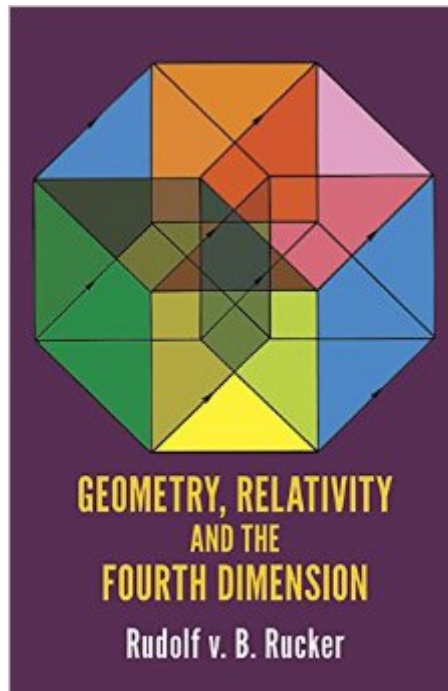


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Geometry, Relativity And The Fourth Dimension (Dover Books On Mathematics)



Synopsis

This is a highly readable, popular exposition of the fourth dimension and the structure of the universe. A remarkable pictorial discussion of the curved space-time we call home, it achieves even greater impact through the use of 141 excellent illustrations. This is the first sustained visual account of many important topics in relativity theory that up till now have only been treated separately. Finding a perfect analogy in the situation of the geometrical characters in Flatland, Professor Rucker continues the adventures of the two-dimensional world visited by a three-dimensional being to explain our three-dimensional world in terms of the fourth dimension. Following this adventure into the fourth dimension, the author discusses non-Euclidean geometry, curved space, time as a higher dimension, special relativity, time travel, and the shape of space-time. The mathematics is sound throughout, but the casual reader may skip those few sections that seem too purely mathematical and still follow the line of argument. Readable and interesting in itself, the annotated bibliography is a valuable guide to further study. Professor Rucker teaches mathematics at the State University of New York in Geneseo. Students and laymen will find his discussion to be unusually stimulating. Experienced mathematicians and physicists will find a great deal of original material here and many unexpected novelties. Annotated bibliography. 44 problems.

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Customer Reviews

In his own introduction the author, Mr. R. Rucker, states, "My goal has been to present an intuitive

picture of the curved space-time we call home. There are a number of excellent introductions to the separate topics treated here, but there has been no prior weaving of them into a sustained visual account. I looked for a book like this for many years- and finding none, I wrote it." His dedication has been rewarded, as the text is one of the finer introductory books on the curvature of space time and special relativity. The 'book like this' as the author calls it, walks the reader through several visual explanations that allow a solid mathematical and graphical explanation of modern physics. This isn't always a simple explanation, but there is a certain reward to struggling with the concepts before understanding them. In particular, Chapter 4 on time as a higher dimension makes the entire book worth reading, with many fascinating examples and a host of thought-provoking examples, such as "Schrodinger's Cat." This is a very interesting book which would be of use to anyone who wishes to push just a little bit further than the typical popular physics text. For those who wish to push even further to solidify their knowledge, there are even questions at the end of each chapter. I highly recommend this book.

I really enjoy Rudy Rucker's nonfiction, and some of his fiction too (*White Light* is great). He's very good at presenting mind-blowingly cool ideas in accessible expository prose, and he knows just when to throw in the bombs. This particular book is published by Dover, and it's not one of their usual reprints; it was originally published by Dover. (In 1977, but the geometry of spacetime hasn't changed much since then.) It's an exploration of just what the title says: the geometry of the four-dimensional spacetime that the theory of relativity says is Really Out There. Well, this is a good book on the subject, but you can get others (although one of the best -- Cornelius Lanczos's delightful *Space Through the Ages* -- has long been out of print). What's coolest about this one is that Rudy Rucker wrote it. Which means you get those little bombs thrown in at all the right places. Of course Rucker gives you what any competent mathematician will give you -- a sound introductory presentation of the mathematics of 4D spacetime and relativity theory, which are weird enough if you haven't encountered them before (and maybe even if you have) -- but he doesn't stop there. You also get an argument that the apparent passage of time is an illusion, and a little speculation about how this might tie in with the Many-Worlds Interpretation of quantum mechanics. And even that isn't all: you get a suggestion that it's possible to develop a spacetime consciousness via some sort of meditation techniques or mystical insight, together with an entry in the annotated bibliography referring you (cautiously) to Robert A. Monroe's *Journeys Out of the Body*, whose experiments Rucker himself has tried. It's like Raymond Smullyan on acid, if you know what I mean. But honest, it really does make sense. And it really will knock your mind loose from your brain even

without the use of chemical aids. This is the sort of thing Rucker does best. He does it in *Infinity and the Mind*, too (with which this volume has a little bit of overlap, but you won't care). Check out that book as well, along with *White Light*. Mathematical hippie mysticism just doesn't get any better.

Yes, finally, I get the hoopla with the fourth dimension. Rucker explains things with lots of classical geometric illustrations. Not intending to scare you, I must warn you that he takes the reader all the way to a 5-dimensional world. Still, it is simple to explain, because he uses line-land (the 2-dimensional version of flatland) adds a dimension, then one more, and the result can be visualized in 3-D. I am just astounded that I could understand this without mind-crunching effort. It was not an easy read, but it was not very hard either. No derivatives, matrixes, integrals, or any of the other off-putting versions of mathematics. Just straight (actually fairly wrinkled) geometry.

This is the best introduction to non-Euclidean geometry and special relativity that I have ever encountered. The book is basic enough to be understandable (at least to a degree) by any intelligent (and determined) adolescent, but deep enough for the physics or math undergraduate and perhaps even graduate student to find continual interest in. Rucker has a way of introducing complex ideas in a rather simple fashion so that one doesn't often realise how deep the subject matter is at first. Unlike some of his other books, however, considerable math background is required and a substantial amount of effort and force of will on the part of the reader will be necessary. All the same, the book is an intensely interesting foray into the world of geometry and relativistic physics. His adaption of Abbott's "A. Square" character to elaborate his ideas are particularly amusing and helpful.

Don't let the title frighten you. Clear, concise, and not overly daunting....this tome can be read and understood by anyone--even if you haven't had calculus yet. This is a great introduction to non-Euclidean geometry and a nice summary of the history of mathematics. At the very least, it made me read Flatland again. :o)

Five stars because Rucker put a lot into this book, it's obvious he cared a great deal about writing this book; the annotated bibliography is an example of this and worth buying the book just to read this. Having said that, I found this book very tough. Bits of understanding come through but this is the kind of book you can read and re-read and re-re-read and still be baffled, which is not Rucker's fault.

it is just the material subject matter.

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