

Dear Brother,

I appreciate your satire. The meaning of time in relativity theory (special and general) has been causing confusion since the beginning of the theory, and every month I receive dozen of papers from people that supposedly proved that the theory leads to contradictions. I wrote at least three papers on the subject a long time ago. One of the papers is quoted by Martin Gardner in his book: *Relativity Simply Explained*.

Now, the general theory of relativity do not permit closed time lines. The so called solutions that claim that are simply wrong and based in wrong identification of the range of coordinates covering a subset of the world manifold. It happens that in all “solutions” containing closed timelike curves people start with a cyclic spacelike variable (like, e.g., the polar angle θ in a cylindrical system of coordinates) and then use that variable in a region of the manifold where it is timelike. This creates artificially “closed timelike curves” with no physical meaning. In fact with this process you can create “closed timelike lines” even starting with Minkowski spacetime. To know everything on the subject, please read the attached paper, which irritated many relativists.

Best regards,

Waldyr

1. The Meaning of Time in Relativity and Einstein’s Later View of the Twin Paradox (with M. A. Faria Rosa), *Found. Phys.* **19**, 705-724 (1989). **MR 90k:83006**
2. A Comment on the Twin Paradox and the Hafele-Keating Experiment (with E. C. de Oliveira), *Phys. Letters A* **140**, 479-484 (1989). **MR 90m:83007**
3. Rotating Frames in *RT*: Sagnac’s Effect in *SRT* and other Related Issues, (with M. Sharif), *Found. Phys.* **31**(12), 1767-1784 (2001). **MR 2003a:83005**
4. F. I. Cooperstock and S. Tieu, Closed Timelike Curves and Time Travel: Dispelling the Myth, *Found. Phys.* **35**, 1497-1599 (2005).

MR2188896 (2006m:83096)

Cooperstock, F. I.(3-VCTR-PA); Tieu, S.(3-VCTR-PA)

Closed timelike curves and time travel: dispelling the myth. (English summary)

Found. Phys. 35 (2005), no. 9, 1497--1509.

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The authors raise the interesting question of whether there exist (geodesically complete) spacetimes which are locally isometric to the Gödel solution but which do not have closed timelike curves. Unfortunately, they fail to give any meaningful answer because (i) they fail to recognize that the standard Gödel solution is singled out by its special mathematical

properties, namely being simply connected and having the largest isometry group (just like Minkowski space is set apart from the flat toy model containing closed timelike curves in Section 2); (ii) they start not with the Gödel solution but with a non-simply connected quotient (formula (17)) (the closed timelike curve in this quotient arises from the identification, and is not related to the closed timelike curve in \ref[S. W. Hawking and G. F. R. Ellis, *The large scale structure of space-time*, Cambridge Univ. Press, London, 1973; MR0424186 (54 #12154)] to whose existence they object); (iii) formulas (25) do not define new coordinates, and hence do not define a local isometry; (iv) even if they did, the authors make no attempt to show that no closed timelike curves exist, but only that certain closed curves are not timelike.

There is also a discussion about Gott's moving cosmic strings, but the model analyzed by the authors is not even a manifold.

José Natário

P.S.: Natário, of course, wrote papers in which timelike curves “exist” (José Natário, Newtonian limits of warp drive spacetimes. *Gen. Relativity Gravitation* 38 475-484,(2006)).