http://www.goodreads.com/quotes/tag/fine-structure-constant
29 Quotes about the Fine Structure Constant

1: “There is a most profound and beautiful question associated with the observed coupling constant, e - the amplitude for a real electron to emit or absorb a real photon. It is a simple number that has been experimentally determined to be close to 0.08542455. (My physicist friends won't recognize this number, because they like to remember it as the inverse of its square: about 137.03597 with about an uncertainty of about 2 in the last decimal place. It has been a mystery ever since it was discovered more than fifty years ago, and all good theoretical physicists put this number up on their wall and worry about it.) Immediately you would like to know where this number for a coupling comes from: is it related to pi or perhaps to the base of natural logarithms? Nobody knows. It's one of the greatest damn mysteries of physics: a magic number that comes to us with no understanding by man. You might say the "hand of God" wrote that number, and "we don't know how He pushed his pencil." We know what kind of a dance to do experimentally to measure this number very accurately, but we don't know what kind of dance to do on the computer to make this number come out, without putting it in secretly!”
— Richard Feynman, QED: The Strange Theory of Light and Matter

8: “If alpha [the fine-structure constant] were bigger than it really is, we should not be able to distinguish matter from ether [the vacuum, nothingness], and our task to disentangle the natural laws would be hopelessly difficult. The fact however that alpha has just its value 1/137 is certainly no chance but itself a law of nature. It is clear that the explanation of this number must be the central problem of natural philosophy.” — Max Born

12: “One hundred thirty-seven is the inverse of something called the fine-structure constant. ...The most remarkable thing about this remarkable number is that it is dimension-free. ...Werner Heisenberg once proclaimed that all the quandaries of quantum mechanics would shrivel up when 137 was finally explained.”
— Leon M. Lederman, The God Particle: If the Universe Is the Answer, What Is the Question?

24: “The theoretical determination of the fine structure constant is certainly the most important of the unsolved problems of modern physics. We believe that any regression to the ideas of classical physics (as, for instance, to the use of the classical field concept) cannot bring us nearer to this goal. To reach it, we shall, presumably, have to pay with further revolutionary changes of the fundamental concepts of physics with a still farther digression from the concepts of the classical theories.” **Wolfgang Pauli**, **Writings on Physics and Philosophy**

2: “There are considerable mysteries surrounding the strange values that Nature's actual particles have for their mass and charge. For example, there is the unexplained 'fine structure constant' ... governing the strength of electromagnetic interactions, ...” — Roger Penrose, The Road to Reality: A Complete Guide to the Laws of the Universe

5: “Realizing its fundamental importance in understanding spectral lines, in atomic physics and in the theory of how light and electrons interact, quantum electrodynamics, Pauli and Heisenberg were determined to derive it from quantum theory rather than introducing it from the start. They believed that if they could find a version of quantum electrodynamics capable of producing the fine structure constant, it would not contain the infinities that marred their theories.”
— Arthur I. Miller, Deciphering the Cosmic Number: The Strange Friendship of Wolfgang Pauli and Carl Jung

10: “Let us begin with the fine-structure constant. ... The fine-structure constant is really the ratio of two natural units or atoms of action. ... We obtain action when we multiply energy by time. ... We are challenged to find a unified theory of electric particles and radiation in which the electrostatic type of action and the quantum type of action are traced to their source.”
— Arthur Stanley Eddington, New Pathways in Science

14: “For [Wolfgang] Pauli the central problem of electrodynamics was the field concept and the existence of an elementary charge which is expressible by the fine-structure constant ... 1/137. This fundamental pure number had greatly fascinated Pauli, ... For Pauli the explanation of the number 137 was the test of a successful field theory, a test which no theory has passed up to now.”

