physical motions must be absolute. Without going into the details that can be examined in [6, p. 421-426], consider the following two arguments:

- 1.- With respect to the impossibility of detecting absolute motion: consider the possible detection of the absolute motion of an object A , for example the Earth, by setting in motion from A other physical objects B, C, D etc. In doing so, and due to preinertia, they all inherit the motion of A to be detected, therefore they will move during all the time in the same way as A moves with the motion to be detected, so that from A only the relative motion of objects B, C, D etc with respect to A can be detected, exactly the same as if there were no absolute motion to be detected.
- 2.- With respect to the absolute nature of motion: consider any one of these objects, for example the object A of the previous paragraph, and suppose that another object B , which is at rest in A , is set in motion from A . If all motions are relative, A maintains literally trillions of such relative motions, one for each of the trillions of cosmic objects with respect to which it moves. And if B is to inherit the relative motion of A (preinertia) which

of those trillions of relative motions will it inherit, and why not another? What memory and what mechanism determines that inheritance? From everything we know about the physical world, neither that memory nor that mechanism exists. Therefore, if there is neither memory nor mechanism for that inheritance of relative motion, the only motion that B can inherit from A is the absolute motion of A , which was also the absolute motion of B when B was part of A , before it was set in motion from A . It must be concluded that the preinertia, whose physical reality is unquestionable, demonstrates the absolute nature of motion.

It can then be stated that physics has not yet discovered, in the year 2025, one of the most important mechanical properties of all physical objects, already announced in 1632 by Galileo, which is indeed a shame for contemporary physics. To conclude this paper I will give a definition of preinertia and a new statement of the Principle of Inertia:

Preinertia: is the property of all physical objects by virtue of which they inherit the absolute velocity vector of the reference frame from which they are set in motion.

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.

Bibliographical References

- [1] Henri Bergson. *Creative Evolution*. Dover Publications Inc., New York, 1998.
- [2] Henri Bergson. The Cinematographic View of Becoming. In Wesley C. Salmon, editor, *Zeno's Paradoxes*, pages 59 – 66. Hackett Publishing Company, Inc, Indianapolis/Cambridge, 2001.
- [3] G. Galilei. *Diálogo sobre los dos máximos sistemas del mundo ptolemaico y copernicano*. Círculo de Lectores, Barcelona, 1997.
- [4] Georg W.F. Hegel. *The Science of Logic*. Cambridge University Press, Cambridge, UK, 2010.
- [5] A. León Sánchez. Physics and the problem of change. *Preprint version*, 2020. [PDF](#).
- [6] A. León Sánchez. *Apparent relativity*. Amazon's Kindle Direct Publishing, 2022. [PDF](#).
- [7] James Clerk Maxwell. *Matter and Motion*. The Macmillan Co., New York, 1920.
- [8] Chris Mortensen. Change. In E. N. Zalta, editor, *Stanford Encyclopaedia of Philosophy*. Stanford University, URL = <http://plato.stanford.edu>, 2020.
- [9] Steven Savitt. Being and Becoming in Modern Physics. In Edward N. Zalta, editor, *The Stanford Encyclopedia of Philosophy*. The Stanford Encyclopedia of Philosophy, 2008.