

“. . . they had succeeded in leading him up the garden path into one of their academic mazes, where a man could wander for eternity, meeting himself in mirrors. No, he repeated. Possibly they were all very nice, high-minded, scrupulous people with only an occupational tendency towards backbiting and a nervous habit of self-correction, always emending, penciling, erasing; but he did not care to catch the bug, which seemed to be endemic to these ivied haunts.”

Mary McCarthy THE GROVES OF ACADEME 1951

24.1 “A glorious non-entity”

¹ ‘AN INVASION OF MATHEMATICS INTO PHYSICS’ was the initial reaction of Einstein, himself ever wary of hallowed ivied haunts,² to *pseudo-Euclidean* ‘Minkowski spacetime’. Yet he seemingly later came to terms,³ as an approximation, with the imaginary variables metric of his earlier professor in Zürich, *Hermann Minkowski*. The latter, who had disparaged Einstein’s apparent lack of enthusiasm for mathematics (but did later praise his ex-pupil’s contributions to relativity), astonished the physics community at a legendary 1908 lecture in Cologne⁴ by highlighting the *interconnectedness* of space and time.⁵ His then also introduced *Minkowski metric* equation still plays a virtually indomitable role in special relativity, as—inappropriately—propounded in a 2006 treatise: “. . . the geometry of Minkowski spacetime has been axiomatised in all rigour”.⁶

A serious generally overlooked problem remains nevertheless. The garden paths of Minkowski spacetime, a *nonvisualisable* academic maze, only accommodate itineraries of point objects (*‘particles’*) or groups of objects accelerating in ‘rigid motion’ mode, better labelled⁷ *‘rigor mortis’ acceleration*.

¹ Mary McCarthy. *The Groves of Academe*. Harcourt, Brace, New York, 1951

² As satirised in his 1933 poem quoted (and translated) in the *‘Prologue*.

³ Alexander Blum, J Renn, D Salisburly, M Schemm, and K Sundermeyer. 1912: A turning point on Einstein’s way to general relativity. *Annalen der Physik*, 524:A11–A13, 2011

⁴ Actually first presented in Göttingen in September 1907.

⁵ Described, using a different viewpoint, as ‘CHRONOS-ITY’—distance-rated disparity of simultaneity—in chapter 1’s *An elegant spacetime underlay*.

⁶ Jürgen Ehlers and Claus Lämmerzahl. *Special Relativity - Will it Survive the Next 101 Years?* Springer, 2006

⁷ To avoid confusion with differential geometry’s ‘rigid motion’ theory.

Twistings and turnings

⁸ J J Callahan. *The Geometry of Spacetime*. Springer, 2000

Questioning Minkowski metric's widespread deployment in *general relativity*, a 2000 textbook⁸ stated "*Spacetime with gravity does not obey the laws of Minkowski geometry. . .*". Yet this clear statement, an opinion not directly disputed in more recent physics literature, does not appear to have 'sunk in' among the community of physicists, judging by continual appearances of general relativity books which usually casually and without elaboration, adopt Minkowski's 4-vector method without further ado—in the time honoured traditional manner.

This book is concerned with the (mis)application of Minkowski's metric in the context of *special relativity*. Here indeed also, not everyone has been silent. In 2004 a paper by two Oxford physicists entitled *Minkowski spacetime: a glorious non-entity*,⁹ took the high road by stating (somewhat tongue in cheek) in the *British Journal for the Philosophy of Science*: "*It is argued that Minkowski spacetime cannot serve as the deep structure within a "constructive" version of the special theory of relativity, contrary to widespread opinion in the philosophical community.*" One might ask however, if this is true, *what might the consequences be?*

⁹ H Brown and O Pooley. Minkowski space-time: a glorious non-entity. *British Journal for the Philosophy of Science*, 2004

24.2 Groves of Academe

At the end of 2008, it became apparent to the present author that the 2004 discovered spherical geometric model for an accelerating object (described in chapter 16 *A Spacetime Odyssey*), if 'helicoidised', pointed to a resolution of the homogeneously accelerating extended medium problem commonly known as *Bell's string paradox*. Nevertheless, attempts to have this thesis accepted were not favoured by physics journal editors and reviewers.

