March 7th 70

Professor F.A.E. Pirani
Dept,of Mathematics
King's College,
London, W.C.2, England.

Dear Felix,

I have been very pleased to hear that you were consulted about the book on relativity I am writing in Polish for PWN and the desirability of it being translated into English. The present situation is as follows:

1. I am committed to write a book on relativity in Polish, intended as a text for our students. The deadline is June 30, 1971.

2. About three months ago, the foreign editor of PWN requested me to prepare a summary of the chapter headings of the projected book, explaining that a "Western publishing house has shown interest in cooperating with them in making the book available to English-speaking readers". Since this did not imply any commitment on my side, I prepared the sheet you probably have seen.

3. Since you agree to write with me a book on relativity, I will definitely not consent to the Polish textbook being translated into English. Although our book will be very different from the Polish one, there will be unavoidable repetitions that would create an impossible situation, comparable to that on the Peanuts market.

4. None of the chapters of the textbook has been written up in a final form yet. There are various first drafts, sets of lecture notes, Brandeis material etc.

5. I shall be very pleased if you communicate my position to Mr. Cameron so as to avoid the necessity of turning him down at a later stage. However, I might be inclined to cooperate with Wiley on a book on "Differential Geometry with Applications", should they be interested.

6. You are completely free to choose a publisher for us. My only preference is to avoid Rhodesian, Albanian, Haitian and similar publishing houses.

Turning now to the question of our joint project, it seems to me that we should concentrate on the topics and aspects of relativity we are reasonably good at. In particular, it seems worth-while to emphasize what you call the structural side of the theory and the relation between observations and various mathematical elements of models of space-time. Classical experiments, such as the optical ones, should be analyzed from the point of view of what theories are compatible with them. Mathematics should be used in a non-dogmatic manner, choosing the tools most appropriate to any given topic, with preference given to intrinsic methods, of course.

It would be very good if we could meet some time this year to discuss at least the chapter headings and the material we should cover. I do not have to tell you that I really look forward to collaborating with you. It is my feeling that we do not have to rush - it is never too late for one more good book but no more bad books should be published so late.

I shall go to Copenhagen in September. Could you drop in then for a few days so that we could discuss things? In any case, I hope you will visit Warsaw on your way to and from the Soviet Union. Mielnik's visit to Austin seems to be getting postponed for later on and on. Would you consider him as a speaker at your summer meeting? Woronowicz is another possibility.

I am enclosing a tentative proposal of the chapter headings of our book. Can it be the basis for discussion?

Should I ask the postmaster to trace Alfred's picture /it was sent by registered mail/? Incidentally, the book on Cracow is from Mielnik.

I find it outrageous that AJP did not accept your conservative paper on tachyons. I hope you are publishing it somewhere else. Our Academy would be proud to have it appear in its Bulletin.

I am very interested but not astonished to hear about Bend Schmid's construction of the positive definite metric on the bundle of frames. Give my best greetings to John Stachel if he is still with you.

With best wishes and regards,

Yours,

A. Trautman

AT:ad

Department of Mathematics
Kings College
Strand, London W.C.2
10 April 1970

Dear Andrzej,

I was very pleased at your enthusiastic response to my tentative remarks about the possibility of writing a book, and look forward to discussing it with you in Copenhagen. Before I got your letter, I had independently decided to visit Copenhagen in September, because I am developing some side interests in studying the history of science from a concrete point of view, and I want to ask Rosenfeld about his experience in this field. He writes that he will probably be there throughout the month, and with high probability from 7 to 26 September. Can you let me know the dates of your projected visit, as I have to meet a great many other boundary conditions? I have not yet heard from Indiana or from Petrov, so the rest of my hoped-for trip is not yet settled.

As far as the book is concerned, I think that a good deal of discussion will be necessary before our ideas about it converge strongly. A friend to whom I was explaining the project the other day asked me what kind of book it would be, and I answered impulsively "the last one"! I think this is perhaps overambitious, but I should certainly be inclined to write something in the nature of a standard treatise (of course it may be called "Introduction to ..."), rather than an introductory textbook. Of course one should emphasize the parts of the subject which one is 'reasonably good at', but isn't writing a book, like preparing a lecture course, an opportunity to become 'reasonably good at' things which one didn't know very well before?

