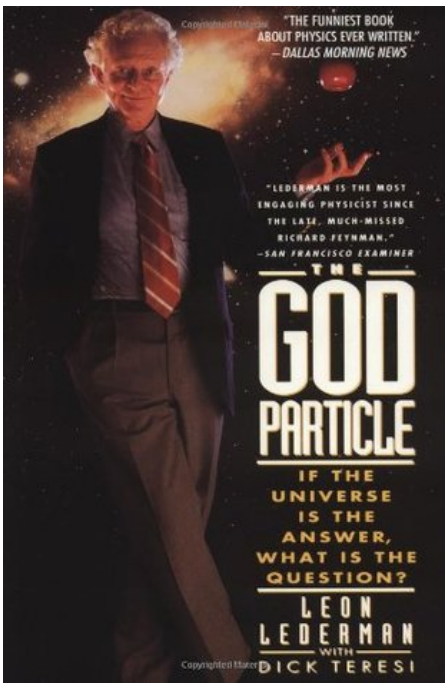

The God Particle: If the Universe Is the Answer, What Is the Question?

Leon M. Lederman , Dick Teresi

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In this extraordinarily accessible and enormously witty book, the Nobel Prize-winning physicist Leon Lederman guides us on a fascinating tour of the history of particle physics. The book takes us from the Greeks' earliest scientific observations through Einstein and beyond in an inspiring celebration of human curiosity. It ends with the quest for the Higgs boson, nicknamed the God Particle, which scientists hypothesize will help unlock the last secrets of the subatomic universe. With a new preface by Lederman, The God Particle will leave you marveling at our continuing pursuit of the infinitesimal.

The God Particle: If the Universe Is the Answer, What Is the Question? Details

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From Reader Review The God Particle: If the Universe Is the Answer, What Is the Question? for online ebook

Francisco Cebrián says

Creo que son las cuatro estrellas más cortas -o las tres más largas- que he dado en mi vida. Este libro es muy irregular y os gustará si os queréis curtir en la historia de la Física y conocer cómo se vive la Física 'de élite' por dentro, qué hay detrás de los grandes descubrimientos, de los grandes proyectos, de las naciones y lo importante que es la coordinación. A nivel experimental NO vais a encontrar libro mejor, también tiene humor, diálogos... pero debo reconocer que me salté medio centenar de páginas que iban acerca de un mero diálogo entre el escritor (Premio Nobel de Física en 1988, por cierto) y Demócrito por lo surrealista y plomizo, y a nivel teórico vais a ver pocos con tanta teoría, pero MUCHOS con una teoría bastante más ligera, pero mejor explicada. Me esperé de este libro una información 'dos mil dieciseisesca' siendo de 1993, y algo más teórico e informativo siendo un libro de divulgación, y quizá por eso no terminé de disfrutarlo en exceso. Ahora todo ha cambiado, el Higgs se ha descubierto, el SSC se canceló, muchos compañeros del libro se han muerto, Lederman tiene ya 94 años (y no sus 71 dulces primaveras al momento de escribir el libro) y bueno, para su momento fue increíble. Eso sí... exceso de experimentación, reiteración de muchos temas, alta concentración de términos... creo que de forma mucho más sencilla podría haberse incluido las Matemáticas -que amo- y haberse ahorrado los términos kaón, protón, muón, leptón, hadrón, mesón, barión... que están por doquier y que no lo complican, pero sí lo hacen más 'coñazo' por momentos. Pero claro... físico experimental: muchos experimentos --> mucha descripción ---> pocas Matemáticas. Estaba claro.

Le agradezco la formación recibida en Historia de la Física, el porqué del fracaso de múltiples teorías, algunas pistas sobre bosones que no conocía y bueno... le agradezco que me haya dado una base, aunque quizá esperé más, para tratar la divulgación específica. Primera lectura 'seria' del verano. Gracias, Leon, ¡y dura, dura mucho!

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retroj says

Why am I reading a twenty year old popular physics book? The title alone would have been enough to make me steer clear — this label, *god particle*, for the Higgs boson, is just the kind of hype and misrepresentation that science does not need — I can't get behind that. Nevertheless... well, a friend gave me a copy of this book and said that it was one of his favorite books, so, yeah, that's why. Despite initial misgivings, I did eventually come to enjoy it. Despite some slow parts and some theoretical parts where the book is beginning to show its age, I did come away with an overall favorable impression, and would recommend it to others for certain topics that it covered splendidly.