The *American Journal of Physics* has a long tradition of relativity papers addressing the accelerating medium question, not least the very 1959 paper which brought the topic into prominence, yet that journal does not formally view itself as a 'research' journal. Accordingly, in reference to a related 2010 'off the beaten track' submission of the present author, its then editor kindly explained that "*. . . many papers need to be evaluated by research journals if they contain significantly new physics. I think that may be the case for your paper as well.*"¹⁰

¹⁰ June 6th 2010 email correspondence on AJP manuscript MS23122.

Referring to the author's later published 2016 paper, the *European Journal of Physics* similarly stated: "*The tearing down of Minkowski space should at least begin in more specialised circles before making its way into the mainstream literature. I suggest that the author submits his (hopefully) profound insights to a journal such as Foundations of Physics.*" On the other hand, the *New York Journal of Mathematical Physics* declared that the paper's maths being "*at the level of elementary calculus*" excluded it being of interest to that journal and suggested: "*. . . Some of the discussions in the manuscript and arguments for new terminology seemed to point to a journal dedicated to Foundations of Physics as a possible place to submit this.*"

A Dutch drawbridge

The globally deferred to Utrecht *Foundation of Physics* research journal posts a laudable if somewhat grandeur-laden policy:

“Our views of the physical world are changing rapidly. Humanity’s continuing search for coherent structures in physics, biology, and cosmology has frequently led to surprises as well as confusion. Discovering new phenomena is one thing, putting them into context with other pieces of knowledge, and inferring their fundamental consequences is quite something else. There are controversies, differences of opinion, and sometimes even religious feelings which come into play. These should be discussed openly. Philosophical issues that are of a nontechnical nature should be handled in the opinion pages of the news media, but when the discussed arguments become too technical for that, when peer review is needed to select the really valuable pieces of insight, only a distinguished scientific journal is the appropriate form.”

This “*International Journal Devoted to the Conceptual Bases and Fundamental Theories of Modern Physics*” had already published a related paper in late 2013,¹¹ whose author’s likewise related 2010 *European Journal of Physics* paper was partly endorsed but also partly criticised by the present author’s paper submitted December 2013. The quite crudely aspersive refusal¹² by Foundations of Physics to even consider the paper for review therefore came as a surprise.^{13,14,15}

“This Journal’s policy is one of severe restraint concerning theories that are well-understood and well-tested experimentally, such as the theory of special relativity. Regrettably, this fact places the current submission outside the scope of Foundation of Physics.”

The later successfully peer-reviewed paper and its sequel published in the (like-wise Dutch-based) *Results in Physics* journal, have so far attracted over two thousand downloads in the U.S alone, and a proportionate number in the FoP journal’s Netherlands base. No dissenting comment has yet emerged.¹⁶

The Ante Portas ‘invitation’

¹⁷The Montréal-based *Institute for Foundational Studies Hermann Minkowski*¹⁸ received a copy of the author’s January 2016 *Results in Physics* paper, with a request for comment. The institute’s stated goals include “To help change the present situation in fundamental physics and lead the research on the major open questions.” and “To provide continual science education for the general public in order that scientific culture becomes an inseparable element of the common culture of every individual.”. Citing lack of time available to read the paper, a founder member¹⁹ responded by mentioning a forthcoming ‘Fourth International Conference on the Nature and Ontology of Spacetime’ sponsored by that institute, to be held at the end of May 2016 at the Black Sea Bulgarian city Varna.

¹¹ Jerrold Franklin. Rigid Body Motion in Special Relativity. *Foundations of Physics*, 43:1489–1501, 2013

¹² FOOP-D-13-00511 / FOOP-D-14-0048. The second submission remedied a minor blemish in the earlier submission.

¹³ ⇒ A fallacy’s domino effect on page 135.

¹⁴ B.C. Minkowski spacetime does not apply to a homogeneously accelerating medium. *Results in Physics*, 6:31–38, January 2016

¹⁵ <http://dx.doi.org/10.1016/j.rinp.2016.01.001>

¹⁶ Nor has FoP responded to a subsequent formal request for comment.

¹⁷ *Ante Portas* means ‘Before the Gates’.

