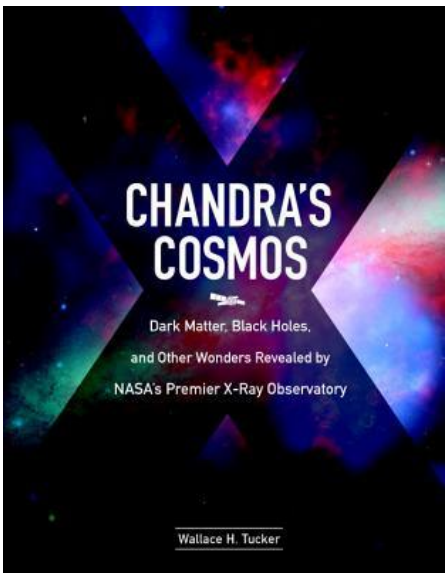

Chandra's Cosmos : Dark Matter, Black Holes, and Other Wonders Revealed by NASA's Premier X-ray Observatory

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On July 23, 1999, the Chandra X-ray Observatory, the most powerful X-ray telescope ever built, was launched aboard the Space Shuttle Columbia. Since then, Chandra has given us a view of the universe that is largely hidden from telescopes sensitive only to visible light. It is a universe of violent and extreme environments, such as black holes, supernova shock waves, and titanic collisions between clusters of galaxies. In Chandra’s Cosmos, the Smithsonian Astrophysical Observatory’s Chandra science spokesperson Wallace H. Tucker uses a series of short, connected stories to describe the exploration of the hot, high-energy face of the universe with Chandra.

Chandra has imaged the spectacular, glowing remains of exploded stars, and taken spectra showing the dispersal of elements. Chandra has observed the region around the supermassive black hole in the center of our Milky Way and traced the separation of dark matter from normal matter in the collision of galaxies, contributing to both dark matter and dark energy studies. Tucker explores all of these observations and explains their implications with an entertaining style that will engage anyone interested in space and astronomy.

Chandra's Cosmos : Dark Matter, Black Holes, and Other Wonders Revealed by NASA's Premier X-ray Observatory Details

Date	:	Published March 28th 2017 by Smithsonian
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From Reader Review Chandra's Cosmos : Dark Matter, Black Holes, and Other Wonders Revealed by NASA's Premier X-ray Observatory for online ebook

Kadri says

It's an informative book about the kinds of objects and cosmic events that can be and have been observed with an X-ray telescope. Since X-rays are emitted in some of the hottest events, then it makes for interesting reading.
The images are a large part of the book, and probably the reason this book exists, but I think the author did a great job in introducing the objects, relevant physics etc.
It has the effect of getting the reader interested in x-ray astronomy.

Ross says

This is an excellent book covering the history of the universe, with special focus on what has been learned from the Chandra x-ray telescope over the last 20 years.
The author is a scientist working on this telescope and the detail in the book is quite technical, the reader needs to be quite scientifically oriented.
I especially liked the coverage of dark energy and dark matter which make up 95% of what our universe is made of. Very frustrating that we have virtually no idea about what this dark stuff is.

STEPHEN PLETKO says

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This book presents the universe as you never have seen it before

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“On July 23, 1999, NASA launched the Chandra X-ray Observatory [or satellite] aboard the space shuttle “Columbia.” A telescope designed to detect X-ray emissions from extraordinarily hot regions of the universe—exploded stars, galaxy clusters, and matter around black holes—Chandra now orbits above Earth’s X-ray-absorbing atmosphere at an altitude of up to 86, 500 miles…

Since its launch, Chandra has given us a view of the universe that is largely hidden from telescopes sensitive only to visible light. It is a universe of violent and extreme environments, such as intense gravitational and magnetic fields around black holes, supernova shock waves, and titanic collisions between clusters of galaxies.”

The above comes from this concise but detailed book by Wallace Tucker. Tucker is an astrophysicist who specializes in X-ray astronomy. He is also the science spokesperson for the Smithsonian Astrophysical Observatory’s Chandra X-ray Center (which operates the satellite, processes the data it collects, and

distributes it to scientists around the world for analysis). As well, Tucker is the author of numerous papers and books on the universe.