Of course your list of chapters covers a great deal of the subject, and I shall not presume at this stage to suggest alterations of substance. However, I might remark that some of the chapters, e.g. "2. Algebra and differential geometry" could become exceedingly long.

In fact, a large number of the chapter headings could serve (and have served) as book titles themselves. Of course by taking a unified point of view one would eliminate duplication, but on the face of it this book could be enormous. I shouldn't necessarily mind that, because I think that most books are too short to cover the subject properly. One way to deal with the starting problem (i.e. the problem "where do we start this topic?") would be to follow the practice of Hewitt and Ross, who, if I remember correctly, say in the introduction to their book Abstract Harmonic Analysis v. 1, that they assume in the reader a familiarity with vdWaerden Modern Algebra, Halmos Measure Theory and Kelley General Topology! (I do not suggest that we should assume familiarity with these books, but merely that this is a possible mode of procedure).

Another point which I think should be discussed carefully is the question of motivation. It is very hard to understand how physics developed into its present state without some historical awareness, and the least study of history, even in the most superficial way, produces some surprises, at least for me. I'm not sure that I want to go so far as to suggest that one should actually write a book showing the order of historical development, but some balance, perhaps like that struck by Pauli in his book, ought to be attempted. In fact, every time one gets too enthusiastic about the whole idea, one ought to read Pauli's book and ask "Can I do better than this?" Unless the answer is a clear Yes, what is one doing writing a book at all?

Mr Cameron is coming to see me on Tuesday, when I shall encourage him to take up your offer of Differential Geometry with Applications. He will probably want to see if he can commission our joint project, but I am disinclined to agree to anything at this stage. In the meantime I had a letter from Oxford University Press asking for a short (~ 60 K words) book on relativity, so I've written back to ask if they'd be interested in a long one.

I am afraid that I have done nothing more about a summer meeting, and since there is a meeting in Berne in May, any number of whose participants intend to pass through London, it seems more desirable to have our next meeting in the autumn,

but because of the uncertainty of my own plans, I have done nothing about that either. Michel Cahen was to organize a London/Cambridge Stevens meeting in Brussels, originally about January '71, but is now talking about April or September of that year; however, I think that the big Copenhagen conference is scheduled for Summer '71, so that again there is some ambiguity. Lately I have ~~been~~ become very alienated from organizational responsibility, and have almost given up going to committee meetings. On the other hand, I have been giving some time, as I said, to the study of history, as well as economics and other social problems.

John Stachel spent a week here, and has just left. We worked very hard on the extension of his Lie derivative formulation of the Cauchy problem to the characteristic case. There are still some puzzles to unravel, but we made interesting progress and clarified a lot of our ideas. He is almost certainly going to come back for the summer, and, we hope, for some part, or the whole, of next year.

My paper on tachyons, rejected by the American Journal of Physics, I sent, unchanged, to the Physical Review, who have just accepted it.

I gather from your letter, although you do not make it quite explicit, that Alfred has not received the picture ~~you~~ we sent to him. Perhaps you should try to trace it. But of course he may have received it. He is a very bad letter writer.

I look forward to seeing you in September (must have dates!), and to visiting you in Warsaw before long.

With best wishes to you all

Yours

Felix.

13 April
p.s. Just got your letter of 7 April, at the instant of posting. A copy (in English!) of your article on the future of physics would be very much appreciated.
Beware of schemoetsin.

14 April
pps: Have just seen Cameron. He says
1) Wont you have some difficulty with PWN over the concept of not having your book translated?
2) He is interested in Applications of DG and would like to know the timetable for this project.
3) He would not be frightened off our joint book merely by great length.

UNIVERSITY OF LONDON KING'S COLLEGE

DEPARTMENT OF MATHEMATICS

Professor F. A. E. PIRANI

STRAND, W.C.2.

01-836 5454.