The best of them were the detailed explanations of how many important particle physics experiments throughout history were done — how they proved what they proved, and how the apparatus was constructed. One tends to read pop physics by theorists, but this one is by an experimenter, a Nobel Prize winning experimenter at that. It's a different perspective from most of what other physics I have read, and has a nuts and bolts feel to it. You get a hardware-level look at everything from Galileo's inclined planes, to the earliest alpha-particle scattering experiments to the invention and development of cyclotrons and synchrotrons, and the different kinds of detectors used in them. We also learn about how different experimental setups competed for some of the same discoveries, and the relative advantages and disadvantages of, say, electron-positron colliders compared to proton-antiproton colliders.

The book is structured around a theme of the quest for the *atomos* posited by Democritus, the fundamental

uncuttable constituent of all matter (as opposed to the *chemical atom* which is itself a composite particle). This theme is traced all the way from Democritus (what little we know of him) to the physicists of the Enlightenment, the 19th century, and into the modern era. I found the connection to ancient Greek philosophy to be a bit of a stretch, or at least over-emphasized, but it was at least food for thought. There were some whimsical digressions where the author played with this theme — imaginary conversations with Democritus — that I personally found to be the most dull parts of the book. On the other hand, there were also fascinating stories about famous scientists that I had not heard before, and even a few lesser-known scientists that I was introduced to for the first time, like Boscovich. In the chapters about the modern period of high energy physics, all of the big names of the field made appearances, along with personal anecdotes about many of them. The parts written as memoir are some of the most entertaining parts of the book.

This book is becoming a little bit dated as far as the physics and cosmology it covers is concerned. Not so much that it's wrong, as that it is incomplete. At the time this was written, the Superconducting Supercollider project had not yet been cancelled, the Large Hadron Collider had not yet been announced, the tau particle had not been discovered, the accelerating expansion of the universe (and dark energy) was unknown, and the age of the universe was only known to be "about 15 billion years". For this reason, I did not focus so much on the physics and cosmology in the book, and read more for the history and engineering. This made some parts of the book seem like a very slow read.

There was one outright error in the edition that I read that first brought me confusion, then surprise. I can only hope that it was corrected in later editions. On page 278, the time-energy uncertainty principle was described incorrectly: "borrowed energy times the duration of the loan must be greater than Planck's constant divided by twice pi". That should read "uncertainty of ..." for both terms, and four pi, not two pi. I also wondered about another statement later in the book, but I forget now what it was.

To end on a positive note, I did want to mention that Leon Lederman is a very entertaining personality and his personality comes through vividly in his writing. There were definitely some laugh-out-loud moments in this book. I'm glad to have taken time to learn about Leon Lederman's life and work and his contributions to our understanding of the universe.

Bob Nichols says

Lederman provides an entertaining history of physics and much of it is accessible to the general reader. Interestingly, he writes that it takes a grad student at least two years "to develop quantum intuition." This comment bolsters the confidence of the lay reader.

The book leads to the so-called God particle. What gives particles their mass, he asks, and then he answers that "we suspect a field." The Higgs field he writes later, generates all mass. As massless particles (light of various wave lengths?) travel across space, they acquire (rest) mass. Provokingly, he states that mass, therefore, may not be a fundamental attribute of matter, "but a property acquired by the interaction of particles and their environment." Empty space "is awash in particles that are temporary," he writes. Is the Higgs field the new aether Lederman asks? What is implied here is that space is not merely a metric (measurement of distance by time) but is a "something" after all: "When you next look out at the night sky you should be aware that all of space is filled with this mysterious Higgs influence...."

In contrast to those who state that gravity is only an attractive force, Lederman clarifies that there are two types of mass. There is big mass that pulls and inertial mass that resists being pulled by "a force." If that is the case, then how is it said that gravity is only an attractive force between two bodies? And does gravity not

exhibit the oscillation between the attractive and repulsive forces that occur on the atomic scale? If there are four forces in nature, might there be two underlying patterns to them as one of the Greeks (Empledocles - love and hate, harmony and discord?) theorized two millenia ago: attraction and resistance?

Alternatively, under Einstein geometric theory of gravity, is gravity really a force at all? Is there need for a graviton? Also in support of Einstein and counter to Lederman, John Archibald Wheeler tosses Newton's "inertial mass" and "gravitational mass" aside, along with his theory of motion. There's motion, but it's created by "rolling down hill" so to say, and not by any magical pulling and resistance forces. Interesting stuff.

