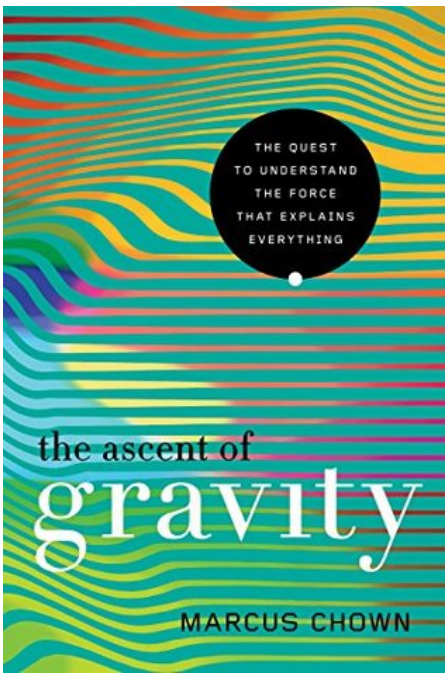

The Ascent of Gravity: The Quest to Understand the Force that Explains Everything

Marcus Chown

The Ascent of Gravity: The Quest to Understand the Force that Explains Everything

Marcus Chown

The Ascent of Gravity: The Quest to Understand the Force that Explains Everything Marcus Chown

Why the force that keeps our feet on the ground holds the key to understanding the nature of time and the origin of the universe.

Gravity is the weakest force in the everyday world yet it is the strongest force in the universe. It was the first force to be recognized and described yet it is the least understood. It is a "force" that keeps your feet on the ground yet no such force actually exists.

Gravity, to steal the words of Winston Churchill, is "a riddle, wrapped in a mystery, inside an enigma." And penetrating that enigma promises to answer the biggest questions in science: what is space? What is time? What is the universe? And where did it all come from?

Award-winning writer Marcus Chown takes us on an unforgettable journey from the recognition of the "force" of gravity in 1666 to the discovery of gravitational waves in 2015. And, as we stand on the brink of a seismic revolution in our worldview, he brings us up to speed on the greatest challenge ever to confront physics.

The Ascent of Gravity: The Quest to Understand the Force that Explains Everything Details

Date	:	Published November 7th 2017 by Pegasus Books
ISBN	:	
Author	:	Marcus Chown
Format	:	Kindle Edition 276 pages
Genre	:	Science, Nonfiction, Physics, Astronomy

From Reader Review The Ascent of Gravity: The Quest to Understand the Force that Explains Everything for online ebook

John Gribbin says

I did a double review of two books for the Wall Street Journal, so posting it under both titles!