B. Wilcock, Esq.,
Science Editor,
The Clarendon Press,
Walton Street,
Oxford OX2 6DP.

30 April 1970

Dear Mr. Wilcock,

Trautman and I have not yet reached the stage of agreeing on the contents of our book and I am not sure that he will agree with me on the extent to which it should be comprehensive. I intend to discuss it with him at length in September, when we shall both be in Copenhagen, and my talk with you might be more concrete if it was after that, but I should be glad to talk to you, or any of your colleagues, in a general way before that if you think it might be useful, in which case perhaps you could ring me up to make an appointment.

Yours sincerely,

University of Chicago press are also interested-

An Introduction to Relativistic Physics

by Andrzej Trautman

Warsaw University

Scope.

The book is based on several lecture courses, given by the author for students of the Physics Department, Warsaw University, during the years 1962-1969. The book is intended as an advynced text for graduate students and research workers but a substantial part of it constitutes a self-contained outline of the special theory of relativity at the undergraduate level.

The book emphasize the physical and logical foundations of relativistic physics. A special attention is paid to the physical significance of the various mathematical structures introduced in constructing models of space-time. In addition to the standard material covered by texts on relativity, the book contains a thorough discussion of the historical background of Einstein's special and general theories, including an analysis of the first and second order effects and of the rival theories. Separate chapters are devoted to the classical theory of fields and particles, spinor calculus, solutions of Einstein's equations, gravitational waves and cosmology. The mathematical methods introduced and used include those of modern differential geometry in the intrinsic, coordinate-independent notation. The last chapter contains a list of unsolved problems and open questions connected with the theory of relativity.

Chapter headings.

1. Historical introduction
2. Algebraic preliminaries
3. Differential geometry
4. Galilean physics
5. Foundations of the special theory of relativity
6. Relativistic kinematics and Lobatchevski space
7. Classical theory of fields and particles
8. Spinors
9. The Poincare group and its representations
10. The Newtonian theory of gravitation
11. Foundations of general relativity theory
12. Methods of solving the Einstein equations
13. Gravitational waves and radiation
14. Cosmology
15. A list of problems

Andrzej Trautman
Warszawa, ul. Slupecka 4 m. 87

21. 9. 1968

Konspekt ksiazki

pt.

Teoria wzglednosci

Ksiazka jest oparta na rocznym wykladzie teorii wzglednosci i semestralnym wykladzie kosmologii; wyklady te autor prowadzil w latach 1962-67 na IV i V roku kierunku fizyki Wydzialu Matematyki i Fizyki Uniwersytetu Warszawskiego.

Przyblizona objetosc: 15 arkuszy.

Zawartosc rozdzialow:

1. Wstep historyczny

fizyka newtonowska, czas absolutny, zasada wzglednosci Galileusza, rozwoj optyki i elektrodynamiki, eter, doswiadczenia Michelsona - Morleya, hipoteza Fitzgeralda - Lorentza, doswiadczenie Kennedy'ego i Thorndike'a, teoria Ritza, postulaty Einsteina i ich podstawowe konsekwencje

2. Wiadomosci uzupelniajace z matematyki

przestrzenie wektorowe i tensory, algebra zewnetrzna, przestrzenie afiniczne, przestrzenie euklidesowe, rozmaitosci rozniczkowe i odwzorowania rozniczkowalne, pola wektorowe, grupy przeksztalcen, podrozmaitosci, koneksje i geodezyjne, geometria Riemanna, twierdzenia calkowe

3. Podstawy szczegolnej teorii wzglednosci

geometria czasoprzestrzeni Newtona, eter i optyka nierelatywistyczna, geometria przestrzeni Minkowskiego, przeksztalcenia Lorentza, kinematyka relatywistyczna, podstawowe efekty, paradoks blizniat, elementy optyki i dynamiki relatywistycznej, zwiazek miedzy masa i energia, precesja Thomasa, ruch jednostajnie przyspieszony

