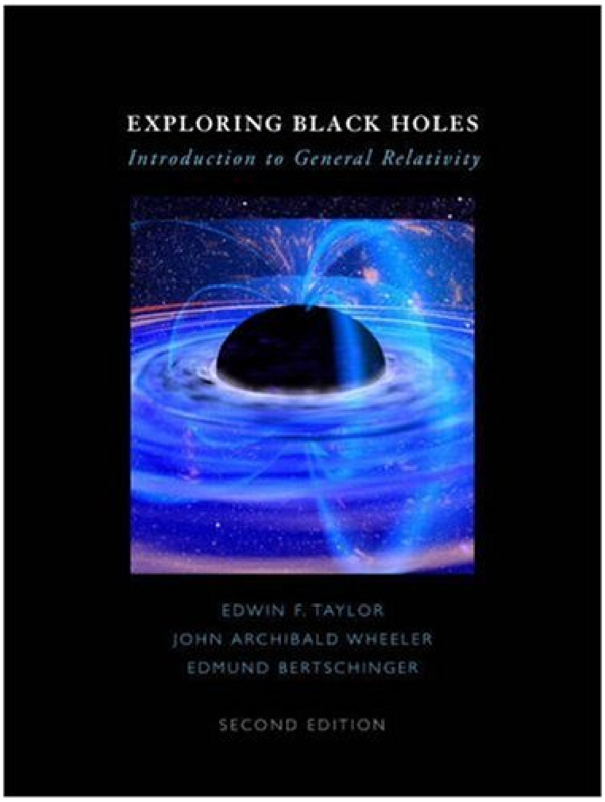
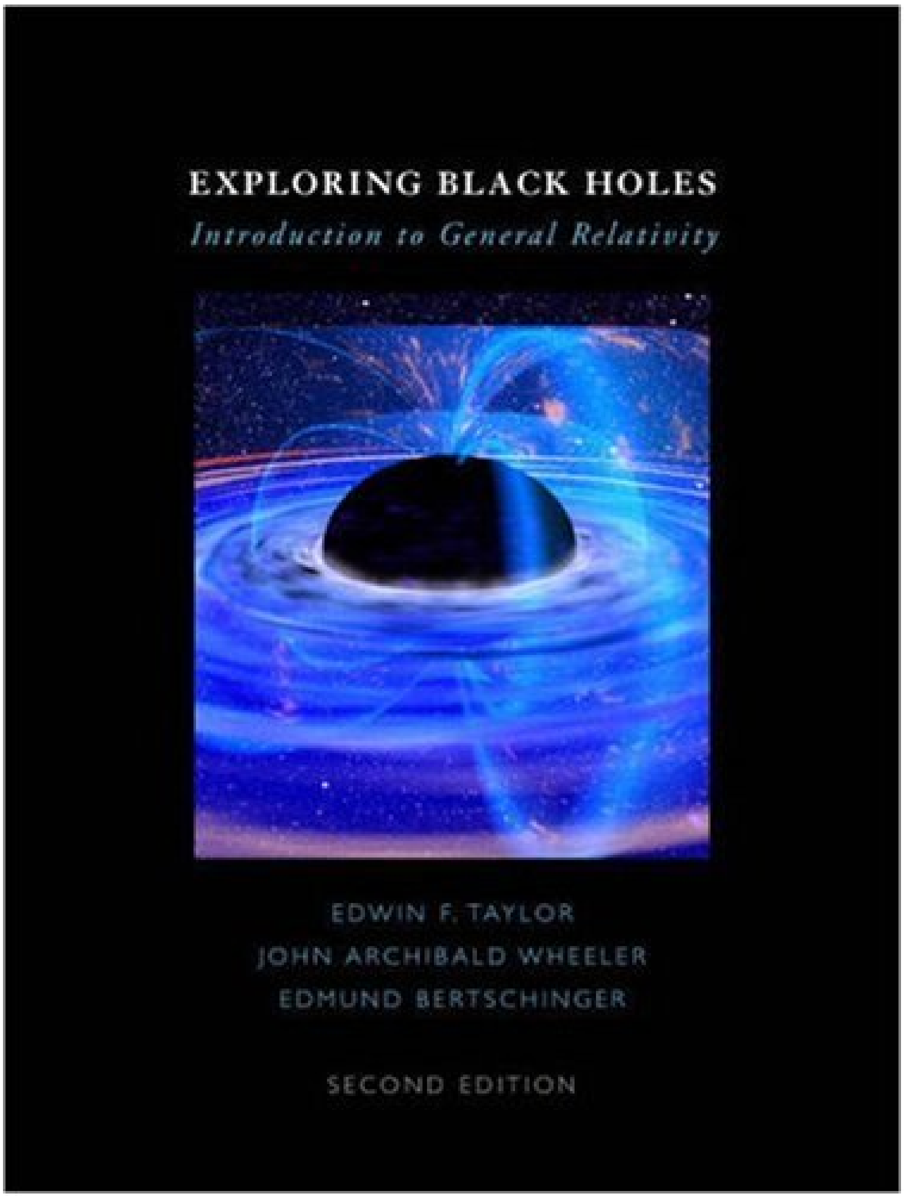
# EXPLORING BLACK HOLES: INTRODUCTION TO GENERAL RELATIVITY (2ND EDITION) BY EDWIN F. TAYLOR, JOHN ARCHIBALD WHEELER, EDMUND BERTSCHINGER