Javier Santaolalla says

Una obra maestra de la divulgación.
Leon Lederman es premio Nobel en física, es además un conocido científico con grandes aportaciones al a física de partículas del siglo XX, es testigo directo de grandes descubrimientos y ha presenciado momentos históricos en la ciencia, amigo y compañero de los más grandes... pero por encima de todo es un cachondo.
La partícula divina es una revisión histórica de la física de partículas, con una profundidad adecuada, nunca excesiva, siempre al alcance de cualquier humano y con una dosis de humor y originalidad que lo hace delicioso a la vista. Un juguete de 577 páginas. Bravo.
No te quiero contar más porque prefiero que tú mismo lo descubras. Ve a comprar este libro y disfrútalo.
No te vas a arrepentir.

Jim says

A very lively, funny, and informative book by Nobel Laureate Leon Lederman. The first part of the book is a vivid and hilarious historical survey of ideas and discoveries in Western physics from the Greeks down to the present day. Having brought you as a reader step by step on this journey, Lederman then opens the door to his own utterly fascinating but little-understood speciality, particle physics. Lederman conveys with excitement and humor what it is like to be one of two or three people in the world who are pushing the frontiers of scientific knowledge in a particular specialized area. This book is especially significant right now, in 2008, as we are about to see the Large Hadron Collider, the world's largest and most powerful particle accelerator, begin operation. The entire aim of the LHC is to find the elusive Higgs boson, the "God Particle" of the book's title, which would largely confirm the Standard Model of physics. Leon Lederman takes you by the hand and walks you through all these ideas with joy and humor. This is one of the sharpest science books for the general reader ever published.

Ellen says

As a history of particle physics, it's pretty good. However, I still had to consult Wikipedia after I read it to find out what the Higgs field is (the point of the book was to tell the story of the quest to prove its existence, upon which all of particle theory rests...), And despite many references to God and Creation, Lederman is still a champion of making science more accessible to the general public. And there's this one great passage where he rips on "The Tao of Physics" and other pseudo-science books that are written and sold by people who abuse their credentials (yes!).

"The public sees science as some monolithic edifice of unbending rules and beliefs, and-- thanks to the media's portrayal of scientists as uptight nerds in white coats-- sees scientists as stodgy old artery-hardened defenders of the status quo. In truth, science is a much more flexible thing. Science is not about status quo. It's about revolution."

Nikhil Narain says

An extraordinary book. Engrossing without being over simplistic and filled with wit and interesting anecdotes, The God Particle is a chronicle of the human intellectual endeavour to answer some of the Universe's most challenging questions. Lucidly written and inspiring, it is a must read for anyone even remotely interested in Physics.

Katie Curry says

I would not describe Lederman as a Feynman by any means but he is comparable to Simon Singh by way of Brain Green, though I prefer Singh's work simply due to the absence of obnoxious puns and over the top attempts at some form of verb schtick. Overall, it was okay with the amount of information that was easily obtained and ability to comprehend but the writing style was beyond annoying bordering on tedious.

Dallas says

This book provides an interesting foray into the deep mechanisms of particle physics. Nicknamed 'The Plumber'(due to his preference for experimentation) by Murray Gell-Mann, it is clear from this book that Lederman's work in the 60s and 70s is nothing short of Nobel calibre. This book is fairly dense in terms of physics technicalities, but one can still appreciate the humorous anecdotes throughout.

As generally explained in the book, a neutrino ('little neutral one') is an elementary particle of neutral electric charge and almost 0 mass. Neutrinos are extremely difficult to detect, yet more than 50 trillion of them pass through our bodies every second (via the sun). Leptons (electrons, muons, and the tau) can also be neutrinos with corresponding antineutrinos. These are said to be the "flavours" of a neutrino. Lederman's Nobel Prize, in 1988, was awarded "for the neutrino beam method and the demonstration of the doublet structure of the leptons through the discovery of the muon neutrino", and it was shared with Schwartz and Steinberger.

As an aside, direct evidence for the neutrino related to the tau was announced by Fermilab (a particle accelerator like the LHC, but in Chicago) in July 2000. Current studies indicate that neutrinos have a small but nonzero mass. Travel at light-speed is impossible for objects having mass. Since so many neutrinos are predicted to exist, their combined mass may be sufficient to cause all the matter in the Universe to eventually collapse into a single point, which might then explode and create a completely new Universe.

Almir Olovcic says

Great piece of science book, hard to understand in moments, but overall funny, vivid and informing book.

Would recommend to everyone interested in world around us and development of atom theory from Greeks to modern days.

