

The universe is the judge of the matter

The elimination of a universal (absolute) frame of reference leaves one with a circular definition of inertial frame (inertial system):

In a physical sense, to be in what is called an inertial system is to have an absence of experience (detection) of any force that could be construed as gravity-based or acceleration-based.

The origin of such force must come from a relationship with the totality of the environment outside of the system in question, thus implying there is such an environment and that if your motion changed in relation to it, you would experience force.

Any generation of force inside the system merely creates a new system within the system, with no change in the net motion of the system. i.e., the barycenter of your original system is unchanged relative to the totality of the external environment. And no meaning can be attached to a net movement of the totality of the external environment, which is the universe itself.

There is no way around this.

It won't do you any good to imagine that your little system is all alone in the universe and that there is therefore no external environment, for all you would accomplish is to define your little system as the universe itself, to which no meaning of net motion can be attached, and whereby any motion inside that little system must now be seen as different from its net external system, i.e., your original little system (the new universe).

Without an external environment, we can appeal only to kinematic measures of acceleration between two reference frames:

One might say "A is in uniform motion relative to B". It might then be noticed that B is accelerating relative to C while C is in uniform motion relative to D. Who is in an inertial frame, and who is not?

This relates to complexity, emergence, and the fallacy of "simple universe" twins paradox discussions. See my book.