¹⁸ www.minkowskiinstitute.org

¹⁹ Author of *Accelerating spaceships paradox and physical meaning of length contraction* <https://arxiv.org/pdf/0903.5128v1.pdf>

The abstract of a *sequel* paper provisionally entitled *Bell's string paradox solved by real differential geometry* and explicitly containing this book's real metric equation (22.5), was thereupon submitted to the organizing committee, requesting a presentation slot but also emphasizing that a poster presentation alone would be inappropriate. The hope was for a live half hour dialogue with a challenging audience, an interesting, perhaps also enlightening prospect even though it would be a bit like 'going into the lion's den'. The previously forwarded already published paper was entitled *Minkowski spacetime does not apply to a homogeneously accelerating medium*, and an invited guest speaker was the same *Foundation of Physics* chief editor (after whom an asteroid is named) who had declined to even review that earlier paper.

Disappointingly, an invitation to the four thousand kilometres distant venue came for an 'ante portas' waiting-in-the-wings *poster presentation*, an option explicitly ruled out in the submission letter. An appeal to reconsider (made when several conference schedule slots had still not been filled) was not answered. Nor has any comment on the earlier emailed published paper been received. The intended presentation²⁰ sequel paper has now been successfully peer-reviewed and published in the same *Results in Physics* journal. (<http://dx.doi.org/10.1016/j.rinp.2017.07.013>)

Mistrodden ground

The *ex-cathedra* empty platitude of a major journal and the Minkowski Institute's likewise closed door policy—matters of record—suggest to the present author that not only have they coarsely misjudged the matter with respect to the metric topic, but also, contrary to their own self-proclaimed mandates, remain oblivious to other anomalies still prevalent in special relativity theory.

In addition to continually tolerated presentisms²¹ and the quagmire of mathematical formalisms remonstrated against—to no avail—in Desloge and Philpott's 1987 AJP paper,²² these include the literature's frequent overextension of the (unnecessarily postulated) limit speed principle, its cumbersome approaches to the 'rigor mortis'/rigid motion topic, and the many inadequate solutions put forward for the homogeneously accelerating medium scenario.

An outstandingly incriminating symptom of this oligarchic paralysis in spacetime theory²³ is the incredible *hitherto absence* in books and papers of the relevant straightforward but of course 'inconveniently' non-constant radar interval formulae.

²⁰ B.C. Bell's twin rockets non-inertial length enigma resolved by real geometry. *Results in Physics*, 7:2575–2581, July 2017

²¹ ⇒ [Challenging a sacrosanct dichotomy](#) on page 80.

²² Quoted at the beginning of chapter 21.

²³ ⇒ [Equations that did not bark in the light](#) on page 8.

24.3 Two Russian overtures

A 2009 correspondence with Russian physicist *Stanislav Podosenov* regarding the Bell's string expansion equation, led to his sincere proposal, with three of his colleagues, of joint collaboration. Surprisingly nevertheless, an assent to their interesting suggestion was not responded to. In a 2010 paper,²⁴ the same physicists appropriately asserted: "*The standard solution of Bell's well-known problem... must be revised*". In 2014²⁵ they further aptly stated: "*The [Bell's] paradox is solved only when going out of [abandoning] the Minkowski [complex variables] space to the Riemann [real variables] space*", and proposed (on their 2014 paper's page 24) a length formula equivalent to²⁶

$$\Lambda(\tau) = \ln(\cosh L + \sinh L \cosh \tau). \quad (24.1)$$

Yet they unreasonably claimed that "...all authors (except [own papers] [3-5]) connect the string rupture with the Lorentz shrinkages", without reference to the present author's 2009 communicated *non-presentism* equation:

$$\Lambda(\tau) = L\sqrt{1 + \tanh^2 \tau} = L\sqrt{1 + v^2/c^2}. \quad (24.2)$$

A January 2017 related paper²⁷ did not mention formula (24.2) which appeared in the web abstract of the present author's 2012 lecture in Göttingen²⁸, and also overlooked the simple radar approach to the 'rigid motion' acceleration topic expounded in the 2016 paper *Minkowski spacetime does not apply to a homogeneously accelerating medium*. Significantly, their 2017 paper (page 16) directly overruled their earlier equation (24.1): "*Although the formula... is correct both for large and low accelerations, it does not solve the Bell paradox in principle.*"

Stanislav Podosenov (who speaks only Russian) is one of the few physicists who have unceasingly been railing in earnest against the dismal Ptolemaic status quo of accelerating frames in relativity literature. Now, as this present book is 'going to press', he has repeated his initial 2009 (then not followed up) suggestion for joint cooperation, and has kindly undertaken to soon relate the present author's July 2017 paper *Bell's twin rockets non-inertial length enigma resolved by real geometry* in the context of his own April 2017 co-authored book²⁹. This book's dedicated future website <https://spacetimefundamentals.com> is intended to encompass just such a dialogue.

