



Understanding The Universe: From Quarks to the Cosmos (Revised Edition)

By Don Lincoln

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The Big Bang, the birth of the universe, was a singular event. All of the matter of the universe was concentrated at a single point, with temperatures so high that even the familiar protons and neutrons of atoms did not yet exist, but rather were replaced by a swirling maelstrom of energy, matter and antimatter. Exotic quarks and leptons flickered briefly into existence, before merging back into the energy sea.

This book explains the fascinating world of quarks and leptons and the forces that govern their behavior. Told from an experimental physicist's perspective, it forgoes mathematical complexity, using instead particularly accessible figures and apt analogies. In addition to the story of quarks and leptons, which are regarded as well-accepted fact, the author (who is a leading researcher at one of the world's highest energy particle physics laboratories) also discusses mysteries at both the experimental and theoretical frontiers, before tying it all together with the exciting field of cosmology and indeed the birth of the universe itself.

The text spans the tiny world of the quark to the depths of the universe with breathtaking clarity. The casual student of science will appreciate the careful distinction between what is known (quarks, leptons and antimatter), what is suspected (Higgs bosons, neutrino oscillations and the reason why the universe has so little antimatter) and what is merely dreamed (supersymmetry, superstrings and extra dimensions). Included is an unprecedented chapter explaining the accelerators and detectors of modern particle physics experiments. The chapter discussing the hunt for the Higgs boson — currently consuming the efforts of nearly 6000 physicists — reveals drama that only big-stakes science can give. Understanding the Universe leaves the reader with a deep appreciation of the fascinating particle realm and reverence for just how much it determines the rich beauty of our universe.

Since the release of the first edition, the landscape has changed. The venerable Fermilab Tevatron has ceased operations after a quarter century of extraordinary performance, to be replaced by the CERN Large Hadron Collider, an accelerator with a design energy of seven times greater than the Tevatron and a collision rate of nearly a billion collisions per second. The next few years promise to be very

exciting as scientists explore this new realm. This revised edition of Understanding the Universe will leave the reader with a deep appreciation of just why physicists are so excited.

Readership: Students, scientists and lay people.

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Understanding The Universe: From Quarks to the Cosmos (Revised Edition) By Don Lincoln Bibliography

- Sales Rank: #3469903 in Books
- Published on: 2012-03-26
- Original language: English
- Number of items: 1
- Dimensions: 9.10" h x 1.60" w x 6.20" l, 2.20 pounds

- Binding: Hardcover
- 596 pages

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Editorial Review

Review

"Lincoln has an infectious love for physics ... (and) demonstrates a humorous writing style that successfully engages the reader." -- Publishers Weekly

"The author is well equipped to write a book on the topic ... It is not light reading, but worth the effort ... Lincoln is careful to distinguish between what is known versus what is merely dreamed." -- Mensa Bulletin

"A veteran of many popular talks on physics, (Lincoln) charmingly relates the tale of humankind's almost insatiable curiosity about the ultimate nature of nature and the quest to determine the basic particles of matter. His style is engaging and obviously directed to informed lay readers, but the more scientifically minded will find it equally appealing ... If digested with the notion that this topic is presented in a broad swath, both historically and scientifically, and not meant to be definitive, the work offers readers an appreciation of the investigative procedure, the accumulated body of research, and the people who did the investigating." -- Library Journal

"Don Lincoln, an experimentalist on DZero at Fermilab, motivates his tale of the development of particle physics, from its origins to its current state, almost entirely by experiments, a refreshing alternative to the usual theoretical treatments. Rather than posing thought experiments, Lincoln describes real experiments that have led to deeper questions and the consequent progress of particle physics ... With his light and easy-to-read style, Lincoln's humor and personal tales do much to convey the flavor of modern particle physics research — a picture that is not often painted so realistically in other popular physics books. The content is more complicated than in most similar books, but this is a virtue for its intended audience, as it allows for greater depth." -- Symmetry

"Knowledgeably written ... 'Understanding the Universe' provides the nonspecialist general reader with a fascinating and informative introduction to the complex world of quarks, leptons, and the forces that govern particle physics. Written especially to introduce lay readers to subatomic mysteries, (the book) discusses the Big Bang, known and proven theories, suspected hypotheses that have yet to be firmly established, cutting-edge discussions of modern particle physics experiments, and much more. Black-and-white diagrams help illustrate the amazing ideas presented with a minimum of mathematics and a maximum of awe." -- Midwest Book Review

"Don Lincoln takes us on a rollicking tour of the universe: The reader finds out what we particle physicists understand about it, how we arrived at that understanding and where we think we're going next with our research ... Lincoln enlivens the landscape with fresh details, irreverent (yet never unkind) remarks on the cast of characters, and explanations that are homey, humorous and often completely original ... In his epilogue Lincoln addresses explicitly the question of why particle physicists ask why ... the real reason we do research is simply this: It's tremendously fun to figure the universe out." -- American Scientist

"... Lincoln offers lay readers a complete tour of particle physics ... (he) writes very well, using a mixture of humor, history and analogies as well basic scientific explanations ... (and) does a particularly good job of covering the full gamut of particle physics." -- Choice

"This book is addressed to the curious layman, with only a murky recollection of school physics, who wants

to know how far mankind has gone in understanding the world around us ... It is an excellent reference for any scientist who is occasionally unsure how best to explain a particular physics concept to a non-specialist audience ... his understanding and explanations of complex phenomena are excellent and the book strikes a balance between depth and accessibility." -- CERN Courier

"The author faces complex topics in a very simple and clever way without using mathematics but by simple (and suitable) analogies. The reading is intriguing and very flowing and, sometimes, very entertaining. The book is peppered with amusing anecdotes that make reading smoother and funny. This book is a masterpiece of scientific disclosure. I recommend its reading for those people who want to delve into the wonders of modern Physics." -- Zentralblatt MATH

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From the Inside Flap

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About the Author

Don Lincoln is a senior physicist on the scientific staff of Fermi National Accelerator Laboratory. For the last two decades, his research has explored the highest energies accessible to modern science, by exploiting first the Fermilab Tevatron and now the CERN LHC. He was one of scientists who discovered the top quark and is a member of two large experimental collaborations hot on the trail of the Higgs boson. Discovery and pursuit of the frontiers of knowledge have become a way of life for him and he continues to sift through mounds of data, hoping to find something that will shed new light on our understanding of the universe. While his professional career has been impressive (with over 500 scientific publications to his name), Don is also a committed communicator of cutting-edge science for a lay audience. He has written two books on frontier physics for the layman, as well as many magazine articles. He has given hundred lectures of lectures in a dozen countries on four continents to a wide range of audiences, including nonphysicist collegiates, teachers, children of all ages, and many adult groups. He is as comfortable speaking to an audience of hundreds as he is to an audience of one. When he is not trying to find another way to share his infectious love of science, he likes to spend time with his family, which includes a particularly hirsute cat.

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Hilda Szymanski:

Book is usually written, printed, or created for everything. You can understand everything you want by a e-book. Book has a different type. As you may know that book is important factor to bring us around the world. Close to that you can your reading proficiency was fluently. A publication *Understanding The Universe: From Quarks to the Cosmos (Revised Edition)* will make you to end up being smarter. You can feel more confidence if you can know about everything. But some of you think that will open or reading a book make you bored. It is not make you fun. Why they may be thought like that? Have you in search of best book or acceptable book with you?

Willard Edwards:

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Brian Robinson:

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