



The Void

By Frank Close

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The Void By Frank Close

What is the void? What remains when you take all the matter away? Can empty Space--nothing--exist?

To answer these questions, eminent scientist Frank Close takes us on a lively and accessible journey that ranges from ancient ideas and cultural superstitions to the frontiers of current research, illuminating the story of how scientists have explored the void and the rich discoveries they have made there. Readers will find an enlightening history of the vacuum: how the efforts to make a better vacuum led to the discovery of the electron; the understanding that the vacuum is filled with fields; the ideas of Newton, Mach, and Einstein on the nature of space and time; the mysterious aether and how Einstein did away with it; and the latest ideas that the vacuum is filled with the Higgs field. The story ranges from the absolute zero of temperature and the seething vacuum of virtual particles and anti-particles that fills space, to the extreme heat and energy of the early universe. It compares the ways that substances change from gas to liquid and solid with the way that the vacuum of our universe has changed as the temperature dropped following the Big Bang. It covers modern ideas that there may be more dimensions to the void than those that we currently are aware of and even that our universe is but one in a multiverse.

The Void takes us inside a field of science that may ultimately provide answers to some of cosmology's most fundamental questions: what lies outside the universe, and, if there was once nothing, then how did the universe begin?

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Editorial Review

From Publishers Weekly

Aristotle famously wrote that nature abhors a vacuum, but as Oxford physicist Close illustrates in this concise study, that depends on what you mean by a vacuum or a void. Greek and medieval philosophers gave philosophical arguments against the existence of the void, but an artificial vacuum was finally created in 1643 and quickly used to investigate atmospheric pressure. Scientific exploration of a vacuum's properties and applications took off in the 19th century, although ancient ideas like the concept of an ether that pervaded empty space masqueraded as serious science until Einstein explained them away via relativity. Close (*Lucifer's Legacy*) is a particle physicist at heart, and he hits his stride as he explains why scientists now don't think a void is really empty at all, but is teeming with particles popping in and out of existence and pervaded by a contemporary version of the ether, called the Higgs field. Close misses opportunities to make this a more rewarding interdisciplinary study that would attract a broader readership, and science buffs will find it redundant with other books in their collections. The moral of Close's book should be, as Nietzsche said, that when you look into the void, it really is looking back at you. 20 b&w illus. (Feb.)

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Review

"It's a nice read for people with little background knowledge"--*New Scientist*

"Close is a particle physicist at heart, and he hits his stride as he explains why scientists now don't think a void is really empty at all, but is teeming with particles popping in and out of existence and pervaded by contemporary version of the ether, called the Higgs field."--*Publishers Weekly*

"The Higgs boson remains the missing ingredient of the remarkably successful standard model of particle physics that describes interactions between the sub-nuclear elementary particles to an impressive precision, and *The Void* provides an introduction to the underlying concepts. It is nice to think that the explanations may help the physics community share its extraordinary excitement and anticipation with others."--*The Times Higher Education Supplement*

About the Author

Frank Close, OBE, is Professor of Physics at Oxford University and a Fellow of Exeter College. He was formerly vice president of the British Association for Advancement of Science, Head of the Theoretical Physics Division at the Rutherford Appleton Laboratory, and Head of Communications and Public Education at CERN. He is the author of several books, including the best-selling *Lucifer's Legacy*, and was the winner of the Kelvin Medal of the Institute of Physics for his outstanding contributions to the public understanding of physics. His other books include *Particle Physics: A Very Short Introduction*, *The Cosmic Onion*, *The Particle Explosion*, *Too Hot to Handle*, and *The Particle Odyssey*.

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