In order to understand the significance of the Chandra X-ray satellite, it's essential to be familiar with the electromagnetic spectrum. It is the range of frequencies (or spectrum) of electromagnetic radiation and their respective wavelengths. (Photon energy increases with increasing frequency.)

There are seven forms of electromagnetic radiation. Going from low frequency (long wavelength) to high frequency (short wavelength), these are radio waves, microwaves, infrared radiation, visible light, ultraviolet radiation, X-RAYS, and gamma rays.

So, X-rays make up X-radiation, one form of electromagnetic radiation. Humans (and the Hubble Space Telescope) can't see X-rays, they (and it) only see visible light, another form of electromagnetic radiation.

As well, X-rays are absorbed by the Earth's atmosphere. Therefore, X-rays are not detected by Earth-based telescopes.
Thus the need for space-based telescopes like Chandra to detect X-ray emissions from astronomical objects.

The data gathered by Chandra has greatly advanced the field of X-ray astronomy and the field of astronomy in general.

This book with the aid of Chandra explores the high energy "face" of the universe, giving the reader insight on such things as dark matter, dark energy, super massive black holes, neutron stars, pulsars, galaxy clusters, the cosmic web, and the life & death of stars.

The science throughout this book is very well-explained and the main narrative is imbedded in a historical framework (which I personally appreciated).

But what makes this book memorable are the dazzling colour photographs of which there are over eighty. Most of the data from Chandra is superimposed on other photos taken from other space-based telescopes that are sensitive to other forms of electromagnetic radiation (such as visible light). The resulting photographs are unforgettable!!

Finally, if you understood what I said above about the electromagnetic spectrum, then you should be easily able to follow this book.

In conclusion, this book effectively presents a universe that was previously unseen!!!

(2017; introduction; 3 parts or 21 chapters; main narrative 235 pages; references; acknowledgements; index; photography and illustration credits)

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William says

Concise update on dark matter, dark energy, and black holes with great photographs.

Cade says

This book does what I always wish the captions/articles associated with beautiful space pictures would do: it explains how and why those images contribute to the state of understanding of our universe. Of course, those articles are necessarily limited in length and dumbed down for wider consumption. A book length presentation largely helps remove those limitations. The specific science is still entirely qualitative and descriptive (closest thing to something quantitative is facts like specific ages of stars/galaxies or comparisons like "...suggest the progenitor star had a mass of 16 suns..."), and regular readers of popular astrophysics books are not likely to learn much new information (dark matter makes up most of the mass, white dwarfs are supported by degenerate electron pressure, pulsars are fast-spinning neutron stars, etc- stuff in every book like this). However, if you have a little outside knowledge to fill in gaps, this book does give you more background than most on how we came to think the things we think about assorted astrophysical phenomena. Specifically, it explains what information x-ray observations have contributed and how this fits with or refutes various theories that have been proposed.

The best part is clearly that the pictures are beautiful, and there are a lot of them. The hardback version uses non-glossy embedded color pictures which look nice, but I don't feel like I would have missed anything by reading it exclusively on my Kindle phone app (which I also did). The captions are largely redundant with the text, but at least they do a good job of reliably identifying the false color schemes used for non-visible wavelengths.

Charlene says

I savored every moment of this book and took a lot of notes because every page was filled with the most incredible information about black holes (and smaller entities such as quasars, neutron stars, and white and brown dwarfs). Since its launch, Chandra had provided an *incredible* amount of detail about what's going on in our universe. While mainly focused on black holes, this book illustrates, in magnificent detail, how the entire universe works. If, like me, you are interested in how energy works on a very large cosmic scale and on the tiny scale of electrons inside atoms, you will love this book.

Tucker exquisitely and intuitively explains the finding from Chandra and related concepts, including but not limited to:

- Hawking radiation (one of the better explanations on the subject)
- Spin and it's relation to energy (this came up many times because its important when talking about atoms, stars, or supermassive black holes. Spin (along with forces that help create spin and help create matter) creates energy. Energy does work. Work creates the universe.
- How thermodynamics governs everything from the creation of matter to the form matter takes.
- Gravitational pull of stars and black holes as well as the outward explosion pressure, which all result in new forms of matter.
- The feedback loops of blackholes, demonstrating how black holes respond to and influence events on the scale of the entire galaxy cluster.
- The black widow black hole that siphons energy from its mate, a companion star, until that star is sucked dry of all energy.