The Ascent of Gravity
Marcus Chown
Pegasus
On Gravity
A. Zee
Princeton

Gravity has become a hot topic in science, with the discovery of gravitational waves, ripples in the fabric of space coming from colliding black holes and neutron stars. Both The Ascent of Gravity and On Gravity mention those discoveries, but neither book focuses on them. Rather, they provide the background to our understanding of this fundamental force of nature, a force which is the weakest one known but which paradoxically, because of its long range, is the most important one in the Universe at large.
The first person to appreciatee the literally universal importance of gravity was Robert Hooke, who realised that gravity is a universal force possessed by every object in the Universe, which attracts every other object. Hooke, a slightly older contemporary of Isaac Newton, was both an experimenter and observer, and a theorist. His insight about gravity came partly from his telescopic observations of the Moon. He studied lunar craters, and noticed that they are formed of nearly circular walls, around a shallow depression. They looked, in his words “as if the substance in the middle had been digg’d up, and thrown on either side.” So he carried out experiments, dropping bullets onto a mixture of water and pipe-clay, making miniature craters which, when illuminated from the side by a candle, looked just like lunar craters. He realised that the material thrown up from the centre of the craters of the Moon was pulled back down by the Moon’s own gravity, independent of the Earth’s gravity. He pointed out that apart from small irregularities like craters, the Moon is very round, so that “the outermost bounds. . . are equidistant from the Center of gravitation”, tugged towards the center by gravity, and concluding that it had “a gravitating principle as the Earth has.” This was published in 1665, when Newton was just completing his degree at the University of Cambridge. Hooke went on to suggest that planets are held in orbit by an attractive gravitational force from the Sun.
The two books considered here both fill in what has become known about gravity since Hooke’s day, but they are very different, both in approach and style. Marcus Chown is a science writer, and a very good one. He favours the historical approach, starting with Newton’s work on gravity and taking us through Albert Einstein’s contribution to the mysterious world beyond Einstein where physicists hope to find a theory that will explain gravity and quantum physics in one package. He eschews equations, but provides clear explanation with a useful guide to further reading at the end of each chapter. The result feels easy and natural, like the author talking to you, although I suspect it took a lot of hard work to produce that effect.
By contrast, A. Zee (who only uses the initial) is a professor of physics who has previously written an epic tome on gravity, and is now trying to “bridge the gap between popular books and textbooks.” He is only partially successful. Some of his attempts to be “popular” seem forced, as with sentences such as “Ah, the glory days of trial and error experimental physics!”, and the logical structure of his arguments is sometimes faulty, as when (in a book about gravity!) he tells us that “just about the only commonplace example of a force acting without contact is the refrigerator magnet.” He does provide equations, and diagrams, and is on secure footing there. But the sloppiness of his writing is highlighted by comparing his mention of the myth that Galileo dropped weights from the Leaning Tower of Pisa with Chown’s. Chown correctly identifies this as a legend; Zee presents it as a fact “we all learned in school”. Maybe we did learn the story there, but it is definitely legend, not fact.

A particularly delightful feature of The Ascent of Gravity is the inclusion of several fictional vignettes in which the author imagines how the big ideas came to his protagonists – for example, a story of the young Einstein walking out with his girlfriend Marie Winteler under a moonlit sky, and having a sudden insight about the way light travels across space. Fantasy, but fun – and no real surprise that it should work so well, since Chown is also a successful writer of science fiction (on some of which, long ago, I collaborated with him). Chown's great achievement is to make his discussion of such bizarre phenomena as the way rotation distorts space just about as intelligible and entertaining as the fantasy.

Zee's great achievement is to provide the clearest explanation I have seen of the physical principle known as "action", which among other things explains why light travels in straight lines – or, more accurately, why light travels along the path that takes least time. Action is arguably the most powerful tool in the physicist's box of tricks. In Einstein's own formulation of the general theory of relativity he required a set of ten equations to explain the interaction between matter and spacetime; but the whole thing can be described much more simply in terms of a single action. I was also particularly pleased to see Zee emphasising the point that Einstein did not prove that Newton was incorrect. Newton's version of physics is perfectly adequate for things moving much more slowly than light in weak gravitational fields, and Einstein's version includes Newtonian physics within itself. The famous headline in the London Times of 7 November 1919 proclaiming "Newtonian Ideas Overthrown" was just plain wrong. Science does not progress by revolutions, but by building, brick by brick, on what has gone before.

The latest brick in the edifice is, of course, the discovery of gravitational waves, and it is unfortunate that these books are unable to give much space to this. The Ascent of Gravity was written a little earlier than Zee's book, and gives the discovery only passing mention. On Gravity was written, the author tells us, after the first detection was announced, but even so gives it a rather cursory mention. I was baffled by the fact that although Zee mentions plans for a gravitational wave detector to be built in India, he does not mention the one already built in Italy (and a curious footnote suggests that he is unaware of its existence). If you do want the full story of gravitational wave research, it is covered by Marcia Bartusiak in her excellent book Einstein's Unfinished Symphony.

If you are looking for a good read and a chance to absorb painlessly some ideas about the force that controls the Universe, Marcus Chown is the man for you. If you think you already know a little bit about the topic, and are not afraid of a few equations, then On Gravity will take you deeper; if you are very brave, the Appendix will explain the meaning of curved spacetime. If I had a magic wand, I would wave it to put Zee's diagrams into Chown's book, and get the best of both worlds.

