

Physics Reading List

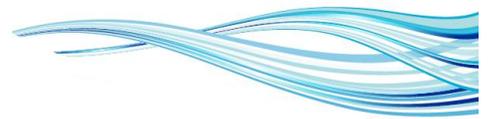
1. A Level Physics for OCR-A Textbook (Oxford; Chapter 1 to Chapter 12)
2. Head Start to AS Physics (CGP)
3. OCR-A A Level Physics Revision guide (Oxford; Gurinder Chadra)
4. Notes and questions: <http://www.physicsandmathstutor.com/past-papers/a-level-physics/>
5. Notes and questions: <http://www.s-cool.co.uk/a-level/physics>
6. A level Physics Online: 289 videos on youtube channel
7. DrPhysicsA : 58 videos on youtube channel
8. Why $E=mc^2$? (book; Brian Cox)
9. Wonders of the Solar System (TV series)
10. Wonders of the Universe (TV series)
11. Wonders of Life (TV series)
12. Human Universe (TV series)

Other suggestions.

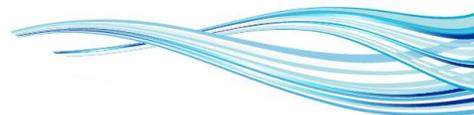
Astrophysics and cosmology

- **A Brief History of Time** - Stephen Hawking
Not as good as its mythological status suggests but definitely worth a read to give a broad overview of cosmology. A little out of date now, and a little mind blowing in places but it certainly opens your eyes to the principles of cosmology. There's nothing really in the way of scary mathematics. There's only 1 equation in the entire book, as Hawking likes to point out - The famous .
If you don't fancy this you may like to try a Briefer History of Time which is more up to date. It's also apparently much easier to read.
- **Universe in a Nutshell** - Stephen Hawking
The sequel to the above. Written in 2001 it brings the reader up to date, focusing mainly on the theory of branes and M-theory, which leads on from string theory. A lot more pretty pictures in this one, but again quite involved conceptually, and somewhat biased towards set theories (namely string theory and the concept of p-branes).
- **The Elegant Universe** - Brian Greene
Another of these mythical "must read" books, which has become extremely popular of late. For all its popularity, make no mistake that it is not an easy read. It's pitched at quite a high level but does give just about everything on string theory you could possibly want to know, without the mathematical complexities inherent in string theory. As you'd expect it's very biased towards string theory. Read it if you like, but in my opinion there are far better books out there. Save yourself the trouble and watch the TV series.
In my opinion if you're going to pick a reading topic, pick a topic with real scientific evidence and applications, as opposed to string theory, which is unable as yet to make any form of testable prediction.

abstraction98: Completely disagree. Although technical towards the end a great book showing the scale of human thought in this area. String theory is one of the best contenders for a TOE out there - if we always studied things with "real scientific evidence and applications" science would be nowhere close to where it is now.