EXPLORING BLACK HOLES
Introduction to General Relativity
EDWIN F. TAYLOR
JOHN ARCHIBALD WHEELER
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SECOND EDITION

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Review

American Journal of Physics, Vol. 69, No. 11, pp. 1212-1213, November 2001



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Key Benefit:

This unique book offers a concise, introductory overview of general relativity and black holes, motivating readers to become active participants in carrying out their own investigations. To this end, the book uses calculus and algebra, rather than tensors, to make general relativity accessible. Five chapters introduce basic concepts, and seven projects require the reader to apply these basic concepts to real astronomical applications.
Key Topics:
Speeding (Review of Special Relativity), Curving (Spacetime Near a Non-Rotating Black Hole), Plunging (Diving Toward a Black Hole), Project B: Inside The Black Hole, Orbiting (Zooming Around a Black Hole)
Market: Intended for this interested in gaining a basic knowledge of Black Holes.

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- Published on: 2016-11-09
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- Binding: Hardcover
- 400 pages

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Most helpful customer reviews

6 of 7 people found the following review helpful.
Gives an intuitive understanding of General Relativity
By Neal J. King
This book sidesteps the hard work needed to motivate and develop the Einstein field equations, and goes directly to one of the most important solutions of the equations, the Schwarzschild solution, which gives rise to the concept of a black hole. By exploring what observers in different parts of space-time would experience along their different trajectories (whether falling into a black hole or watching from a safe spot far away), Taylor and Wheeler manage to convey an intuitive understanding for such typical GR "paradoxes" such as the fact that the same "event" (the crossing over of an object through the event horizon) can be seen to take 15 minutes, or forever, depending on who's watching it.

Because of what it omits, this book is not a complete presentation of GR. It does present the most fun part of GR, however, in a way that is mathematically accessible.

Along the way, a few side questions are adddressed, like "How painful would it be to be squished/torn apart as I fall into a black hole?" A lot of time is also spent explaining how the weird trajectories of light within the event horizon will transmogrify what is seen by the observer.

This is a great book and a lot of fun. I am also left with a greater motivation to go back to a more complete presentation, to be convinced that "this is where you have to end up". Although much longer, this book is a worthy successor to the original output of this dynamic duo, "Spacetime Physics".

3 of 4 people found the following review helpful.
Amazing Introduction to a Very Esoteric Subject
By Serious Inquirer
Einstein's general theory of relativity is perhaps one of the most mathematically intense areas of research any physicist or astronomer could undertake. However this book takes the subject and turns it into a joyous romp through curved spacetime.

By avoiding the field equations and focusing on their solutions the authors impart to the eager student an overview of general relativity and set the stage for a more rigorous approach to be undertaken later. This book is the perfect introduction to the subject.

