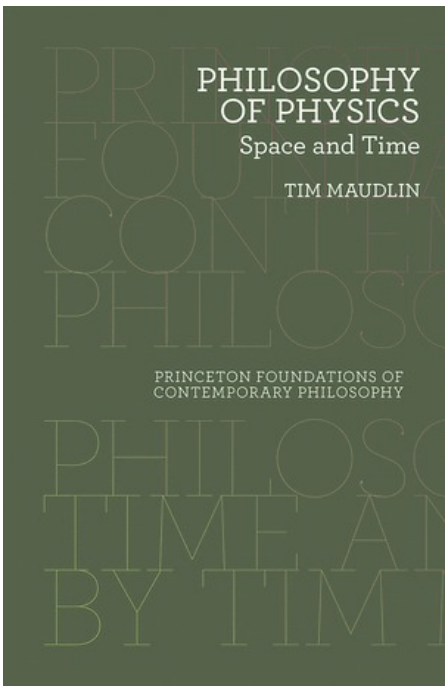

Philosophy of Physics: Space and Time

Tim Maudlin , Scott Soames (Series Editor)

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This concise book introduces nonphysicists to the core philosophical issues surrounding the nature and structure of space and time, and is also an ideal resource for physicists interested in the conceptual foundations of space-time theory.

Tim Maudlin's broad historical overview examines Aristotelian and Newtonian accounts of space and time, and traces how Galileo's conceptions of relativity and space-time led to Einstein's special and general theories of relativity. Maudlin explains special relativity using a geometrical approach, emphasizing intrinsic space-time structure rather than coordinate systems or reference frames. He gives readers enough detail about special relativity to solve concrete physical problems while presenting general relativity in a more qualitative way, with an informative discussion of the geometrization of gravity, the bending of light, and black holes. Additional topics include the Twins Paradox, the physical aspects of the Lorentz-FitzGerald contraction, the constancy of the speed of light, time travel, the direction of time, and more.

Introduces nonphysicists to the philosophical foundations of space-time theory
Provides a broad historical overview, from Aristotle to Einstein
Explains special relativity geometrically, emphasizing the intrinsic structure of space-time
Covers the Twins Paradox, Galilean relativity, time travel, and more
Requires only basic algebra and no formal knowledge of physics

Tim Maudlin is professor of philosophy at New York University. His books include *The Metaphysics within Physics* and *Quantum Non-Locality and Relativity*.

Philosophy of Physics: Space and Time Details

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From Reader Review Philosophy of Physics: Space and Time for online ebook

Colin says

A concise, accessible, enjoyable, responsible and rewarding survey of the historical development of the physicist's conception of space and time.

I say it's concise because this volume weighs in at about 200 pages and covers spatial/temporal geometries from Aristotle, Newton, Galileo and Einstein.

There's certainly a bit of math in the book, but not so much as to exclude the layperson. The descriptions and diagrams provided are about as clear as they can be, given the subject.

I say it's responsible because the author makes use of clear arguments, makes assumptions and missing pieces clear and follows up with recommended readings.

The text is rewarding because it clears up many misconceptions about the theories it covers. I can certainly say this book helped sharpen my understanding of special & general relativity.

There's more physics than philosophy in this text. It serves as an excellent description of space and time for a philosopher. I don't see that it would give the physics student a strong philosophical hook, though it's certainly more philosophical than the average physics text. (The exception would be a relatively sizable discussion of the correspondence between Leibniz and Clarke on Newtonian absolute space, which I enjoyed having studied that debate previously.)

Overall a worthwhile read for anyone looking for an introduction to philosophy of physics, or anyone who could stand to improve their understanding of the theories presented.

Maica says

The book was not an easy read, but the author presented these difficult concepts (especially to the non-physicist reader) in a non-technical and easy to understand language.

Donald says

This book is super dense. While it is not very long, it could easily be taught as a semester long college course. It is very informative and thorough in its exploration of the subject. It was just the wrong choice for me to try to take to the pool everyday. I may revisit it if I ever become an astronaut.

José Uría says

Un excelente tratado de filosofía de la física, centrado en el concepto de espacio-tiempo. La exposición es buena, amena y muy rigurosa, lo que lo convierte en una lectura muy agradable. Presenta algunos puntos de vista sobre el significado de la relatividad especial que no se corresponden con la visión popular entre la mayoría de los físicos. Quizá lo mejor es la presentación de las ideas de espacio absoluto en mecánica clásica, y la parte dedicada a la relatividad especial. También comenta algunos temas muy interesantes de la relatividad general que no aparecen en otras obras, como el argumento del agujero. Aunque aparentemente es un libro para filósofos sobre física del espacio-tiempo, recomiendo especialmente su lectura a los físicos interesados en la filosofía del espacio tiempo.