- **Three Roads to Quantum Gravity** - Lee Smolin
Recommended by [poer](#) as an alternative to Brian Greene's books. Obviously Smolin takes a different approach to explaining things because he has predominantly focused on loop quantum gravity throughout his career. It is by far the best science book I've ever read, although it's conceptually slightly more demanding than "The Elegant Universe."
- **Blackholes and Timewarps: Einstein's Outrageous Legacy** - Kip Thorne
A really excellent book that I would highly recommend. It's quite difficult to obtain, and rather epic in physical dimensions, but it covers all areas of astronomy - right through from relativity to black holes to the search for gravitational waves. I particularly like the way it focuses on the scientific method, and how physics at that level is carried out as a research group. It's interesting to see the inter-relationships between the different groups and gives a nice insight as to what research would be like, quite aside from the actual physics contained in the book.
- **The First Three Minutes** - Steven Weinberg
This is a book that is always highly recommended. It's very well explained to the lay person (but with glossaries and mathematical derivations at the end for those who want it) and concentrates more on a step by step occurrence of what happened in the first 3 minutes after the big bang, in a level of detail not covered elsewhere. It does have one drawback - it is seriously starting to show its age. It shows just how far astronomy has come in the last 25 years as many areas known today are not mentioned, and often he guards his back against the then latest (and now accepted theories) by describing others. Inflation is not mentioned at all. If you bear this in mind though, it's worth a read just for being well-written and slightly different in topic.
- **Just Six Numbers** - Martin Rees
Written by the Astronomer Royal, this book takes a slightly different tact, focussing on 6 dimensionless fundamental constants of nature and looking at how these affect the way the universe is today. It basically tells the story of the development of the universe through these 6 numbers. The underlying issue being why are these values what they are and how would the universe be if they were any different? It tries to be different, but is basically the same story from a different angle. Worthy of a read though.
- **In Search of the Big Bang** - John Gribbin
Very much a pop science book, and like most John Gribbin books probably not entirely accurate, but it is an enthralling read about the history of the universe and how the theories we believe today came about. It includes a bit on string theory, and in particular a discussion of the forces as signalling and requiring the existence of other dimensions, which in my experience is quite rare for a book.
- **Hyperspace** - Michio Kaku
Recommended by [jazznaz](#). Not relevant to the A Level at all (i.e. very advanced), but a very interesting insight into hyperspace theory, string theory, the contenders for the "Theory Of Everything" and some Cosmology.
- **The Road to Reality: A Complete Guide to the Laws of the Universe** - Roger Penrose
Recommended by [jpowell](#) Be warned it is a very dense book and only for the VERY adventurous, the first 500 or so pages cover the maths needed to understand the physics in the next 500 pages. It is well above 1st year uni level, and extends far into graduate level. But I think it is a good book to read even if you don't follow all the dense maths, it certainly gives you an idea of what you can expect to study if you are thinking of continuing on to a physics degree, or thinking about further study after your first degree.



- **The Fabric Of Reality** - David Deutsch
Recommended by Pulse. This is going to be at a high level mathematically so only for the mathematically interested or those already at university I would say. "It is a very dense book, but also a very extensive one. It touches on parallel universes, the nature of mathematics, time travel and virtual reality amongst many others. Highly recommended."
- **The Fifth Essence** - Lawrence Krauss
Recommended by Archduke. A really good read; no maths whatsoever, but still challenging and interesting. Whilst primarily about Dark Matter, it covers a real breadth of subject matter; Gravitation, light/ether/Michelson and Morley, Big Bang and Nucleosynthesis, Particle Physics, Relativity and Gravitational Lensing, Super-symmetry...everything really. A really refreshing view away from A Level which always seemed to be modularised with little or no interrelation between different parts of Physics.

Quantum Physics

- **In Search of Schrodinger's Cat** - John Gribbin
Again, not completely accurate and a little out of date now, but a compelling read for all that. It was this book that awoke my enthusiasm for the world of the quantum, which has remained ever since. It's all just so bizarre. The book is basically a history of quantum physics and how it came about, with some good analogies and a final discussion on how it is used in every day life.
- **Schrodinger's Kittens** - John Gribbin
The sequel to the above, discussing the developments of quantum since the late 80s when the above was written. It mainly covers entanglement, doing quite a reasonable job of explaining it I must say. It focuses more on the ideas behind entanglement and what this means. I think there is a small section on quantum computing also. Not as good as the above book but readable and interesting nonetheless for those with an interest in quantum.
- **QED - The Strange Theory of Light and Matter** - Richard Feynman
Recommended by eventhorizon. Feynman has encapsulated this utterly baffling topic in just 4 short lectures/chapters, and QED is a very good read even for the lesser informed of us out there. He refrains from the torrent of maths and formulae that other books might throw at us, and more focuses on the actual method behind his calculations, whilst giving us a unique insight into his thought processes. Feynman even brings himself down to the reader's level, and reassures us that it's quite alright to not really understand QED, since "not even I do - nobody does". The level of the content is such that most people with even a slight interest in Physics or the Quantum will be able to grasp, and simple diagrams with descriptive annotations aid this greatly. A brilliant read.