Vintagebooklvr says

This book will blow your mind as it tries to explain gravity, quantum physics and associated ideas to the common person. It does a pretty job of it. Any failure is in my lack of understanding. It isn't full of equation that make no sense to the layperson but with analogies and real world explanations make sense of the unexplainable (and yes some of it is unexplainable even to the physicists). In this world of black holes and quarks what is impossible on our level of reality is possible and even fact.

It is also includes humorous stories and statements which liven up this monograph. It brings to life people like Einstein who normally are just thought of because of his brain (and his hairstyle).

So read it for the history and explanation behind some of the most important equations that explain our universe as well as some of the latest finds and current questions that occupy physicists today. You will also be entertained.

Sam says

From Newton to Einstein to the present theories of cosmology. Chown takes us through a universe which shows itself to be a dichotomy of truths. Everyone knows that gravity is an attractive force..right? Well it appears that it also has a dark side which is helping the universe to expand and which may lead to a deeper theory of the universe. This is a great book for those like me who looked into space (pun intended) with glazed eyes in physics. For the first time i was engaged reading this book. It's enjoyable, informative and at times witty.

Bradley says

This is a highly entertaining history of gravity, full of quite interesting anecdotes and the gradual unfolding of our understanding from Newton through Einstein through our quest to reconcile quantum mechanics with the one aspect we're most familiar with but which we understand the least.

From the first page to the last I was enraptured. It's a tour of the inverse square law, the connection between electromagnetism, light, and matter, right down to the physics that keep most theoreticians up late at night even now.

Humorous, insightful, and fairly comprehensive, it focuses on the subject well, describing the manner in which gravity functions and how it behaves. I'd recommend it absolutely as a beginner's book with a special delight for those of us enamored by the LAW. :)

I personally had a great time. Not much new, honestly, but it was a delight. :)

Joseph Williams says

The only downside of this book was the reader (I listened to the audio). When she kept her natural British accent she was fine, but whenever she switched to accents when quoting Einstein (German) or American accents, she sounded ridiculous; that was distracting. Her American accent sounded like all her American scientists were from New York. Argh.

Anyway...

A very accessible popular science book on gravity and the history of the science behind it ending with the unanswered questions still be explored. I thoroughly enjoyed it although I have still to encounter any book which can hammer into me a good understanding of quantum mechanics (which Chown explores at the end of the book). Recommended.

Bree says

I really enjoyed this read. The first two sections (Newton and Einstein) were really clear and written with

humour and I enjoyed the historical context given, but none of it was at the expense of glossing over the science which I really appreciated. It also didn't shy away from discussing maths whilst not overwhelming the matter by including full derivations or anything. The third section was really really dense and complex - but that's the nature of quantum mechanics and I was really impressed at how readable it was given the context. I'm not positive this is a book I could give to someone who hasn't studied at least some undergrad chem or physics so that's just some thing to keep in mind.

Steven says

This title is a bit misleading, because it seems to bit off and chew on quite a bit more than just gravity. It's a nice brief overview of the both the history and the current state of discoveries and thinking about large (and small)-scale physics, from Newton and his apple through quantum physics and string theory. I can't pretend to understand much of what was going on, and I got a bit lost toward the end. But it's a good overview.

It might have been aided by some illustrations or tables to help convey some of the ideas. There are many times that Chown asks the reader to imagine some device or scenario that would have been helped with an accompanying graphic. I did appreciate the choice to put "Further Reading" lists at the end of some of the chapters.

Ray NotBradbury says

Not a review but some kind of essay (based on the book)...

Gravitational waves are bombarding The Earth from all sides at all times. But you don’t know about it. Or maybe you know, but don’t care. Or simply – do not feel it. More likely.

Ray is going to ask you to stop for a moment today, and listen.

