

Faith in the physicists

Joseph Silk

In Search of the Big Bang: Quantum Physics and Cosmology.

By John Gribbin. Bantam/Heinemann: 1986. Pp. 413. Pbk \$9.95, Hbk £14.95.

SUSY GUTS is not a radical feminist, but a theory that is designed to unify the fundamental forces of nature. The reader will find this, along with many other esoteric facts, relieved by occasional gossipy anecdotes, in the latest book from prolific science writer John Gribbin.

In Search of the Big Bang completes a trilogy of major works on what Gribbin considers to be the most important scientific achievements of the twentieth century. Previous volumes were devoted to the nature of reality and quantum physics, and to the origin of life: here we move onto the ultimate issue of the creation of the Universe itself. The faint of heart may dispute the status of our cosmic origins as an equal partner to these other matters, but Gribbin unabashedly takes us on a grand tour of modern cosmology.

The difficulty is that cosmology is a science starved of data and not readily amenable to controlled experiments. We must take each glimpse of the Universe as it comes, no matter how confused or obscure it happens to be. Remote galaxies appear as they were aeons ago, and thereby profoundly alter our normal sense of perspective if, for example, young galaxies were more luminous than the mature, nearby galaxies. It is as though we view the Universe through a distorting lens, and we have little sense of the nature of the distortion. And this applies to the galaxies, whose formation was only the most recent episode in the history of the Big Bang. Extrapolating backwards in time from the furiously receding galaxies we see today, we infer that the Universe was once a far more exotic, denser, hotter hostile place.

In many respects, the Big Bang is to modern cosmology what mythology was

to the ancients. To believe that we understand the very early Universe, the first microseconds of cosmic time, requires immense faith in the physicist's search for the ultimate union of the fundamental forces of nature, because direct evidence is completely lacking. Yet to the physicist, the vast energies attained in the immensely compressed primeval fireball that was once the Universe offer a unique testing ground for the latest theories of elementary particles. Exotic names, like photinos, strings or even superstrings, are reeled off as though they were the most natural state of matter, which perhaps they once were. Provided we accept theories of matter and gravity that are certainly correct at our present epoch and in our environment, then we are inevitably led by the Big Bang to a singular state near the origin of time.

Of course we are still awaiting the ultimate theory of everything, currently thought to be superstrings, which will explain the most important missing link in the puzzle, namely how it all began. Many physicists around the world are pursuing this ultimate goal that represents the union of gravity and quantum mechanics. However, we are not there yet, and opinions differ widely as to how far away we may be: according to Stephen Hawking, the end of physics is in sight, yet Sheldon Glashow argues that superstrings are only a mirage.

My only quibble with Gribbin's book is that he presents physicists and astronomers as gods whereas, in reality, they are no less fallible than other mortals. The Big Bang theory is an excellent description of the here and now, and of the not-so-long-ago and not-so-far-away. But one ought to take the extrapolations back to the begin-

ning of time with a healthy dose of scepticism. The Big Bang cosmology may yet be superseded, just as Newton's theory of gravitation was incorporated by Einstein into a new theory. Our more extreme extrapolations of space and time could prove to be equally false, or at least, incomplete.

In Search of the Big Bang is a remarkably readable guide, however, to the mysteries of cosmic creation. It is strong on personalities, from anecdotes about missed opportunities and Nobel prizes, to the story of the wealthy telescope builder and the mule skinner who paved the way to the realm of the nebulae. The first third of the book represents a historical development of cosmological data, and the second third provides a readable description of the classical Big Bang theory. The remainder is devoted to quantum physics and the very early Universe. Rife with speculation and liable to become largely irrelevant overnight, the last third of the book is the weakest section. But it is definitely worth reading, if only to find out how Kaluza, the founder of higher dimensional cosmology, learnt to swim. □

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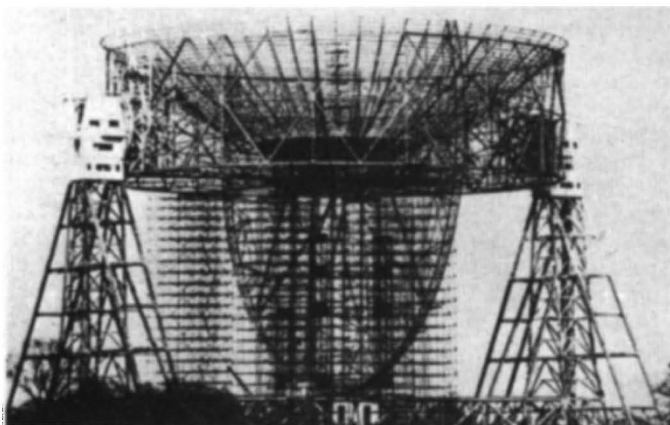
Fact or fiction?

C.E.M. Hansel

Science Confronts the Paranormal. Edited by Kendrick Frazier. Prometheus: 1986. Pp. 367. Pbk \$15.95, £12.95.

Science Confronts the Paranormal contains a selection of articles published by the Committee for the Scientific Investigation of Claims of the Paranormal in its journal *The Skeptical Inquirer*. The book is divided into two sections. The first of them, "Assessing Claims of Paranormal Phenomena", is mainly concerned with parapsychology — including poltergeists, and the claims made by mediums and professional "psychics" — together with palmistry and iridology. The second section, "Evaluating Fringe Science", covers unidentified flying objects, fringe archaeology, creationism, the Turin shroud, astrology and the Loch Ness Monster.

The general approach is set out in the introduction and early chapters. Stephen Toulmin suggests that consideration of the manner in which new ideas have been opposed will "induce a certain modesty even about our skeptical doubts". Paul Kurtz also considers that the claims made by "paranormalists" should not be rejected out of hand. But over the history of scientific inquiry it is difficult to identify a new idea that has been rejected for long, provided that observations could be con-



Jodrell Bank radio telescope nearing completion in April 1957. Taken from Bernard Lovell: A Biography by Dudley Seward, which includes a summary of Lovell's views on the nature and origins of the Universe. Now available in the USA (Salem House, \$21.95). For review, see Nature 312, 210; 1984.