Enrique Oviedo says

Este libro es, ante todo, un engaño. Usa el gancho de Higgs para atraer lectores cuando el espacio que dedica al bosón de Higgs es menos de un 1% del texto.
Más de la mitad lo dedica a una historia de la física muy pobre y meramente enumerativa, sin explicar ningún concepto. No entiendo por qué los libros divulgativos de física se ven en la obligación de tener que recapitular toda la historia de la disciplina para hablar sobre cualquier tema.
El resto del libro lo dedica a la historia de los aceleradores de partículas en los 50, 60 y 70, especialidad que llevó al autor al Nobel. Es quizás lo más interesante del libro pues no se suelen dedicar libros al proceso experimental de la ciencia. El problema que le veo es que en lugar de explicar con más detalle el funcionamiento de los detectores se enreda en enumerar cifras que se olvidan según se leen.
La física teórica apenas existe en el libro y no se intenta explicar ninguno de los experimentos desde la teoría.
Del bosón de Higgs el escritor dice poco más que duda de su existencia. Es una pena que un Nobel tenga que buscar ganchos publicitarios sin relación con el contenido para vender sus libros.

Tomislav Galeta says

Vrlo simpati?no za ?itati uz mnoštvo duhovitosti. Postavio sam si mnoštvo oznaka na zanimljive odlomke dok sam ?itao. Volio bih da ipak ima malo više slika i nešto više formula s pojašnjenjima. Kolikogod autor tvrdio kako je pisao knjigu za laike, sumnjam da ?e baš laici ?itati.
Prili?no me umorio dugi dijalog s Demokritom.
Super analogija u odlomku kao sedmi suprug Zsa Zse Gabor: Znam što trebam, ali kako da bude zanimljivo.
Sjajno mišljenje o Weinbergovoj knjizi kao priru?niku o seksu.
U knjizi je prikladno na nekoliko mjesta spomenut Boškovi?, dok od više izostavljenih možda vrijedi spomenuti nema Tesle.

Mi Camino Blanco says

Mi primer acercamiento serio al bosón de Higgs y ha satisfecho mis expectativas.

Me suele pasar que en los de física me gusta más la primera parte dónde sientan las bases de la segunda, dónde supuestamente está el meollo de la cuestión.

En este caso no ha sido una excepción, me ha resultado muy ágil la primera parte dónde desarrolla los hitos, experimentos y descubrimientos más importantes en la historia de la Ciencia que han llevado a la famosa partícula, más si si tenemos en cuenta que Leon Lederman es un físico experimental y él mismo pone de relevancia la distancia con los físicos teóricos, mayoría en la autoría de este tipo de ensayos.

Resulta muy original el diálogo ficticio que entabla en los primeros capítulos con Demócrito y dónde hace gala de un sentido del humor que está también presente en el resto del libro y que no solemos presuponer en un premio Nobel.

Me quedo con la historia del partido de fútbol sin balón, es la mejor metáfora que he leído sobre la validez del pensamiento científico. Un grupo de extraterrestres con la incapacidad de captar formas blancas y negras (como un balón de fútbol) son testigos de un encuentro en nuestro planeta. La conclusión a la que finalmente llegan es a la inevitabilidad de la existencia de una forma esférica que explica todos los fenómenos. Esa es la grandeza de la Ciencia, “tiene que haber un balón”.

http://micaminoblanco.blogspot.com.es

Pablo says

I'm really interested in quantum physics (layman's quantum physics), particularly when using the discipline to try to gain a greater understanding of the very fabric of existence and how that begins to approach spirituality. In theory, God Particle has the recipe to satisy this penchant, but I cannot get past Lederman's hokey methods e.g. fabricating a conversation with a Greek philosopher that is supposed to be funny but is actually as entertaining as watching a silent film without picture. Lederman tries to use humor to engage the layman reader but he ends up obfuscating the message he is trying to deliver. Lederman may be a brilliant scientist but he is a piss poor humorist.

Alain says

It's not an easy reading, but Leon Ledderman is a fabulous and funny story teller. He brings to the layman understanding of rhe profound laws that govern the universe. I can't say I got it all, but I surely feel like I understand a bit more what's going on in the world of the very very very small.

30 years ago we thought the atom was the final frontier but today with the quarks and the leptons and the gluons and now Higgs boson the cosmos shows us that there are a lot of strange things going on right in (in fact also inside) our face.

The book becomes very actual with the recent discovery in July 2012 of the famous Higgs boson. A must read if you want to get it a bit more.
