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 A little out of date now, and a little mind blowing in places but it certainly opens your eyes to the principles of cosmology.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 $E = mc^2$.

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 conceptly 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 occurance 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 jpowellBe 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 Nucleosythesis, 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 though 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.

- **The new quantum universe** - *Hey and Walters*

Recommended by Robob"A good book on quantum physics"

- **Quantum Theory Cannot Hurt You** - *Marcus Chown*

This is a very simple, very easy to read and understand book. It is quite short and gives you foundation understanding of quantum theory for those who are not quite sure where to begin. A great read for those who want to become interested in the subject or who already know a bit about it but want to know how to explain it. Many simple analogies used too.

- **How to teach Quantum Physics to your Dog-** *Chad Orzel*

Another very simple book that is an excellent introduction to the weirdness of Quantum Physics. It is told through the author talking to his pet dog about the subject, if you can teach a dog about Quantum Physics you can probably teach anyone…

- **Quantum** - *Manjit Kumar*

This tells the history of quantum physics from Plank's famous equation through to Bell's thereom. It tells the story of the arguments between Einstein and Bohr as they try to describe the atomic world. There isn't much maths in the book as it is more of a novel narrating the history of the quantum.

Relativity

Relativity is quite hard to read up on as the subject is necessarily complex and mathematical (especially general relativity). There are not in my experience that many books out there pitched at a level readable by A Level students. The best you can do is to read the astro books above, which do talk and discuss relativity at reasonable length. Books on time travel are another possibility.

- **Special Relativity** - *A. P. French.*

This is really a degree level text book, fairly widely used from what I can gather, but it is just about readable and understandable as a reading book. The maths is kept to a relative (no pun intended) minimum. I wouldn't recommend it to those not totally confident with maths and physics, as it is quite an advanced read.

- **Relativity** - *Albert Einstein*

Recommended by jazznaz. Makes sense to read about the topic from the man himself. The ideas themselves are fairly simple to understand, but the book is not written very concisely, so at times it can be difficult to get through the wordy parts to extract the relevant information, but if you've got the patience, it's a rewarding read. This book is verging on philosophy in nature.

- **Spacetime Physics** - *Edwin F. Taylor* and *John Archibald Wheeler*

A book written by one of Hawkins' tutors and it is a very good read. Quite mathematically in-depth, yet it is quite enlightening. I was recommended it by a physics teacher, who is one of the most highly respected physicists in the country.

- **Why does E=mc^2 ?** - *Brian Cox* and *Jeff Forshaw*

This book derives the famous equation by first explaining the notions of light and space and then shows the equation's applications. It also has a few chapters on particle physics and quantum theory. The book is not very maths-heavy but after the first read I had to go back and read it again taking notes to understand it fully.

Electromagnetism

Finding books on electromagnetism of a pop science nature is nigh on impossible. Electromagnetism necessarily requires high level of mathematical skill and understanding, on topics not covered at A Level (such as vector calculus and multiple integrals to name but two). If anyone can find any I'll include it, but in short I would avoid EM like the plague as it is enough to put anyone off physics for life if you aren't careful. You'll meet it soon enough at uni if you go on that far.

Chaos

Not really deserving of its own sub-heading but I couldn't really fit it in anywhere else. There are quite a few books on it and the useful thing about it is that the mathematics are unsolvable analytically so that the books are very qualitative and therefore suitable for A Level reading.

- **Does God Play Dice?** - *Ian Stewart*

I read this book at the end of my first year of university but I think you could read it at an earlier age and still make sense of it. It's nicely laid out in a very pop science vein (more so than Gleick below). It's got some nice pictures and discusses most areas of chaos and the associated topography. If you are interested in chaos then it's worth a read but it probably won't prepare you much for uni as it's not really studied extensively (if at all) in a degree level course.

- **Chaos** - *James Gleick*

This is somewhat of a classic text on chaos which always seems to be recommended. It might be better if you know something about chaos theory beforehand because I didn't know anything about it at all. Although it really tells the story of how the theory was developed rather than talking about the theory itself.

General

- **Feynman Lectures In Physics (Vol I-III)** - *Richard Feynman*

These are the classic lecture series books produced by Feynman which every degree student likes to claim to have read. I would not advise purchasing them (they are expensive) or indeed reading them cover to cover, but they do offer a different perspective of things and Feynman is unparallelled in his ability to explain. Make no mistake, these are degree level books, although they would not be useful as a core text book in any degree course you do. If you want lighter reading I suggest the extracts below. I really include these to try and discourage you from buying them at A Level. The extracts are far more suitable (and cheaper).

- **Six Easy Pieces/Six Not So Easy Pieces** - *Richard Feynman*

These are the best bits from the above lectures in physics. The first is clealy simpler to read than the not so easy ones, as should be obvious from the title. I would definitely advise reading 6 easy pieces, just for the discussions of quantum theory. Feynman sees things differently too everyone else and his analogies are excellent.

