

PHYSICS 321 Reading List

George A. Akerlof and Robert J. Shiller Animal Spirits: How Human Psychology Drives Economics... Princeton University Press, Princeton NJ (2009) Proof that Homo Eonomus does not exist. A good book on economics.

Robert K. Adair The Physics of Baseball Harper Row, Publishers, NY (1990) All you wanted to know about curveballs and home runs.

Peter Atkins. The Four Laws that Govern the Universe Oxford University Press, NY (2007) Just the best introduction to thermodynamics and eminently readable.

Philip Ball Life's Matrix: A Biography of Water Farrar, Straus, and Girous, NY (1999) All you ever wanted to know about water. What it is and what it does.

John S. Bell Speakable and Unspeakable in Quantum Mechanics Cambridge University Press, Cambridge England (1987) Intellectually challenging essays by the person that has the deepest insight into the implications of quantum mechanics.

Peter Bergman. The Riddle of Gravitation. Scribner & Sons, NY (1968). An excellent book on general and special relativity.

Peter D. Bernstein Against the Gods J. Wiley and Sons Inc., NY (1996). A history of risk with the emphasis on investments.

Stephen Breyer Breaking the Vicious Cycle Harvard University Press, Cambridge, Mass. (1993) A good book on environmental policy by the Supreme Court justice.

Jed Z. Buchwald The Rise of the Wave Theory of Light: Optical Theory and Experiment in the Early Nineteenth Century. The University of Chicago Press, Chicago, Illinois (1989) The definitive treatment of the development of the wave theory of light.

Nigel Calder. The Key to the Universe. Viking Press, NY (1977). A report of a television show which primarily covers particle physics. A bit out of date.

Subrahmanyan Chandrasekhar. Truth and Beauty: Aesthetics and Motivation in Science. The University of Chicago Press, Chicago (1987) Thoughts on how science works and is satisfying by one of the best scientists of this generation.

Bernard Cohen The Nuclear Energy Option Plenum Press, NY (1990) The best book on nuclear power.

I. Bernard Cohen and Anne Whitman Isaac Newton: The Pricipia A New Translation University of California Press, Berkeley CA (1999) A complete translation and interpretation of Newton's Principia.

Robert P. Crease The Play of Nature Indiana University Press, Bloomington Ind. (1993). Develops a philosophy of physics based on experiment as the primary element.

A. D'Abro The Rise of the New Physics: Vol I Classical Physics Dover Publications, NY (1939) A classic history of the development of relativity and quantum mechanics.

A. D'Abro The Rise of the New Physics: Vol II Quantum Physics Dover Publications, NY (1939) A classic history of the development of relativity and quantum mechanics.

Kenneth S. Deffeyes, Hubbard's Peak: The Impending World Oil Shortage Princeton University Press, Princeton NJ (2001) A nice description of how oil reserves are formed and tapped and an analysis of when we will run out.

Mark Denny Air and Water Princeton University Press, Princeton NJ (1993) A terrific book on the physics of biological systems that live in water and air.

Jared Diamond Guns, Germs, and Steel W. W. Norton and Co., NY (1997) A complete and careful argument for the geographic determinism in the patterns of civilization

Gregg Easterbrook A Moment on the Earth Penguin Books NY (1995) If you are going to read one book on the environment this should be it.

Arthur Eddington. The Nature of the Physical World. MacMillan, NY (1948). A classic with a more philosophical bent by one of the great astronomers.

Albert Einstein. Relativity: Special and General Theory. Smith Publishing, NY (1931) 168p. A short and thorough description of relativity from the original source.

Albert Einstein, H.A. Lorentz, H. Weyl, & H. Minkowski. The Principle of Relativity. Dover Publications, Inc., NY (1952). A marvelous collection of articles by the founders of the subject.

Timothy Ferris. Coming of Age in the Milky Way. William Morram and Co., Inc., NY (1988) 494p. A description of the historical development of our conception of the universe from ancient Greece to the 1990's.

Richard P. Feynman. The Character of Physical Law. MIT Press, Cambridge, MA (1967). A good treatment of the way physics works.

