

Review of: "On Planck Areal Speed"

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Potential competing interests: No potential competing interests to declare.

Dear Alejandro Rivero, I very much appreciated reading your paper due to its innovative and profound approach. I have a few comments below.

1. The robustness of the Planck scale suggests that the foundations of quantum gravity will arise from a deep theoretical analysis of this scale, as direct experimental evidence for it does not exist at present.
2. In “a minimal scale of length determines a minimal distance, a minimal area or a minimal time interval,” I think a minimal scale of length determines all of these. This claim is supported by the dependence of space on time due to both special relativity and the uncertainty principle.
3. After equation (1.1), it should have been stated that M_P is the Planck mass.
4. In equation (1.2), I don’t see the necessity of including p and q ; using only k as a rational number suffices, unless I am missing something.
5. It is very profound that “the radius has no dependency on the test mass, and Newton’s constant cancels the Planck area.”
6. Astounding result: “When the areal speed is one-half of the Planck areal speed, the radius of the gravitational orbit around M is the reduced Compton wavelength of the particle M .”
7. Regarding “anyway this regime is outside of the expected range of areal velocities,” one must always bear in mind that the classical is composed of quantum entities.
8. The emergent definition of Newtonian gravity will certainly spark future work.
9. I would suggest making the sentence clearer: “At a distance equal to the Compton wavelength from the center of force, all forces would generate stable orbits with a much higher areal speed than gravity.”
10. I do believe that extra dimensions exist (with spin being an example, given its symmetries under rotation); however, in

my view, they would be neither space-like nor time-like.

11. The interplay between general relativity and the GUP is indeed an interesting result; however, I would suggest investigating the Wigner function for this purpose, as it incorporates an “extra dimension” perspective of the uncertainty principle.

I enjoyed reading your paper a lot; thanks!