

# Rest Mass is a Mathematical Delusion

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*Abstract: Rest mass as defined by a mathematical physicist is a delusion. Everything on Earth and in outer space is moving, meaning nothing is at rest and cannot possibly have rest mass. Their vague definition fails miserably to cover this basic understanding of nature. Explanation is provided.*

To the mathematical physics scientism rest mass is defined as from Wikipedia:

*The **invariant mass**, **rest mass**, **intrinsic mass**, **proper mass**, or (in the case of bound systems or objects observed in their center of momentum frame) simply **mass**, is a characteristic of the total energy and momentum of an object or a system of objects that is the same in all frames of reference related by Lorentz transformations. If a center of momentum frame exists for the system, then the invariant mass of a system is simply the total energy divided by the speed of light squared. In other reference frames, the energy of the system increases, but system momentum is subtracted from this, so that the invariant mass remains unchanged.*

*Systems whose four-momentum is a null vector (for example a single photon or many photons moving in exactly the same direction) have zero invariant mass, and are referred to as massless. A physical object or particle moving faster than the speed of light would have space-like four-momenta (such as the theoretical tachyon), and these do not appear to exist. Any time-like four-momentum possesses a reference frame where the momentum (3-dimensional) is zero, which is a center of momentum frame. In this case, invariant mass is positive and is referred to as the rest mass.*

*If objects within a system are in relative motion, then the invariant mass of the whole system will differ from the sum of the objects' rest masses. This also equals to the total energy of the system divided by  $c^2$ . See mass–energy equivalence for a discussion of definitions of mass. Since the mass of systems must be measured with a weight or mass scale in a center of momentum frame in which the entire system has zero momentum, such a scale always measures the system's invariant mass. For example, a scale would measure the kinetic energy of the molecules in a bottle of gas to be part of invariant mass of the bottle, and thus also its rest mass. The same is true for massless particles in such system, which add invariant mass and also rest mass to systems, according to their energy.*

*For an isolated massive system, the center of mass of the system moves in a straight line with a steady sub-luminal velocity (with a velocity depending on the reference frame used to view it). Thus, an observer can always be placed to move along with it. In this frame, which is the center of momentum frame, the total momentum is zero, and the system as a whole may be thought of as being "at rest" if it is a bound system (like a bottle of gas). In this frame, which always exists, the invariant mass of the system is equal to the total system energy (in the zero-momentum frame) divided by  $c^2$ . This total energy in the center of momentum frame, is the*

*minimum* energy which the system may be observed to have, when seen by various observers from various inertial frames.

*Note that for reasons above, such a rest frame does not exist for single photons, or rays of light moving in one direction. When two or more photons move in different directions, however, a center of mass frame (or "rest frame" if the system is bound) exists. Thus, the mass of a system of several photons moving in different directions is positive, which means that an invariant mass exists for this system even though it does not exist for each photon.*

As the reader can see, this wide and vague definition simply means they HAVE NO definition. This is because you cannot define an observation that is not observed. Trying to give definitions to observations that are not observed is a pillar to the mathematical physics religion. The reader should see their failure quite clearly if the reader chooses to think.

1. The Earth is moving. This means everything on Earth is NOT AT REST.
2. Everything in the galaxy is moving. This means everything in our galaxy is NOT AT REST.
3. Everything in the observable universe is moving. This means everything in the observable universe is NOT AT REST.

The concepts "rest mass, invariant mass, intrinsic mass, proper mass" are nothing but mathematical delusions. Everything is moving, meaning NOT AT REST. It does not get any simpler than that.