What can I say, folks…the book ‘The Ascent Of Gravity’ is FASCINATING! It is also The Science Book of the Year 2017. I picked it only because this is the book about ‘Gravity’. I believe if we’ll understand this amazing ‘force’ – we’ll understand everything:

How and most important why the world was created?
What is time?
What is space?
What is Universe?
Where did the Universe come from?
5 things you may not know about gravity

Gravity creates a force of attraction between you and the coins in your pocket. Between you and a person passing you on the street. You are connected (by gravity).
Gravity is so weak, that if you hold your hand out, the gravity of the whole Earth can not overcome the strength of your muscles.

The rest read on my BLOG - https://raynotbradbury.com/2018/07/12...

Douglas Lord says

Growing up in rural Connecticut presented some difficulties, namely, finding anything to do. Reading proved a dependable pastime and mostly I scrounged through whatever books were left laying around by my six older siblings. The Caine Mutiny, comic books, The Oxford Companion to American History, and lots of Isaac Asimov's science titles. Like Asimov's books, Chown's title is wild—informative, intelligent, and blessedly clear. It does for gravity what Robert Penn did for wood in The Man Who Made Things Out of Trees: The Ash in Human Culture and History: a lot. Topically Chown covers the remarkable work of Newton, Einstein, and those "Beyond Einstein" in an engaging conversational and readable manner with an eye to explain that gravity, for as weak a force as it is, still governs everything. Along the way, the bucket of awesome overfilleth with mind-blowing explanations of dope-ass gravity-related stuff, such as that Newton invented integral calculus so that he could explain what was going on inside his head about the universe, that Einstein figured out that "the Sun creates a valley on space-time in its vicinity around which the Earth circles like a planet-sized roulette ball," and Planet Nine, the recently discovered object ten times the mass of Earth that orbits the sun about every 15,000 years. **VERDICT** For general readers, not true gravity nerds, who enjoy a good read.

Find reviews of books for men at Books for Dudes, Books for Dudes, the online reader's advisory column for men from Library Journal. Copyright Library Journal.

Paul says

As the story goes, in 1666 Isaac Newton watched an apple fall from a tree, and it was this simple action that gave him the inspiration to develop the theory and the mathematics that was first published in 1687 in Philosophiæ Naturalis Principia Mathematica (Mathematical Principles of Natural Philosophy) where he laid out the foundations of classical mechanics. These new laws meant that for the first time people could track the progress of the planets across the night sky, and Halley used the laws laid down by Newton to predict the elliptical path of the celestial object to predict the return of Comet, an event that he was never to see, but it carries his name to this day. They were used to predict the presence of a new planet, Neptune, the first to be discovered using these principles.

Variations in the path of Mercury, lead astronomers to search in vain for another planet amongst the inner planets, a subject covered very well in The Hunt for Vulcan by Thomas Levenson, but this was to show the limitations of Newton's laws.
These limitations were not addressed until a chap called Einstein who was unhappy with the anomalies that the current theory threw up. It took eight years for him to demonstrate that the concept of gravity as everyone understood it was better described mathematically as the curvature of space-time. The ten equations in his general theory of relativity can be distilled down into this elegant equation:

From this, all sorts of things can be deduced and predicted and it is only recently that one of those predictions was finally detected; gravitational waves. This final part of the books ventures into the strange, surreal and occasionally baffling world of string theory. The physicists working on this are trying to reconcile special relativity and quantum theory to one theory of everything and the current consensus is that the present theories, along with years of understanding will have to be totally re-written.

Gravity is a habit that is hard to shake off ? Terry Pratchett

Chown has given us a well written and thankfully, given that this is a physics book, a comprehensible text on the history and the most recent developments in research into gravity.
He goes some way to answering the big questions; what is space? What is time? How did it start, but I can't help but have the feeling that the next breakthrough in this field will make Einstein's theory as irrelevant as he made Newton's work at the turn of the 20th Century.

Brian Clegg says

Marcus Chown is one of the UK's best writers on physics and astronomy - it's excellent to see him back on what he does best. Here we discover our gradual approach to understanding the nature of gravity - the 'ascent' of the title - which, though perhaps slightly overblown in the words 'the force that explains everything' (quantum physics does quite a lot too, for example), certainly makes us aware of the importance of this weakest of fundamental forces. Chown's approach to gravity is a game of three halves, as they say, broadly covering Newton, Einstein and where we go from general relativity.