— Charles P. Enz, Pauli Lectures on Physics: Volume 1, Electrodynamics
15: “There was a time when people thought the value of the fine structure constant was important. Now of course it's still important, of course, as a practical matter, but we now know that the value it has is a function, that in any fundamental theory you derive the fine structure constant as a function of all sorts of mass ratios and so on, and it's not really that fundamental.” — Steven Weinberg
19: “Physicists love this number not just because it is dimensionless, but also because it is a combination of three fundamental constants of nature. Why do these constants come together to make the particular number 1/137.036 and not some other number?” — John Archibald Wheeler, Geons, Black Holes, and Quantum Foam: A Life in Physics
25: “[The fine structure constant] ... defines how firmly atomic nuclei bind together and how all the atoms on Earth were made. Its value controls the power from the Sun and, more sensitively, how stars transmute hydrogen into all the atoms of the periodic table.” — Martin J. Rees, Just Six Numbers: The Deep Forces That Shape the Universe
27: “The fine structure constant is undoubtedly the most fundamental pure (dimensionless) number in all of physics. It relates the basic constants of electromagnetism (the charge of the electron), relativity (the speed of light), and quantum mechanics (Planck's constant).” — David J. Griffiths
17: “Through Jung [Pauli] became very interested in various kinds of mysticism, including Jewish mysticism. This led Pauli to develop a friendship with Gershom Scholem, the world's greatest authority in that field and in the Cabala, ... On one occasion Scholem asked me to tell him about unsolved problems in modern physics. .... When I mentioned this number --137-- to Scholem, ... He told me that in Hebrew .... The number corresponding to the word 'cabala' happens to be 137.” — Victor F. Weisskopf, The Joy of Insight: Passions of a Physicist
6: “Today alpha equals 1/137.0359 or so. Regardless, its value makes the periodic table possible. It allows atoms to exist and also allows them to react with sufficient vigor to form compounds, since electrons neither roam too freely from their nuclei nor cling too closely. This just-right balance has led many scientists to conclude that the universe couldn’t have hit upon its fine structure constant by accident.” — Sam Kean, The Disappearing Spoon: And Other True Tales of Madness, Love, and the History of the World from the Periodic Table of the Elements
4: “Arnold Sommerfeld generalized Bohr's model to include elliptical orbits in three dimensions. He treated the problem relativistically (using Einstein's formula for the increase of mass with velocity), ... According to historian Max Jammer, this success of Sommerfeld's fine-structure formula "served also as an indirect confirmation of Einstein's relativistic formula for the velocity dependence of inertia mass.” — Stephen G. Brush, Making 20th Century Science: How Theories Became Knowledge
7: “The mystery about α is actually a double mystery. The first mystery – the origin of its numerical value α ≈ 1/137 has been recognized and discussed for decades. The second mystery – the range of its domain – is generally unrecognized.” — Malcolm H. Mac Gregor
21: “Alpha, known as the fine-structure constant, characterizes the interactions between matter and light. It has been very accurately measured in the laboratory. It is indeed the most precisely measured of all physical constants ... best memorized in the form ~ 1/137.” — Jean-Philippe Uzan
22: “The fine-structure constant derives its name from its origin. It first appeared in Sommerfeld's work to explain the fine details of the hydrogen spectrum. ... Since Sommerfeld expressed the energy states of the hydrogen atom in terms of the constant [alpha], it came to be called the fine-structure constant.” — John S. Rigden, Hydrogen: The Essential Element
13: “All integral laws of spectral lines and of atomic theory spring originally from the quantum theory. It is the mysterious organon on which Nature plays her music of the spectra, and according to the rhythm of which she regulates the structure of the atoms and nuclei.” — Arnold Sommerfeld, Atombau Und Spektrallinien

18: “The mystery about α is actually a double mystery. The first mystery – the origin of its numerical value α ≈ 1/137 has been recognized and discussed for decades. The second mystery – the range of its domain – is generally unrecognized.”
— Malcolm H. MacGregor, Power of (Alpha): Electron Elementary Particle Generation With (Alpha)-quantized Lifetimes And

20: “At his "World of Physics" Web site, Eric W. Weisstein notes that the fine structure constant continues to fascinate numerologists, who have claimed that connections exist between alpha, the Cheops pyramid, and Stonehenge!”
— Clifford A. Pickover, A Passion for Mathematics: Numbers, Puzzles, Madness, Religion, and the Quest for Reality

23: “The measured magnetic moment, together with fine structure constant determined by a different method, is the most stringent test of QED and the Standard Model of particle physics. The measured magnetic moment and QED theory together yield the most precise measured value of the fine structure constant.”
— W Quint, Manuel Vogel

26: “Sommerfeld's fine-structure theory was generally considered to be excellently and unambiguously confirmed by experiment. Because the theory rested on the foundation provided by Bohr, the experiments were also taken as strong support for his theory of atomic structure.”
— Helge Kragh, Niels Bohr and the Quantum Atom: The Bohr Model of Atomic Structure 1913-1925

28: “The first physicist to stress the all-encompassing role of [the fine-structure constant] and [the proton/electron mass ratio] in determining the inevitable structure of atomic systems seems to have been Max Born.”
— John D. Barrow & Frank J. Tipler, The Anthropic Cosmological Principle

29: “The significance of [the fine-structure constant] goes far beyond atomic physics, however. It is the smallness of 1/137 compared to unity that enables us to treat the coupling between the electromagnetic field and a charged particle such as an electron as a small perturbation, a fact of great computational importance. [Forces of Nature]”
— Paul C.W. Davies

11: “We have found that the values of the constants of nature have not been fine-tuned for life by accident, but that these values are constrained by and logically follow from the fundamental space-time organization of the Cosmic Tree of Life.”
— Carl Johan Calleman

9: “Alpha sets the scale of nature -- the size of atoms and all things made of them, the intensity and colors of light, the strength of magnetism, and the metabolic rate of life itself. It controls everything that we see. ... In 137, apparently, science had found Nature's PIN Code.”
— Frank Close, The Infinity Puzzle: Quantum Field Theory and the Hunt for an Orderly Universe

3: “If the deep logic of what determines the value of the fine-structure constant also played a significant role in our understanding of all the physical processes in which the fine-structure constant enters, then we would be stymied. Fortunately, we do not need to know everything before we can know something.”
— John D. Barrow, New Theories of Everything

16: “Since only a narrow range of the allowed values for, say, the fine structure constant will permit observers to exist in the Universe; we must find ourselves in the narrow range of possibilities which permit them, no matter how improbable they are. We must ask for the conditional probability of observing constants to take particular ranges, given that other features of the Universe, like its age, satisfy necessary conditions for life.”
— John D. Barrow, The Constants of Nature: The Numbers That Encode the Deepest Secrets of the Universe