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Secular Increase of the Astronomical Unit: A Hubble-like Expansion?

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This paper analyses the outcome of a new metric [1] that describes the space-time geometry of a static symmetric massive celestial object. It is based on an *erfc* potential that characterizes the gravitation field emerging from this model. The metric relies on an intrinsic physical constant σ, a star-specific proper length that scales measurements in its surroundings. Although σ must be evaluated experimentally, we propose a heuristic to estimate its value and call attention to the resultant numerical predictions regarding the Hubble constant and the secular increase of the Astronomical Unit (AU). In this context, the Hubble constant provides an experimental backing to the new metric. As a corollary, the metric conveys theoretical support to the Hubble methodology for standardizing the various extragalactic distance measurements. However, the definition of the Hubble constant is star specific; its value in the solar system is derived from the Sun *erfc* metric. To support this specificity hypothesis, we show that the secular increase of the AU is the result of a similar space-time expansion effect. Indeed, the AU spread out rate is predicted with the same paradigm, using the Earth *erfc* metric in this case. These accurate numerical estimates support the concept of a specific proper length σ associated to a massive object, at the expense of challenging our understanding of the space-time expansion.
[1]Plamondon, R., Ouellet-Plamondon, (2015), **Emergence of a quasi-Newtonian law of gravitation: a geometrical impact study** in Rosquist, K., Jantzen, R.T., Ruffini, R., Eds., On Recent Developments in Theoretical and Experimental General Relativity, Astrophysics, and Relativistic Field Theories, World Scientific, Singapore, 1301.

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