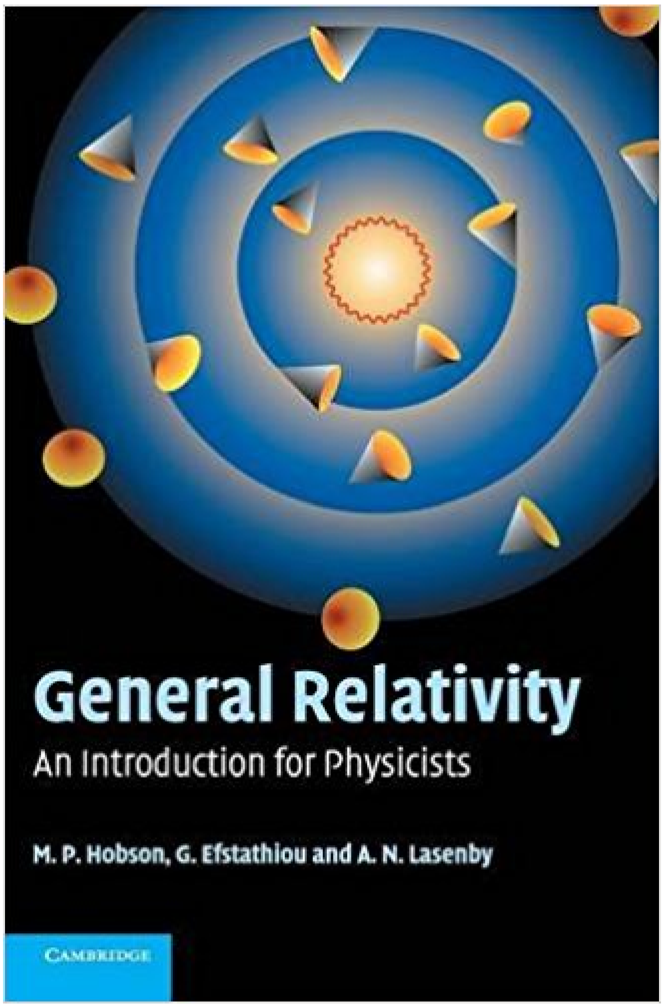
General Relativity: An Introduction For Physicists



Synopsis

After reviewing the basic concept of general relativity, this introduction discusses its mathematical background, including the necessary tools of tensor calculus and differential geometry. These tools are used to develop the topic of special relativity and to discuss electromagnetism in Minkowski spacetime. Gravitation as spacetime curvature is introduced and the field equations of general relativity derived. After applying the theory to a wide range of physical situations, the book concludes with a brief discussion of classical field theory and the derivation of general relativity from a variational principle.

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Customer Reviews

"General Relativity is written clearly... gives a good, readable introduction to the foundations and applications of general relativity theory, and it is a good choice for a general relativity course emphasizing astrophysical and cosmological applications." Lawrence H. Ford, Tufts University for Physics Today"Like any good book on general relativity, much is expected of the reader, but the writing is concise and elegant, with plenty of good exercises for the student to work on. The authors strike an excellent balance between the demands of mathematical rigor and physical significance." Alan S.McRae, Mathematical Reviews

This is a clear mathematical introduction to Einstein's theory of general relativity. It presents a wide range of applications of the theory, concentrating on its physical consequences. After reviewing the basic concepts, the authors present an intuitive discussion of the mathematical background, which is then used to develop a physical understanding of a wide range of topics in relativistic gravitation. Written for advanced undergraduate and graduate students, this approachable textbook contains over 300 exercises to illuminate and extend the discussion in the text.

I have read parts of many books on general relativity and cosmology and I have to say that when looking for a refresher on a concept, I always turn to this book first. It might be because I first learned much of general relativity from this book, but I think the explanations are clear and the authors don't get bogged down in details. This makes the book a great starting point for new students.That said, there are a lot of typos in the book. There is one and half pages of corrections in the back of the book, and the notation that is used is sometimes a bit strange (power spectrum, etc.) For me, I am more concerned about the concept and the intuition so these hiccups don't bother me too much.Bottom line: for those who want to learn GR as fast as possible using only high school calculus read Exploring Black Holes by Taylor and Wheeler. For those who want all the details and multiple perspectives on GR, read Gravitation by misner thorne wheeler. Bridging the gap is this book.

