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# The Four-Body Problem

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**Abstract**.-This short paper poses in vector terms a kinematic problem whose only solution is the consideration of relative motions as the apparent motions resulting from the different absolute motions of celestial bodies through the same real and absolute physical space. Absolute motions which, on the other hand, are unobservable due to preinertia. The problem and its solution should have immediate consequences on special relativity, but it surely will not; which is more significant than the problem itself and its corresponding solution.

**Keywords**: Relative motion, absolute motion, special relativity.

## 1. Introduction

Unlike the famous three-body problem, the four-body problem posed here does have a very simple solution, although that solution is very radical from the point of view of the official relativism of contemporary physics. It is also very illustrative of the human way of doing science, particularly of the almost total absence of criticism on its foundations and on the dominant currents of scientific thought.

Almost all known cosmic bodies perform motions of rotation around unique elements of rotation: internal axes of rotation and centers (or foci) of rotation external to the objects themselves. Internal or external, they are all unique and absolute geometrical elements of rotation. Indeed, for any particular rotation we consider, for example the daily rotation of our planet around its internal axis of daily rotation, that axis of that daily rotation is unique and therefore absolute: any point $P$ of the Earth performs a single daily revolution around the same and unique center of daily rotation (a point of the unique and absolute Earth's axis of internal daily rotation): in its daily rotation, it is impossible for $P$ to rotate at the same time around two different centers of daily rotation (it would have to be in two different places at the same time). Therefore, the daily rotation of the Earth is an absolute motion in the real physical space[1].

This brief introductory reflection can only lead to the conclusion that practically all known cosmic bodies move (rotate) in absolute, not relative, terms. Relativism that modern physics defends since the times of E. Mach, for whom celestial bodies rotate WITH RESPECT TO the cosmic background of fixed stars [3], not AROUND geometrical and absolute elements of rotation as I propose here.

## 2. Approach and solution of the four-body problem

But this article is not about rotations but about uniform motions (rectilinear motions at constant speed). For this purpose we will consider any four cosmic objects $A$, $B$, $C$ and $D$ in uniform relative motions during a certain time interval $\Delta t > 0$, where $\vec{v}_{ab}$, $\vec{v}_{ac}$, and $\vec{v}_{ad}$ are the respective relative velocity vectors during $\Delta t$ of one of them, the body $A$, with respect to the other three bodies $B$, $C$ and $D$ (the argument applied to the body $A$ can be applied to any of the other three). Those three relative velocity vectors of $A$ with respect to $B$, $C$ and $D$ during $\Delta t$, unequivocally determine the only velocity vector $\vec{v}_{abcd}$ of $A$ compatible with the relative velocities that $A$ maintains during the time interval $\Delta t$ with respect to the bodies $B$, $C$ and $D$. Indeed, and according to the basic principles of vector calculus, the velocity vector $\vec{v}_{abcd}$ is the only one simultaneously compatible with the relative velocity vectors $\vec{v}_{ab}$, $\vec{v}_{ac}$ $\vec{v}_{ad}$ of $A$ respectively with respect to $B$, $C$ and $D$ during $\Delta t$. And as a consequence the trajectory $Tr$ of $A$ is the only one compatible with its velocity vector $\vec{v}_{abcd}$ (Figure 1).

The unequivocal and exclusive uniqueness of the trajectory $Tr$ and the velocity vector $\vec{v}_{abcd}$ from which result the relative velocity vectors $\vec{v}_{ab}$, $\vec{v}_{ac}$, and $\vec{v}_{ad}$ of the body $A$ respectively with

[1] Fictions do not vibrate or transmit their own vibrations as physical space does (gravitational waves).

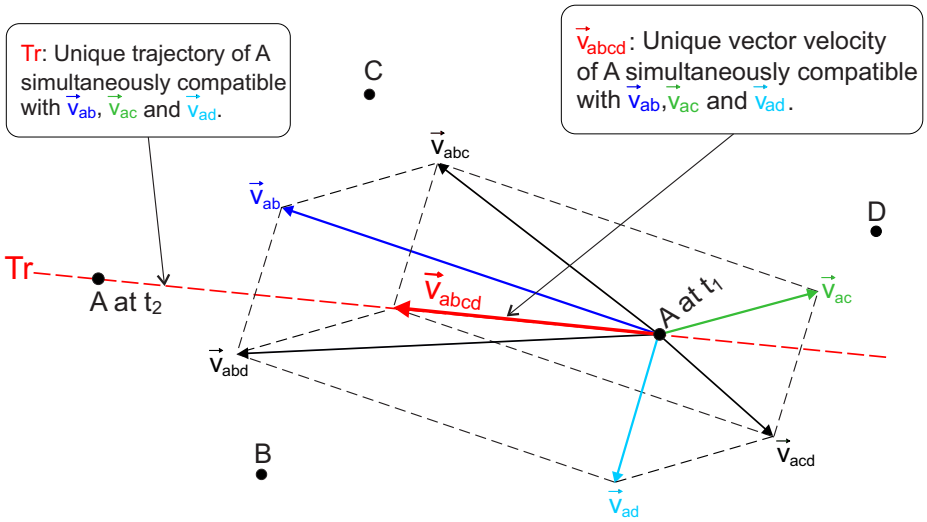


**Figure 1** – The four-body problem $A$, $B$, $C$ and $D$ (small black circles). If all motions were relative, the four-body problem inevitably leads to an unacceptable relativistic solution: any cosmic body, such as the body $A$ in the figure, could only have three different relative velocities with respect to the rest of the trillions of cosmic bodies. Or, alternatively, each celestial body could simultaneously be in trillions of different places at the same time.

respect to the bodies $B$, $C$ and $D$ during the time interval $\Delta t$, has as immediate consequence that the body $A$ would have to move with respect to any of the other trillion cosmic objects that during the time interval $\Delta t$ are animated by uniform motion, with one of the three relative velocity vectors $\vec{v}_{ab}$, $\vec{v}_{ac}$, or $\vec{v}_{ad}$, otherwise the body $A$ would have to follow different trajectories at the same time, which would imply being in different places in the same real physical space at the same time. Or in other words, and taking into account the symmetry of all relative motions, during $\Delta t$ all cosmic bodies in the universe would have to move with respect to $A$ with one of the three relative velocity vectors $\vec{v}_{ab}$, $\vec{v}_{ac}$, and $\vec{v}_{ad}$, and only with them. Which is obviously not the case.

It is then demonstrated that the relative motions of cosmic bodies (the only observable motions) can only be apparent, appearances that can only result from the different absolute motions of the different cosmic bodies through the same real and absolute physical space. Although, as just indicated, such absolute motions are undetectable, and they are undetectable due to preinertia [1, 2]: every body $Y$ set in motion from any other body $X$ inherits the absolute velocity vector of the body $X$ through the same real and absolute physical space.

For special relativity, the four-body problem implies admitting that, all motions of all celestial bodies being relative, for each particular celestial body $A$ only three of its relative motions can be considered at the same time. A restriction not established by that theory (nor by any other). Obviously, it is an arbitrary and very limiting restriction; an ad hoc restriction to solve the four-body problem. Moreover, each considered cosmic body $A$ would have to follow different trajectories in the real physical space, and therefore $A$ would have to be at the same time in different places in real physical space, depending on the considered group of three other cosmic objects in uniform relative motion with respect to body $A$.

Comment: The simplicity and relevance of the previous argument of the four bodies has made me reconsider it several times looking for some formal incorrectness. But I have not found it and that is why I am making it public. Although I am firmly convinced of the null consequences that its publication will have on the hegemonic and intransigent relativism of our days.

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