- **The Meaning of it All** - *Richard Feynman*

I've never actually read this one, I'm not even sure what it's about. However, it was recommended to me by people in the know about these things, before I applied to uni, and with Feynman you really can't go wrong. The only reason I haven't read it is that for thin book (as with all Feynman books) it isn't cheap.

- **A Short History of Nearly Everything** - *Bill Bryson*

A really interesting read that tells the story of science, right back from the beginning when the philosophers were thinking about the stars, to the latest theories on unifying quantum mechanics with general relativity. It's filled with all sorts of anecdotes and really makes you interested in how all these discoveries came about!

- **Hidden Unity in Nature's Laws** - *John C. Taylor*

A fantastic account of developments in physics starting with Newton's work and getting as far as String Theory. Following a historical but ultimately detailed and scientific tack, physics is presented in a very accessible and clear manner with the interesting quirk that most of the (mathematical) equations are expressed in words. I found the level of the mathematics to be low enough to make a relaxing read, but high enough to support details of the main ideas. This book is so good that I've struggled to read more on subjects such as relativity without wishing for the clarity and precision of Taylor's writing.

- **Fizz: Nothing is as it seems** - *Zvi Schreiber*

A newer book with an unusual approach - Fizz tells the history of physics from Aristotle to Hawking through a fictional story about a young woman who time travels to meet the likes of Galileo, Newton and Einstein. Within the storyline, the book discusses many fundamental concepts of both classical and modern physics. This provides interesting historical context for physics students, and brings the great physicists to life in a more personal way as real historical people. (Currently exclusively from Amazon and the publisher.)

Historical & Casual Reads

- **Great Physicists** - *William H. Cropper*

I love this book. I take it to uni with me every term as it's great to just dip into. It covers nearly every possible area of physics in surprising detail. It even gives explanations of some advanced mathematical topics such as vector calculus. It's set out as a biography of around 30 key physicists, arranged by area of physics and discussing in depth the lives of these greats and the detail behind what they discovered. I highly recommend this one as an excellent mixture of physics and background interest.

- **Surely You're Joking Mr Feynman?** - *Richard Feynman*

First things first, this book has little or nothing to do with physics and I believe you could quite easily read this with a GCSE knowledge of physics. This is not a book on physics, but a collection of extracts and anecdotes from one of the greats (and certainly one of the great characters), Richard Feynman. I love this book, the style is witty and it gives a real insight into the mind of a great man. He got up to a surprising amount, from safe cracking at Los Alamos to painting to time out in Brazil. Don't kid yourself that you'll gain physics knowledge from it, but as a stand alone entertaining read it's an awesome read.

- **The Pleasure of Finding Things Out** - *Richard Feynman*

A book along the lines of "Surely You're Joking", but this time instead of being a compilation of conversations the great Feynman had with his friend Ralph Leighton, the book consists of talks and interviews that Feynman did during his life. From the famous television interview that the book took its name from, talks given in Japan about the future of computing, to why Feynman thinks Physics is the bees knees, this book both shares some interesting Physics with the reader and gives an insight into the mind of the incredible, bongo playing genious that is Richard Feynman.

A Level Standard Texts

Recommended by frixis

- **Pacific Physics**

(I guess that's only available in asia or something) It's not really good on the theory part but it has lots of practice questions.

- **A Level Physics** - *Roger Muncaster*

Another reference book my teacher recommended. This book is much longer than most A Level physics texts, it was written about 20/30 years ago for the physics syllabus' of that time, this is seen by some as a good things because it still has the maths which has now been removed from the A Level physics course. However will be harder than most A Level texts and much of it will not be relevant for the exam, I would only really recommend this if you are aiming to get a deeper insight into the physics because you are thinking of studying physics at university.

- **Accessible Physics** - *Azzopardi and Stewart*

The theory is explained in a nice easy understandable concise manner - best theory explanation so far.

- **Advanced Physics** - *Oxford University Press*.

A great reference book for A Level physics, even if it does go a little bit too far in some places. Great layout which is really easy to understand, pretty much the only physics book you will need for A Level. In fact many students at university still look to this book for guidance.

Below is a list of some other useful sites that contain A level information. Please be aware that not all of them are just for the OCR course and may cover other syllabus topics.

Physics and Maths Tutor -THIS SITE IS EXCELLENT!! Print off the notes and answer the questions- hey-presto, instant increase in grade!!
Physics net- Pretty easy to navigate and some good resources
School Matters website. Some OK resources but a lot of clicking back and forth
Hyper Physics- A comprehensive, physics site which has a concept maps format which makes it very easy to find information.
The INSTITUTE of PHYSICS' website. Some excellent resources and some stuff beyond the curriculum but very interesting none the less.
School Physics- Has brief descriptions and diagrams on each topic.
IF YOU NEED MORE MORE MORE. This link goes to a list of other Physics websites. Make your own mind up on which are good :)
Here is a link to a nice little proof of E=mc2
https://www.youtube.com/watch?v=A5IlKfdbjAk

MEDICAL IMAGING LECTURE link

https://www.youtube.com/watch?v=buqMDbuwQrw&index=4&list=PL74C52DA96E9F8695