While looking for a book to teach my undergraduates I was lucky to obtain a copy of this book.I was ready to implement the Nightingale/Foster , but I was disappointed to see the degradation of its second edition. I learned GR with the first edition of N/F!!!.Well , I checked this excellent book and I was amazed.In the first chapters the authors expose Vectors tensors and manifold in the easier possible way. Then they revise Special Relativity . Then , they proceed as usual , Curved spaces , Einstein's Field Equation , Scwh-Metric, Schw -Black Holes , Interior solutions, but , then : Kerr solution in great detail!!. Without going into Ehler's equations or Degenerated Algebras , the authors describe very well Kerr's Geometry and Physics (Penrose's , Celestial Mechanics..etc).Cosmology (FLW) solutions ,..Inflation in some extent!!..Linearization and Gravitational Waves (Production and detection) .At the very end there is the Hilbert action etc.I wish some Kaluza/Klein , which is possible and necessary for the new generation (to understand completely String Theory you need to taste KK- theory) and also , I wish a given amount of solution for the large number of problems at the end of every chapter.I hope to see both of these in future versions of this magnificent introductory book and then I will give the 5-star.

A well written presentation of a difficult subject. However, this is not for the beginner. You must have a good command of Calculus and analytic geometry in order to understand this material, but the authors do an excellent job of presenting it in a logical and accessible manner.I particular like the way the authors have broken the material into digestible bits makes this the best presentation of the material have seen - and I have a PH.D in Astronomy.

For someone wanting to get into the real workings of general relativity with only a background of multivariable and vector calculus, this is a perfect book. It’s easy to read with a great method of introducing the material by showing you how to use it, then deriving it, which allows you to know the importance of why you are deriving it. Problems at the end of each chapter. The only problem is finding the solutions, which can be found by searching for courses that are using the textbook, and happen to post homework solutions.

I have this book along with the classic by Misner, Thorne, and Wheeler. Both are good, but I like the explanations in this book better. I think it benefits from being published in 2006. Physicists have learned how to explain General Relativity better. Misner, Thorne, and Wheeler is 3 times thicker and covers more topics, but this is actually a distraction from learning the subject for the first time.Another advantage of being published in 2006 is that the quality of presentation has improved.I recommend the book.

It should be among the standard choice of GR textbooks like Schutz and Carroll. It provides an exposition of essential differential geometry (if you want mathematical rigor read Wald or a math book), comprehensive discussions on Schwarzschild and Kerr black holes, gravitational waves and FRW/ inflationay cosmology, to name a few.The best thing about this book is that it shows detailed steps in deriving equations, which most other authors regard as trivial but not for students. The exercises are also very helpful. It’s also a very good source of reference.This book is ideal for advanced undergrad/beginning grad students who learns GR for the first time, before moving on to more advanced stuff (e.g. Wald). I myself read Schutz and Hartle before discovering this book and this really got me started.The latest edition has most typos corrected.

I judge a text by first reading material in it I am familiar with. Hopefully I will find that material clear; even better is when it illuminates and improves my understanding. Many of the topics in this book’s first half are matters I have studied before. But I found the presentation often crucially vague and confusing. It left me with no confidence about understanding the complex subjects in the latter portion of the text. A poor presentation of GR. Reading it was disappointing: I gave up after wading through the first third. In my opinion, this is a book that will leave a lot of confusion for the reader and, later, you will have to "unlearn" and relearn this material elsewhere to gain insight. What should you read instead? Schutz is superb and definitely worth even a second careful reading! Read Misner, Thorne, and Wheeler! Read Taylor and Wheeler's undergrad book on black holes! Beautifully clear physical insights. Read Spivak volumes 1 and 2 to learn the differential geometry. You can profitably skip around in these wonderful volumes. Also, read the wonderful book by Hicks (Notes on Differential Geometry).

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