- Galaxy formations (definitely one of the better discussions on this topic), which is controlled by some of what has already been listed.
- The amazing behavior of gas clouds. While I have read about star and galaxy formation before, the detail included about gas clouds was probably some of the best I have read to date. The author paints vivid and easy to understand pictures of how gas clouds act around a black hole, how they form stars and galaxies. This was probably my very favorite part of the book. Understanding how the electromagnetic field in clouds work along with warping of spacetime. Also, how gas clouds feed black holes- just glorious.
- Black hole jets (great section, which includes how black hole jets are like the water coming out of your garden hose)
- The energy efficiency of black holes (they are extremely efficient and produce an incredible amount of the energy in our universe)
- The energy efficiency of stars
- so much more

Gary Beauregard Bottomley says

The more I learn about the world, the more I want to be alive. This is the kind book that keeps me wanting to stay alive in order to learn more. The author did a perfect job in the areas in which he explains: dark matter, super galaxies, black holes, and other such phenomenon. He gave just enough of the history but kept the focus on what we know and why we think we know it.

Each piece of our knowledge lives in a web. Each piece is entangled with other pieces of information forming a network. The author gave at least five completely different reasons why we know dark matter exists even though we don't know what it is. Dark Energy is more mysterious, it could be 'vacuum energy' or anomalies within gravity over great distances or something else we have yet to think about . As he was explaining his science, I was thinking how this was the perfect book for refuting climate change deniers. Even though this book never mentions climate change, it reminded me of the way deniers see the world incorrectly and incoherently because they do not realize how the pieces must fit together thus creating cognitive dissonance within their feeble minds thereby denying reality and living within their little fantasy world (usually motivated by hate of the other). Books like this one are what we need in order to eliminate ignorance based on denialism of reality one denier at a time. I only hope they prayer on the matter more and read books like this one.

Science is not perfect. This book gets that. "Every so often one must kick the paradigm to see if it turns over" (that's a quote from this book). Sometimes the best avenue for further analysis is when a Fred Hoyle says 'that's absolutely not possible", and as a character in this book said, "that when science precludes explicitly that's when we know we should investigate further" (it's a paraphrase, but someone does say something like that within the book).

I've stopped reading science books (for the most part) because most of them are redundant and say almost nothing new and the author is usually ignorant on the real nature of science. This book is a pleasant exception. The author understands astronomy, knows the real nature of science and coherently explains. I would say that even graduate students in astronomy or cosmology would profit from this book because of the way the author knew how to tie all the concepts together in to a coherent explanation for the universe in which we live in.

One final note: I noticed that this book doesn't seem to be tearing up the best seller list by the limited number

of reviews it has received. That's a shame. It just goes to show that when I find something of interest, and it stands outside of Sturgeon's Law (90% of everything is crud) the whole world seems to ignore it.

Ogi Ogas says

My ratings of books on Goodreads are solely a crude ranking of their utility to me, and not an evaluation of literary merit, entertainment value, social importance, humor, insightfulness, scientific accuracy, creative vigor, suspensefulness of plot, depth of characters, vitality of theme, excitement of climax, satisfaction of ending, or any other combination of dimensions of value which we are expected to boil down through some fabulous alchemy into a single digit.

Gendou says

This is a good book for people curious about how we know what we know in cosmology. Many seminal discoveries were made thanks to the Chandra X-ray Observatory. It opened up a whole new part of the EM spectrum for study by astrophysicists.

One could summarize this book as being all about gas. It's actually a fun drinking game to drink whenever the author uses the word "gas". Which is often. I have a drinking problem. This is a cry for help. (Just kidding!) Gas is really important because hot gas emits X-rays. Violent events, like jets from dying stars and the centers of galaxies, heat up gas so that it emits these X-rays. So the book goes into great detail about hot gas all over the universe.