A pleasant, rigorous and interesting book. The presentation of special relativity by the author is not the standard. Perhaps the best part of book is the exposure of the justification of absolute space in Newtonian physics. Apparently though as a book for philosophers on physics of space-time I recommend specially for physicists interested in the philosophy of space-time.

Manuel says

This is a wonderful book. I started reading it just to get a clearer picture on a couple of concepts of geometry, but the writing is so good that I kept turning the pages and eventually stuck with it to the end. The lessons on topology, transformations, and absolute space and time were just fantastic; I never knew something as commonsensical as Euclidean space would have so much involved. The book has 7 chapters, and the first 3 were easy, anyone can dive right in. Chapter 4, with the introduction of Special Relativity, requires much more focus from the reader as it goes against some popularizations of the theory, but it is still digestible. The last 3 chapters, however, tackle subjects that are difficult no matter how you look at them (e.g. compactification of space-time in space-like or time-like direction), and there is where I struggled. I need to make a second or third reading of them, but no more I should think. Still, this is a very accessible book if you're interested in an introduction to the philosophical aspects of theoretical physics, from Newtonian to Einsteinian. I, for one, am now more motivated to research the topics covered therein in more depth, even if that means getting into the nitty-gritty of mathematical formulas. Very much recommended!

Brian Tracz says

This is a briskly paced survey of conceptual issues in physics, using light mathematics to illustrate the larger geometrical picture of space and time. Maudlin's writing style is dry but clear, and the material and its presentation are engaging. I found the discussion of the Newton/Leibniz dispute over absolute space to be quite illuminative, and it was interesting to see Maudlin parse out which conceptual facets of Relativity (Special and General) are truly a departure from Galilean space-time, and which components of Galileo's picture actually serve as *assumptions* for Einstein's Relativity. His points on the ontological priority of geometrical representations over coordinate systems (e.g., the priority of Minkowski's geometry over Lorentz's coordinatization of it; or, the priority of Euclid's geometry over Descartes' coordinatization of it) was a point that was consistently reinforced throughout the book in different examples. I found very little repetition in this book.

In all, I highly recommend the book to anyone with a basic understanding of physics (Maudlin does light speed past stuff like kinematics and F=ma, so I would suggest some pre-knowledge of that stuff. Just read the Wiki.). I found it thoroughly understandable, and my B.Sc. was in biology (only one year of college

physics). Those with a philosophical background will also find themselves at home with the book. Bravo!

To Chin says

Extremely well-written introduction to relativity. Must read for physicists.

Leonardo Rydin Gorjão says

A fairly comprehensive overlook on the philosophical problems from Newton to Einstein in regards to our perception of time and space. From the ontological character of space and time in Euclidean space, to the extensive and still difficult subtleties of curved spacetime. Dr. Maudlin clarifies on only old, but rooted misconceptions, but also brings forth clear descriptions for these misapprehensions.

Gregory Strong says

I finished this book today, though I can hardly say I grasped much of it with deep comprehension. Maudlin's treatment of the philosophy of the physics of space and time contains more mathematics than I can easily follow. It's been such a long time since I delved into mathematics beyond adding and subtracting in a bank account. Still, now and then I got some of the meanings of changing views of space and time from Euclidian geometry and Newtonian absolute space and absolute time to space-time configurations in other geometries and Special and General Relativity. I finished it because the topic fascinates me and because of a deep-seated sense of responsibility to finish a book once started. For this reason, I don't know that I have ever put aside a book I have started without finishing it. I have never lacked in stubbornness, as family and friends will attest, much to their annoyance. So if you have the math to grasp this book, I recommend it. And I will turn to other books on the subject to grow in understanding beyond what I can comprehend at this point.

Peter Mcloughlin says

Covers the ideas about space and time and reference frames from the time of Galileo through Einstein's relativity to the present. Covers the foundational assumptions behind absolute space, absolute time and Relativity's spacetime. Some physics and math knowledge required.

Murray says

Maudlin’s introduction to the Philosophy of Physics (Volume 1): Space & Time is a brief and somewhat concise account of the key historical theories of space and time, and a few core philosophical concerns with these theories.

Maudlin offers clear explanations of the necessary components of each theory. However, some of the components explicitly skipped or left unaddressed could have been more smoothly transitioned, or even

justified in greater detail. One issue specifically would be less historical perspective and more teasing out of the philosophical problems.

That being said, if Maudlin hadn’t focused as much as he did on explaining the derivation of the theoretical physics perhaps I would not have understood as much as I did. Overall, it was really enjoyable to grapple with an explanation of space and time from a new perspective, much of which was idea altering.

Kristofer says

Nice overview of the philosophy of physics without an analysis of time. Author doesn't cover relativity with the same clarity that he covers Aristotle and Newton.
