Qeios

Peer Review

Review of: "Why Is Gravitational Mass Equal to Inertial Mass?"

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I did enjoy reading this commentary by Dr. Ma, particularly the historical introduction and for bringing forward a well-known issue that is generally thought to be resolved by Einstein.

I do like his argument that the gravitational force between two bodies, estimated by measuring their relevant acceleration, involves just their inertial masses.

His statement, "When we define mass independently of force, we may find that Newton's second law is inconsistent with experimental findings," brought to mind the dynamics of stars in galaxies, where the gravitating mass of a galaxy is estimated from its light. There, the orbits of stars and gas, far from where the galactic mass is, deviate from their expected Newtonian trajectories. This led to the consideration of physical models (MOND) for which there is a non-linear relation between a, F, and m, in gross violation of the equivalence principle. I would like the author to refer to this issue in a revised version of his paper, since this is directly related to the issues he wants to raise with his article (of course, the issue is resolved by most of the community by invoking the presence of the yet undiscovered Dark Matter).

I would also like to point out to the author that light bending by the Sun (and other objects) provides a measure of its (their) gravitational mass. I would like to have the author include this in the paper, as it would add to the paper's completeness by noting this fact.

Finally, I would like to point out below two publications by Sultana and myself (and references therein) in which Newton's second law is obtained from the gravitational interaction of an accelerating body with the rest of the universe. If the author thinks this argument is relevant to his paper, he could add a sentence to this effect.

10.1142/S0218271811019384 The Problem of Inertia in Friedmann Universes

10.1007/s10509-015-2452-y Inertia in Friedmann Universes with variable G and Λ

In conclusion, with the modifications suggested above, the paper should be published.

Declarations

Potential competing interests: No potential competing interests to declare.