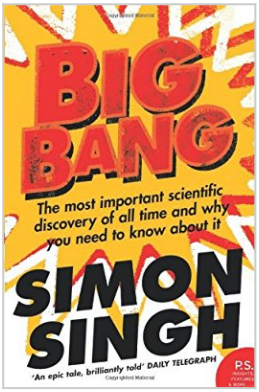

Big Bang

By Simon Singh

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The bestselling author of Fermat's Last Theorem and The Code Book tells the story of the brilliant minds that deciphered the mysteries of the Big Bang. A fascinating exploration of the ultimate question: how was our universe created? Albert Einstein once said: 'The most incomprehensible thing about the universe is that it is comprehensible.' Simon Singh believes geniuses like Einstein are not the only people able to grasp the physics that govern the universe. We all can. As well as explaining what the Big Bang theory actually is and why cosmologists believe it is an accurate description of the origins of the universe, this book is also the fascinating story of the scientists who fought against the established idea of an eternal and unchanging universe. Simon Singh, renowned for making difficult ideas much less daunting than they first seem, is the perfect guide for this journey. Everybody has heard of the Big Bang Theory. But how many of us can actually claim to understand it? With characteristic clarity and a narrative peppered with anecdotes and personal histories of those who have struggled to understand creation, Simon Singh has written the story of the most important theory ever.

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Big Bang By Simon Singh Bibliography

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Editorial Review

Amazon.com Review
A baffling array of science books claim to reveal how the mysteries of the universe have been discovered, but Simon Singh's *Big Bang* actually delivers on that promise. General readers will find it to be among the very best books dealing with cosmology, because Singh follows the same plan he used in his brilliant *Code Book*: he puts people--not equations--first in the story. By linking the progression of the Big Bang theory with the scientists who built it up bit by bit, Singh also uncovers an important truth about how such ideas grow.

> Death is an essential element in the progress of science, since it takes care of conservative scientists of a previous generation reluctant to let go of an old, fallacious theory and embrace a new and accurate one.

As harsh as this statement seems, even Einstein defended an outmoded idea about the universe when an unknown interloper published equations challenging the great man. Einstein didn't have to die for cosmology to move forward (he reluctantly apologized for being wrong), but stories like this one show how difficult it can sometimes be for new theories to take root. Fred Hoyle, who coined the term "big bang" as a way to ridicule the idea of a universe expanding from some tiny origin point, strongly believed that the cosmos was in a steady state. But Singh shows how Hoyle's research, meant to prove the contrary, added evidence to the expansion model. *Big Bang* is also a history of astronomical observation, describing the development of new telescopes that were crucial to the development of cosmology. Handwritten summary notes at the end of each long chapter add a charming, classroom feel to this revealing and very readable book. --*Therese Littleton*

From Publishers Weekly
Starred Review. It was cosmologist Fred Hoyle who coined the term "big bang" to describe the notion that the universe exploded out of nothing to kick-start space and time. Ironically, Hoyle himself espoused the steady state theory, positing that the universe is eternal and never really changes. Former BBC producer and science writer Singh (*Fermat's Enigma*) recounts in his inimitable down-to-earth style how the big bang theory triumphed. Readers will find here one of the best explanations available of how Cepheid stars are used to estimate the distance of other galaxies. Singh highlights some of the lesser-known figures in the development of the big bang theory, like Henrietta Leavitt, a volunteer "computer" at the Harvard College Observatory who in 1912 discovered how Cepheid stars can be used to measure galactic distances. Singh shows how the creation of the heavier elements was a major stumbling block to widespread adoption of the big bang until Hoyle (once again boosting the theory that he so fervently opposed) proved that they were created in stars' nuclear furnaces and strewn throughout the universe via supernova explosions. Readers who don't need a review of the early development of cosmology may wish that Singh had adopted a somewhat less leisurely pace. But his introductory chapters hold a lot of worthwhile material, clearly presented for the science buff and lay reader. There's no better account of the big bang theory than this. B&w photos and illus.