Richard P. Feynman The Pleasure of Finding Things Out Persius Books, Cambridge Mass (1999) Intellectually challenging short pieces by Feynman

Justin Fox. The Myth of the Rational Market: A History of Risk, Reward, and Delusion on Wall Street, Harper Collins eBooks (2010) A good description of the how the quants and gamblers took over Wall Street.

David Friedman Hidden Order Harper Business, NY (1996) An economics book by an economist and lawyer trained as a physicist.

Michael Fumento Science Under Siege William Morrow and Co., NY (1993) A criticism of the media handling of environmental issues from the conservative perspective.

Henning Genz Nothingness: the Science of Empty Space Perseus Books, Reading Mass. (1999) The history of the development of our understanding of the vacuum and a laymans level discussion of modern theories of it.

Robert Geroch. General Relativity from A to B. University of Chicago Press, Chicago, IL (1978) 225p. A discussion of relativity stressing the historical development of the concept of a "frame of reference" and its ties to observation. The best book on General Relativity.

James Gleick. Chaos. Viking Penguin, Inc., NY (1987). A best seller which covers work in an important branch of modern physics research.

James Gleick Genius: The Life and Science of Richard Feynman Pantheon Books, NY (1992) An idolatry biography of Feynman.

Ursula Goodenough The Sacred Depths of Nature Oxford University Press, NY (1998) If you need a connection with a belief system, this is a good book to read.

Brian Greene The Elegant Universe Vintage Books, NY (2000) A good book on string theory for the layperson.

Robert Greenler Rainbows, Halos, and Glories Cambridge University Press, NY (1980) If you see it in the sky this book shows it and explains it.

Paul R. Gross, Norman Levitt, and Martin W. Lewis The Flight from Science and Reason Johns Hopkins University Press, Baltimore MD (1996) An extensive collection of articles dealing with the problem of threat to science from many post modern academics.

Robert Hahn Risk, Costs, and Lives Saved: Getting Better Results from Regulation Oxford University Press, NY (1996) The best of the contrarian books on the problem of regulation of the environmental.

Stephen Hawking. A Brief History of Time: From the Big Bang to Black Holes. Bantam Books, Toronto, Canada (1988) 198p. A very brief introduction to relativity and quantum mechanics is followed by a description of the search for a theory of quantum gravity, the flow of time, and unified fields.

John Horgan The End of Science Addison Wesley, Reading Mass. (1996) This book presents the claim that we have discovered all the basic science that there is to discover.

Bruce Hunt The Maxwellians Cornell University Press, Ithaca New York, (1991) A wonderful review of the struggle to understand what Maxwell had done by a UT historian of science.

Max Jammer Concepts of Space, Second Edition Harvard University Press, Cambridge (1969) History of our understanding about space.

Max Jammer Concepts of Force Harvard University Press., Cambridge

J.M. Jauch. Are Quanta Real? Indiana University Press, Bloomington, IN (1973). A discussion of the reality of quantum phenomena following the patterns of the Galilean dialogue.

Daniel Keyles The Baltimore Case NY (1998) The story of the investigation of supposed fraud in an important case in biology. Will make you wonder about the competency of the people in charge of protecting us against scientific fraud.

Daniel Kevles The Physicists: The History of a Scientific Community in Modern America. Alfred A. Knopf, NY (1978) A really well done history of physics in this country.

Lawrence Krauss, Atom : An Odyssey from the Big Bang to Life on Earth...and Beyond. (2001) The life story of an oxygen atom from birth to today. A neat read.

William Lanouette Genius in the Shadows Charles Schribner and Sons, NY (1992). This is a biography of Leo Szilard, an excellent physicist and a real character. He patented the atomic bomb.

Leon Lederman The God Particle Houghton Mifflin Company, NY (1993) A book by a Nobel Prize winner that is more interested in humor than knowledge.

H. W. Lewis Technological Risk W. W. Norton & Co., NY (1990) A good book on risk assessment.

H. W. Lewis Why Flip a Coin? John Wiley and Sons, NY (1997) A very interesting book on decision making.

D. K. Lynch and W. Livingston. Color and Light in Nature Cambridge University Press, NY (1995) Great pictures of interesting optical effects and simple explanations

M. Minaert The Nature of Light and Colour in the Open Air Dover Publications, NY (1954) A classic that tells you everything you wanted to know about how light interacts with the atmosphere. A little technical.