As far as the first two sections go, with the exception of the 2015 gravitational waves detection, there's not much that's actually new - if you want a popular science exploration of these aspects of the topic with more depth there are good alternatives - but no one has covered the topic with such a light touch and joie de vivre as Chown.

Although Chown doesn't give us too much character detail on his two key figures, we get good mental sketches of them, enough to get a feel for what kind of personality produced the remarkable work that each was responsible for. There has been a lot written of late criticising science writers for putting too much focus on the 'heroic lone individual' in the history of science. And we certainly get a full power portrayal of this pair as solitary geniuses. But though you can quibble about how original calculus was or whether Einstein should have given more credit to others in his work on special relativity, it's hard to imagine two people in the history of science who more deserve this treatment - and it is far and above the best approach for the kind of storytelling that Chown excels at.

The third section has its highs and lows. It gives what I think is the best introduction to string theory at this basic descriptive level I've ever seen, going considerably beyond the basics of vibrating strings and rolled up dimensions. However, I was rather surprised at the total dismissal of string theory's main rival, loop quantum gravity, which literally only appears in an end note. In one sense this was refreshing. I had read so much pointing out the flaws in string theory and how it arguably wasn't even science because of its inability to make useful predictions that I had pretty much mentally dismissed it. It seemed very reasonable that the only thing that kept it alive was the large number of careers that had been dedicated to it. Chown, however, gives it a spirited defence which, while not necessarily clinching, certainly made it possible to understand why so many physicists found it attractive.

Overall, then, a very readable exploration of humanity's gradual realisation of what gravity was about with all of Chown's usual sparkle. It would have been good if we had seen a little more of the points where things aren't set in stone - for example the alternatives to dark matter or that elusive loop quantum gravity - but what we get is a delight.

Jingsheng says

In part I, the author explains simple things pretty well, as a Phd in physics, I also learned a thing or two.

Then in part 2, he explains things too simple. As far as the part 3, it is a little bit awkward. I got a feeling he trusts Nima too much... Well, I admit I agree with most of what Nima has said. However, this is a popular science book for everyone, you have to interpretate what you heard using your own language and help ordinary people digest those profound ideas using your own examples.

Dan Graser says

Gravity is one of those concepts everyone thinks they understand, only occasionally discovering that their notions of gravity are identical to those held in the time of Newton. Curiously enough, just as in every other area of scientific inquiry, there have been significant new discoveries and developments in our understanding of this force on huge and infinitesimally small scales.

Where this book succeeds is in providing the curious reader with a context to understand the current ways gravity is being studied. Beginning the the journey with Newton, venturing through Maxwell and Einstein and up to early developments of string theory, Chown writes very accessibly and vividly on the history of this study. Perhaps the primary disappointment is that there is little in the way of contemporary accounts of quantum gravity. He does a remarkable job setting the stage but once we get to the past couple decades the book ends abruptly which is a bit disappointing.

However if this is a topic you're interested in and haven't thought about much beyond the very earliest theories then Marcus Chown has written a very eloquent introduction here.

Deepak Saxena says

Since the book is written in 2017, it has an advantage of being definite about gravitational waves. It gives the book a promising start and defines its central focus on gravity. It is divided into three parts - first one dealing with classical gravity (aka Newton), second one with space-time (aka Einstein), and the final one on possible future. The book is filled with anecdotes and interesting implications of theories under consideration (although the author 'imagining' some life events of Einstein's seem to be 'inspired' from NGC series Genius). In the last part, its good to see that there is a fair treatment of various proposals. This is in contrast to some other works that put too much stress on String Theory. The books teases ideas such as Holographic Universe, Dark Matter, or Modified Newtonian Gravity. Overall, an enjoyable, informative and intellectually satisfying read. 4.5 stars.

John Kaye says

Not the first time I've read through to the end of a Marcus Chown and realised that, though there are some good stories and some nice linking of events and people, I'm not much better educated about the subject matter than when I started. Perhaps I should stop reading the author!