From Scientific American
When I started teaching college in 1964, the required reading for my general studies science course included two articles by two prominent physicists published in Scientific American eight years previously. George Gamow, a principal architect of the big bang theory, made the case for a universe that began billions of years ago as an explosion from an infinitely dense and infinitely small seed of energy. Fred Hoyle, stalwart champion of the steady state theory, took the stand for an infinite universe with no beginning and no end, in

which matter is continuously created in the space between the galaxies. Both theories explained the outward rush of the galaxies discovered by Vesto Slipher, Edwin Hubble and Milton Humason in the first decades of the century. Both theories had strengths and weaknesses. For example, the big bang successfully accounted for the known abundances of hydrogen and helium in the universe but posited an embarrassing beginning that could not be explained. The steady state theory avoided the stumbling block of a universe that seemed to come from nowhere but replaced it with many little unexplained beginnings (those particles of matter appearing continuously from nothing). Yet the big bang theory made one prediction that was testable: if the universe began in a blaze of luminosity, a degraded remnant of that radiation should still permeate the cosmos, and the precise spectral distribution of this microwave-frequency background could be calculated. Meanwhile, entirely independently, two radio astronomers at Bell Labs in New Jersey, Robert Wilson and Arno Penzias, were trying to find the source of an annoying hiss in their microwave antenna that seemed to come equally from all parts of the sky. The hiss turned out to have precisely the characteristics predicted by the big bang cosmologists. For the first time in history, the human mind had constructed a creation story that could be tested empirically. With the discovery of the cosmic microwave background radiation, the big bang delivered a knockout blow to its steady state competitor. It's a wonderful story, and it deserves a master storyteller. Simon Singh--a physicist with established credentials as a science popularizer--is up to the task. His previous books, Fermat's Enigma and The Code Book, became international best-sellers. Singh weaves the many threads of the story skillfully together, beginning with the cosmological speculations of the ancient Greeks and ending with the thorny contemporary question, "What came before the big bang?" His tale begins slowly, but only because we know so little about the personal lives of the early players. Singh really gets up to speed as we enter the 20th century, with its lively cast of strong personalities tussling with the universe and with one another. Two great historical debates lie at the heart of the book. The first concerned whether the spiral nebulae, catalogued throughout the 19th century, are part of our own Milky Way Galaxy, and therefore relatively near, or other "island universes" far away. Resolving this debate meant finding a reliable way to measure the distances to the nebulae. Singh ushers onstage two giants of 20th-century astronomy, Harlow Shapley and Edwin Hubble, who anchored opposite sides of the nebula debate. He also gives star turns to astronomers who deserve to be better known, such as Annie Jump Cannon and Henrietta Leavitt. Telescopes played a leading role in the debate, most notably the 100-inch Hooker Telescope on Mount Wilson and the 200-inch Hale reflector on Mount Palomar, both in California. These instruments enabled astronomers to resolve the nebulae into stars, which provided the necessary distance indicators. The spiral nebulae are indeed other Milky Ways. Once the nebula debate was resolved, Hubble recognized the expansion of the universe, and a second great debate came to the fore: big bang vs. steady state. Big ideas and big egos were at stake. Gamow and Hoyle, in particular, squared off against each other, even in the pages of this magazine. Then came the discovery of the cosmic background radiation in the mid-1960s by the Bell Labs radio astronomers. No sooner had I introduced my students to the most contentious cosmological debate of the 20th century than the universe whispered the resolution. Singh spins out the drama with verve and wit. We meet scientists w ho are shy and retiring and others with a flair for contention, epic discoveries made serendipitously and beautiful theories shot down by intractable facts, a pooch named Kepler and a persistent pigeon that made its home in the Bell Labs telescope. This is a perfect book for anyone who wants to know what science is all about.

Chet Raymo has taught physics at Stonehill College and written about science for the Boston Globe. His latest book is Climbing Brandon: Science and Faith on Ireland's Holy Mountain.

Users Review

From reader reviews:

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