Leonard Miodinow, The Drunkard's Walk. Pantheon Press, New York, NY (2008). A very good book on probability and statistics. Lot's of interesting examples and some biography.

Jacque Monod. Chance and Necessity. Vintage Books, NY (1972). A biologist writes about the implications of microscopic physics.

Philip and Phylis Morrison. Powers of Ten Scientific American Library, NY (1982). A book based on the film that explores the scales of length in Physics

Richard A. Muller. Physics and Technology for Future Presidents: An Introduction to the Essential Physics that Every World Leader Should Know Princeton University Press, Princeton NJ (2010) The subtitle says it all. It is well done.

Walter Moore Schroedinger. Cambridge University Press, NY (1989). A biography of a major figure in the development of quantum mechanics.

Yuval Ne'eman & Yoram Kirsch. The Particle Hunters. Cambridge University Press (1986). A careful and correct review of modern particle physics. A new edition has just come out.

Isaac Newton. The Principia: Mathematical Principles of Natural Philosophy, Translated and interpreted by I. Bernard Cohen and Anne Whitman, University of California Press, Berkeley CA (1999) The book and explained too.

Heinz R. Pagels. Perfect Symmetry: The Search for the Beginning of Time. Bantam Books, Toronto (1985) 412p. Cosmology and the search for a unified field theory with more particle and quantum physics and less relativity.

Heinz R. Pagels The Cosmic Code: Quantum Physics as the Language of Nature. Simon and Schuster, NY (1982) 370p. Modern particle physics is described beginning with an heavy emphasis on quantum mechanics.

Abraham Pais Subtle is the Lord: The Science and Life of Albert Einstein. Oxford University Press, NY (1982) An excellent history of the development of general relativity and Einstein's role in quantum mechanics. Somewhat technical.

Abraham Pais Inward Bound. Oxford University Press, NY (1986). Somewhat technical but very careful review of the history of modern microscopic physics.

Abraham Pais Neils Bohr's Times in Physics, Philosophy, and Polity. Oxford University Press, NY (1991). The best review of Bohr's contributions.

Jay M. Pasachoff, and Leon Golub, Nearest Star : The Surprising Science of Our Sun. (2001) The latest on what we know about the sun. Well written and up to date.

David Park [The Fire within the Eye: A Historical Essay on the Nature and Meaning of Light](#). Princeton University Press, Princeton, New Jersey (1997). A wonderful summary of the early history of our understanding of light.

David Park [The Grand Contraption](#). Princeton University Press, Princeton NJ (2005). The interpretations of how the universe operates from the ancients to today.

Robert Park [Voodoo Science](#) Oxford University Press, NY (2000). How ideas based on bad science can become fashionable.

John Allen Paulos [A Mathematician Reads the Newspaper](#). Treats several topics of current interest from the perspective of a mathematician.

C. J. Pennycuik, [Newton Rules Biology](#). Oxford University Press, Oxford, England. A very nice small book on the scaling laws of biology.

Roger Penrose. [The Emperor's New Mind](#). Oxford University Press, NY (1989). Discusses modern physics and mathematics in order to set the stage for a critique of current theories of intelligence.

Roger Penrose. [The Road to Reality: A Complete Guide to the Laws of the Universe](#). Alfred A, Knopf Inc. A Division of Random House, New York, NY (2005) A most complete description of modern understanding of physics by one of the brightest physicists of the last half century. A little technical.

Henri Poincaré, [The Value of Science: Essential Writings of Henri Poincaré](#), Ed. by Stephan Jay Gould, The Modern Library, NY (2001) Considered by many to be the most influential writing on science and culture at the turn of the 20th century.

Ilya Prigogine & Gr'goire Nicholas. [Exploring Complexity](#). W. H. Freeman and Co., NY (1989). Explains the basis for complex dynamical behavior, it is somewhat technical.

Martin Rees. [Just Six Numbers](#). Basic Books, NY (2000). A short up to date summary of what we know about the nature of the universe.

Richard Rhodes. [The Making of the Atomic Bomb](#) Simon & Schuster, NY A great history of the nuclear physics that lead to the Manhattan Project and the making of the atomic bomb.