	III	1.	Introduction
A&F	III	2.	Algebra, topology and differential geometry. Mainly definitions, motivations and results.
	II	3.	Galilean physics. Mechanics on the tangent bundle.
	II	4.	The ether (including discussion of optical experiments). Ritz. Fresnel dragging. Experimental foundations.
	II	5.	Foundations of the special theory of relativity
	II	6.	Relativistic kinematics and Lobatchewski space
	II	6a.	Representations of the Lorentz and Poincare groups. The symmetric group. Wave equations.
AT	I	7.	Formal theory of fields and particles (including Noether's theorem and local Cauchy problem).
F	II	8.	Classical electrodynamics, including media.
F	II	9.	Spinors
A	I	10.	Relativistic quantum mechanics
A	II	11.	Newtonian theory of gravitation
	II	12.	Foundations of Einstein's theory of gravitation, Lagrangian formulation.
	II	13.	The Schwarzschild solution and spherical collapse
F	II	14.	Optics and conformal geometry $O_{(2,4)}$ twistors.
	I	15.	Methods and results of solving the Einstein equations
F	I	16.	Gravitational waves and radiation. Asymptotic symmetry. Conformal infinity.
	I	17.	Cosmology, not only isotropic.
	III	18.	Rival theories of gravitation and review of evidence for Einstein's theory.
	III	19.	A list of problems (including comments on quantization).
F	I	20.	Unified field theories
	I	21.	Some global problems. Cauchy problems.
		22.	Relativistic thermodynamics. Hydrodynamics. Energy tensors. Some relativistic astrophysics.

PIRANI / TRAUTMAN

1. Introduction.

2. Algebra topology and differential geometry. Mainly definitions, motives and results.

3. Galilean physics; Bundles for mechanics.

4. The ether/including discussion of optical experiments/Ritz, Fresnel dragging experimental foundations.

5. Foundations of the special theory of relativity.

6. Relativistic kinematics and Lobatchewski space.
6a Representations of Lorentz and Poincare groups. Symmetries.

7. Formal theory of fields and particles/including Noether's theorm and local Cauchy problem.

8. Classical electrodynamics, including media.

9. Spinors.

10. Relativistic quantum mechanics.

11. Newtonian theory of gravitation.

12. Foundations of Einstein's theory of gravitation. Lagrangian formulation.

13. The Schwarzschild solution, and spherical collapse.

14. Optics and conformal geometry. O(2, 4) and twistors.

15. Methos and results of solving the Einstein equations.

16. Gravitational waves and radiation. Asymptotic symmetry. Conformal infinity.

17. Cosmology, not only isotropic.

18. Rival theories of gravitatin and review of evidence for Einstein's theory.

19. A list of problems/including comments on quantization.

20. Unified field theories.

21. Some global problems. Cauchy problems.

\+ Relativistic Thermodynamics
Hydrodynamics
Energy tensors
Some relativistic astrophysics.

INTRODUCTION TO RELATIVISTIC PHYSICS

	STAGE		
	III	1.	Introduction
A&F	III	2.	Algebra, (topology,) and differential geometry — Almost entirely definitions, motivations and results, with references.
	II	3.	Galilean physics — Bundles for mechanics.
	II	4.	The ether /including discussion of optical experiments/ — Ritz. Fresnel dragging needed. Experimental foundations &P
	II	5.	Foundations of the special theory of relativity
	II	6.	Relativistic kinematics and Lobatchewski space — 6a. Representations of L_+ and their reduction. symmetry gp. Wave eqns.
AT '70	I	7.	Formal theory of fields and particles /including Noether's theorem & local Cauchy problem/
FAE	II	8.	Classical electrodynamics, including electromagnetism in media.
F	II	9.	Spinors algebra & analysis.
AT	I	10.	Relativistic quantum mechanics
AT	II	11.	Newtonian theory of gravitation
	II	12.	Foundations of Einstein's theory of gravitation. Lagrangian foundation.
	II	13.	The Schwarzschild solution & spherical collapse
FAE '70	II	14.	Optics and conformal geometry — Twistors?
	I	15.	Methods (and results) of solving the Einstein equations
FAE '70	I	16.	Gravitational waves and radiation — Asymptotic symmetry. Conformal ∞.
	I	17.	Cosmology — not only isotropic
	III	18.	Rival theories of gravitation and review of evidence for Einstein's theory
	III	19.	A list of problems /including comments on quantization/
F	I	20.	Unified field theories
	I	21.	Some global problems. Cauchy problems.

Relativistic Thermodynamics
Hydrodynamics.
Energy tensors.
Some relativistic astrophysics