The book is well suited for advanced undergraduates who have had several hours of physics and mathematics. It is likewise suited to serve as a introductory text for graduate students that are studying astrophysics and astronomy. In the latter case the text serves well as an overview of what general relativity is, many of its findings, its predictions, and its relevance to observational astronomy.

If you have a basic understanding of calculus and have studied the special theory of relativity in some detail then this book is well suited to your needs.

0 of 0 people found the following review helpful.
Very easy read. Highly recommnd the book those who want ...
By David Byrd
After I read a few pages I said to my self " so thats what other book were saying. Very easy read.Highly recommnd the book those who want to uinderstand black holes and GR.

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About the Author

Edwin F. Taylor is a Senior Research Scientist Emeritus in the Department of Physics at the Massachusetts Institute of Technology. He graduated from Oberlin College and earned a PhD from Harvard University. He has received the Oersted Medal, the highest award of the American Association of Physics Teachers "for notable contributions to the teaching of physics," and was an editor of the American Journal of Physics for six years. Dr. Taylor has written interactive software for physics education, as well as numerous articles, reports, and reviews for both technical and trade publications. His book-authoring career began with Introductory Mechanics (Wiley, 1963); since then, he has written An Introduction to Quantum Physics with A. P. French (Norton, 1978), Spacetime Physics (Freeman, 1992) with John Archibald Wheeler, and the first edition of Exploring Black Holes (Addison-Wesley, 2000), also with Wheeler.
John Archibald Wheeler (born July 9, 1911) is an eminent American theoretical physicist. He received his doctorate from Johns Hopkins University in 1933, and went on to become a professor of physics at Princeton University from 1938-1976, then a professor of physics at the University of Texas at Austin. During his teaching career, he placed a high priority on education and student motivation.

Wheeler made important contributions to theoretical physics. In 1937 he introduced the S-matrix, which became an indispensable tool in particle physics. He was a pioneer in the theory of nuclear fission, along with Niels Bohr and Enrico Fermi. In 1939, he collaborated with Bohr on the liquid drop model of nuclear fission.

During World War II, Wheeler interrupted his academic career to participate in the development of the U.S. nuclear bomb under the Manhattan Project at Hanford, WA, where reactors were constructed to produce plutonium for the bomb which was to be dropped on the Japanese city of Nagasaki. He went on to work on the development of the American hydrogen bomb under Project Matterhorn B.

After concluding his Project Matterhorn work, Wheeler returned to Princeton to resume his academic career, and subsequently worked on extensions to general relativity, geometrodynamics, the theory of gravitational collapse, quantum gravity, and more. Wheeler was awarded the Wolf Prize in Physics in 1997. He maintained an office in Jadwin Hall at Princeton up until 2006.
Edmund Bertschinger is a Professor of Physics and Division Head of Astrophysics at MIT. He is a theoretical astrophysicist whose research interests focus in cosmology and relativistic astrophysics. A native of California, he received his B.S. in physics from Caltech in 1979 and his PhD in Astrophysical Sciences from Princeton University in 1984. Following postdoctoral positions at the University of Virginia and at UC Berkeley, he joined the MIT faculty in 1986, where he rose through the ranks reaching his present position as full professor in 1996.

Professor Bertschinger is passionate about education.  He enjoys teaching classical mechanics, electromagnetism, quantum mechanics, relativity, and cosmology. In collaboration with Dr. Edwin Taylor, he introduced an undergraduate class on black holes and astrophysics that is taken by MIT alumni as well as by undergraduates. In 2002 he received the Physics Department's Buechner Teaching Prize for his undergraduate and graduate classes in relativity.

Professor Bertschinger also loves working with students on research in astrophysics, cosmology, and general relativity. His research students at the high school and undergraduate level have won national prizes for their work, including First Prize in the Intel Science Talent Search. His former PhD students now hold faculty positions at Harvard, UC Berkeley, and other fine universities.

As a member of the MIT Kavli Institute for Astrophysics and Space Research, Professor Bertschinger leads a research program studying the mysteries of dark energy and dark matter. He and his research students investigate the formation of cosmic structure after the big bang, the physics of dark matter both in the early universe and in forming galaxies, and the physical processes governing matter and radiation close to black holes.

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