Richard Rhodes. [Dark Sun: The Making of the Hydrogen Bomb](#). Simon & Schuster, NY (1995) Details the physics and the spying that were associated with the development of the hydrogen bomb.

Burton Richter. [Smoke and Mirrors: Climate Change and Energy in the 21st Centurey](#) Cambridge University Press, Cambridge, England (2010). The best short summary of the physics issues and their policy implications.

Vasco Ronchi. The Nature of Light: A Historical Study. Harvard University Press, Cambridge, Massachusetts (1970) The best review of the classic theories of vision and light.

Hazel Rossotti Colour: Why the World Isn't Grey Princeton University Press, Princeton (1983) All that you ever wanted to know about why things have the colors that they have.

Carl Sagan The Demon Haunted World. Random House, NY (1995) The well known television personality and astrophysicist is concerned about the public fascination with bad science.

Alan Sokal and Jean Bricmont Fashionable Nonsense Picador USA NY (1998) A scathing indictment of the post modernist movement in philosophy and sociology.

James D. Stein How Math Explains the World. HarperCollins Publishers, 10 East 53rd Street, New York, NY 10022 (2008). Rather than explaining the world, this book describes some modern physics and modern mathematics.

Gary Taubes Nobel Dreams. Random House, NY (1986) A not flattering description of work that lead to a Nobel Prize.

Edwin F. Taylor and J. A. Wheeler, Exploring Black Holes. Addison Wesley Longman (2000) A little technical but an excellent introduction to General Relativity.

Henk Tennekes The Simple Science of Flight. MIT Press, Cambridge Mass. (1996) If you want to read one book on how things fly read this one.

Kip Thorne Black Holes and Time Warps. W. W. Norton & Company, (1995) This is the book to read if you really want to know what happens around black holes and worm holes.

Christopher P. Toney Conjuring Science Rutgers University Press,, New Brunswick, NJ, (1996) An anthropologist looks at the use of scientific images in pseudo-science

James Trefil. The Dark Side of the Universe: A Scientist Explores the Mysteries of the Cosmos. Charles Scribner's Sons, NY (1988) 197p. Modern cosmology and astrophysics stressing ties to observation.

James Trefil. A Scientist at the Seashore Collier Books, NY (1984) A nice little book that tells you all about the neat things that happen at the beach.

James Trefil. A Scientist in the City. Doubleday, NY (1994) Illustrations of physics in an urban setting

Steven Weinberg. The First Three Minutes. Basic Books, NY (1977). The best book on big bang cosmology.

Steven Weinberg Dreams of a Final Theory. The best book on how a modern physicist views the world.

Steven Weinberg Facing Up. Harvard University Press, Cambridge Mass. (2001) Essays on how science works, particularly the current trends in cultural acceptance of science.

Sharon Weinberger. Imaginary Weapons: A Journey through the Pentagon's Scientific Underworld Avalon Publishing Group Inc. New York, NY (2006) How the pentagon allows weird science to determine weapons studies.

Victor Weisskopf. Knowledge and Wonder. Doubleday & Co., Garden City, NY (1966). A classic by an excellent physicist.

Richard S. Westfall Never at Rest: A Biography of Isaac Newton Cambridge University Press, NY (1980) The definitive biography.

John A. Wheeler A Journey into Gravity and Spacetime Scientific American Library, NY (1990) A great book that I almost made one of the texts for the course.

John A. Wheeler with Kenneth Ford Geons, Black Holes, and Quantum Foam W. W. Norton & Co. NY (1998) The life of former University of Texas Professor John Wheeler. Includes work on Manhattan Project and General Relativity.

Eugene P. Wigner Symmetries and Reflections Ox Bow Press, Woodbridge, Conn. (1967) Essays by one of the founding fathers of modern physics. A little technical.

Frank Wilczek & Betsy Doinz. Longing for the Harmonies. W. W. Norton & Co., NY (1988). My favorite book on modern physics.

Clifford Will. Was Einstein Right? Basic Books, Inc., NY (1986). Nice little book on the observational basis for general relativity.

Edward O. Wilson. Consilience Alfred A. Knopf, NY (1998). An attempt to integrate science with all the other fields of knowledge.

A. Zee. Fearful Symmetry. MacMillan Publishing Co., NY (1986). A good book on the attempt to establish a grand unified theory.

October 30, 2010