²⁴ S. A. Podosenov, J. Foukzon, and A. A. Potapov. A Study of the Motion of a Relativistic Continuous Medium. *Gravitation and Cosmology – Pleiades/Springer*, 16(4): 307–312, 2010

²⁵ S. A. Podosenov, A. A. Potapov, J. Foukzon, and A. A. Menkova. Geometry of Noninertial Bases in Relativistic Mechanics of Continua and Bell's Problem Solution. *International Journal of Recent advances in Physics (IJRAP)*, 3(1): 23–37, February 2014

²⁶ L being the rockets' scaled 'launch' separation length, and τ the rockets' scaled own-time.

²⁷ S. A. Podosenov, J. Foukzon, and A. A. Menkova. Structure Equations, Permitted Movement of Relativistic Continuum and Sagnac's, Ehrenfest's and Bell's Paradoxes. *Physical Science International Journal*, 13(2):1–18, January 2017a

²⁸ B.C. Relativity Acceleration's Cosmographicum and its Radar Photon Surfings—A Euclidean Diminishment of Minkowski Space-time, February 2012. URL <http://www.dpg-verhandlungen.de/year/2012/conference/goettingen/part/gr/session/4/contribution/4>

²⁹ S. A. Podosenov, J. Foukzon, and E. Menkova. *Difficulties in the Interpretation of the Einstein's Relativity Theory*. Lampert Academic Publishing, 2017b

24.4 *The Emperor's New Mind Clothes*

Fashionable devotion to Minkowski spacetime is epitomised by a sweeping statement on page 257 of *Roger Penrose's* best seller *The Emperor's New Mind*:³⁰

“...there is now an enormous amount of experimental evidence in favour of it.”

³⁰ Roger Penrose. *The Emperor's New Mind*. Vintage, 1989

³¹ A notable other example being:

³² Gregory L Naber. *The Geometry of Minkowski Spacetime*. Springer, 1992, 2010

³³ ‘An Afternoon with Professor Oppenheimer’—unpublished 1960 talk to the Tokyo Society of Science and Man.

³⁴ Ray Monk. *Inside the Centre - The Life of J. Robert Oppenheimer*. Vintage, 2013

^{31,32} Perhaps the true reasons for this endemic overgeneralisation lie in observations made by the ‘father of the atomic bomb’, *Robert Oppenheimer*, to a poignantly receptive postwar Japanese audience.³³ As recounted on page 649 of a book by philosopher *Ray Monk*³⁴ (by coincidence using the same publisher), the American physicist vehemently criticised a certain physics elite as:

“...a small society because of its inherent snobbery [whose leading elite] go to the same colleges, they meet at the same clubs and they frequent each other and read the same things. [Their philosophers] are out of touch with science, they are out of touch with politics, they are out of touch with history. And what they are in touch with is themselves.”

The unit thrust medium’s real metric is firmly authenticated in chapters 21–23 as the sole possible solution to the six decades disputed and hitherto misconstrued Bell’s ‘string’ paradox. Nevertheless, an inescapable consequence of this obviously still bewilders many physicists:

Minkowski's pseudo-Euclidean metric does not generally represent an extended accelerating medium, even in special relativity.

In spite of (or actually perhaps *because of*) the relative simplicity of the issues dealt with in this writer’s 2016 and 2017 papers, attempts to solicit comments and/or criticisms from established authors like Penrose and Naber or those of likewise mainstream books such as ^{35,36}, have sadly fallen on deaf ears—an all too prevalent phenomenon succinctly documented in ³⁷. (<http://www.bookpump.com/upb/pdf-b/9429934b.pdf>).

³⁵ Ta-Pei Cheng. *Relativity, Gravitation and Cosmology*. Oxford University Press, 2005, 2010

³⁶ Matthias Bartelmann et alia. *Theoretische Physik*. Springer, 2015

³⁷ Martín López Corredoira and Carlos Castro Perelman, editor. *Against the Tide: A Critical Review by Scientists of How Physics and Astronomy Get Done*. Universal Publishers, Boca Raton, Florida, 2008

Hopefully this book’s dedicated website

<https://spacetimefundamentals.com>

will serve as a suitable platform for opening up discussions on the various issues raised in this book, both general as well as controversial, to a wider forum.