

Peer Review

# Review of: "A Common Origin for the Sagnac Effect and Einstein's Train-Embankment Thought Experiment"

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Review of Quattrini's article

I was pleased to read Stefano's interesting and sort of amusing article.

As seen from the laboratory frame where the one-way light speed is  $c$ , there seems to be a correspondence between the three examples: the Sagnac effect, the embankment exercise, and the race between Achilles and the turtle.

However, I do not agree that the embankment exercise discussed by Stefano represents the linear version of the circular Sagnac effect. The linear Wang-Sagnac effect was realized in 2003 by Wang et al. and is considered to be equivalent to the circular Sagnac effect.

In both the circular and linear effects, the observer with the clock, or measuring device, sees the photon, or light wave, traversing the optical fiber length  $2\pi R$  (circular) or  $2L$  (linear). Instead, in the embankment exercise, the photon is not constrained to travel a fixed distance.

According to the followers of Sagnac, his experiment indicates that the local light speed along the fiber cannot be the invariant  $c$ , because it would imply a round-trip time interval  $T = 2L/c$  (e.g., for the linear effect), contrary to observation. Still, relativists claim that the local speed along the contour of the Sagnac effect is the invariant  $c$ .

It seems that this controversy has not been solved, and the inconsistencies of the Lorentz Transformations have been pointed out by many physicists (e.g., Sagnac 1913, Tangherlini 1961, Landau and Lifshitz 1962, Selleri 1997, Gift 2015, Kipreos 2016, Lundberg 2019-21, Spavieri et al. 2019-2025). Some references [1-4] are indicated below.

Interestingly, a Research Group is offering an award of 10 thousand dollars to the person capable of showing that the light speed in these effects is indeed the invariant  $c$ .

If Stefano is interested in participating in the award initiative, he can simply write to the e-mail: [researchgroup.phys.ula.award@gmail.com](mailto:researchgroup.phys.ula.award@gmail.com)

and ask to be invited.

Best wishes to Stefano for his research.

[1] Spavieri, G., Haug, E. G.: The reciprocal linear effect, a new optical effect of the Sagnac type. Open Physics 2023. <https://www.degruyter.com/document/doi/10.1515/phys-2023-0110/html>

[2] Spavieri, G., Haug, E. G.: The One-Way Linear Effect, a first order optical effect. Helyon 2023. [https://authors.elsevier.com/sd/article/S2405-8440\(23\)06798-1](https://authors.elsevier.com/sd/article/S2405-8440(23)06798-1)

[3] Spavieri, G.: Exploiting a Built-In Simultaneity: Perhaps, the Simplest Way to Show that the One-Way Speed of Light is Measurable in Principle. Eur. J. App. Phys. Vol 6, Issue 6, 2024. Doi: 10.24018/ejphysics.2024.6.6.349

[4] Gianfranco Spavieri et al.: Entangled Simultaneity: Testing Lorentz and Light Speed Invariance with Quantum and Classical Entanglement. International Journal of Theoretical Physics. (2025) 64:78 <https://doi.org/10.1007/s10773-025-05932-8>

## Declarations

**Potential competing interests:** No potential competing interests to declare.