

## 1.1: Nobel Prizes in Particle Physics

1903	BECQUEREL, ANTOINE HENRI, France, École Polytechnique, Paris, b. 1852, d. 1908:	"in recognition of the extraordinary services he has rendered by his discovery of spontaneous radioactivity";
	CURIE, PIERRE, France, cole municipale de physique et de chimie industrielles, (Municipal School of Industrial Physics and Chemistry), Paris, b. 1859, d. 1906; and his wife CURIE, MARIE, née SKŁODOWSKA, France, b. 1867 (in Warsaw, Poland), d. 1934:	"in recognition of the extraordinary services they have rendered by their joint researches on the radiation phenomena discovered by Professor Henri Becquerel"
1922	BOHR, NIELS, Denmark, Copenhagen University, b. 1885, d. 1962:	"for his services in the investigation of the structure of atoms and of the radiation emanating from them"
1927	COMPTON, ARTHUR HOLLY, U.S.A., University of Chicago b. 1892, d. 1962:	"for his discovery of the effect named after him";
	and WILSON, CHARLES THOMSON REES, Great Britain, Cambridge University, b. 1869 (in Glencorse, Scotland), d. 1959:	"for his method of making the paths of electrically charged particles visible by condensation of vapour"
1932	HEISENBERG, WERNER, Germany, Leipzig University, b. 1901, d. 1976:	"for the creation of quantum mechanics, the application of which has, inter alia, led to the discovery of the allotropic forms of hydrogen"
	SCHRÖDINGER, ERWIN, Austria, Berlin University, Germany, b. 1887, d. 1961; and DIRAC, PAUL ADRIEN MAURICE, Great Britain, Cambridge University, b. 1902, d. 1984:	"for the discovery of new productive forms of atomic theory"
1935	CHADWICK, Sir JAMES, Great Britain, Liverpool University, b. 1891, d. 1974:	"for the discovery of the neutron"
1936	HESS, VICTOR FRANZ, Austria, Innsbruck University, b. 1883, d. 1964:	"for his discovery of cosmic radiation"; and
	ANDERSON, CARL DAVID, U.S.A., California Institute of Technology, Pasadena, CA, b. 1905, d. 1991:	"for his discovery of the positron"
1938	FERMI, ENRICO, Italy, Rome University, b. 1901, d. 1954:	"for his demonstrations of the existence of new radioactive elements produced by neutron irradiation, and for his related discovery of nuclear reactions brought about by slow neutrons"
1939	LAWRENCE, ERNEST ORLANDO, U.S.A., University of California, Berkeley, CA, b. 1901, d. 1958:	"for the invention and development of the cyclotron and for results obtained with it, especially with regard to artificial radioactive elements"

1943	STERN, OTTO, U.S.A., Carnegie Institute of Technology, Pittsburg, PA, b. 1888 (in Sorau, then Germany), d. 1969:	"for his contribution to the development of the molecular ray method and his discovery of the magnetic moment of the proton"
1944	RABI, ISIDOR ISAAC, U.S.A., Columbia University, New York, NY, b. 1898, (in Rymanow, then Austria-Hungary) d. 1988:	"for his resonance method for recording the magnetic properties of atomic nuclei"
1945	PAULI, WOLFGANG, Austria, Princeton University, NJ, U.S.A., b. 1900, d. 1958:	"for the discovery of the Exclusion Principle, also called the Pauli Principle"
1948	BLACKETT, Lord PATRICK MAYNARD STUART, Great Britain, Victoria University, Manchester, b. 1897, d. 1974:	"for his development of the Wilson cloud chamber method, and his discoveries therewith in the fields of nuclear physics and cosmic radiation"
1949	YUKAWA, HIDEKI, Japan, Kyoto Imperial University and Columbia University, New York, NY, U.S.A., b. 1907, d. 1981:	"for his prediction of the existence of mesons on the basis of theoretical work on nuclear forces"
1950	POWELL, CECIL FRANK, Great Britain, Bristol University, b. 1903, d. 1969:	"for his development of the photographic method of studying nuclear processes and his discoveries regarding mesons made with this method"
1951	COCKCROFT, Sir JOHN DOUGLAS, Great Britain, Atomic Energy Research Establishment, Harwell, Didcot, Berks., b. 1897, d. 1967; and WALTON, ERNEST THOMAS SINTON, Ireland, Dublin University, b. 1903, d. 1995:	"for their pioneer work on the transmutation of atomic nuclei by artificially accelerated atomic particles"
1955	LAMB, WILLIS EUGENE, U.S.A., Stanford University, Stanford, CA, b. 1913:	"for his discoveries concerning the fine structure of the hydrogen spectrum"; and
	KUSCH, POLYKARP, U.S.A., Columbia University, New York, NY, b. 1911 (in Blankenburg, then Germany), d. 1993:	"for his precision determination of the magnetic moment of the electron"
1957	YANG, CHEN NING, China, Institute for Advanced Study, Princeton, NJ, U.S.A., b. 1922; and LEE, TSUNG-DAO, China, Columbia University, New York, NY, U.S.A., b. 1926:	"for their penetrating investigation of the so-called parity laws which has led to important discoveries regarding the elementary particles"
1959	SEGRÉ, EMILIO GINO, U.S.A., University of California, Berkeley, CA, b. 1905 (in Tivoli, Italy), d. 1989; and CHAMBERLAIN, OWEN, U.S.A., University of California, Berkeley, CA, b. 1920:	"for their discovery of the antiproton"
1960	GLASER, DONALD A., U.S.A., University of California, Berkeley, CA, b. 1926:	"for the invention of the bubble chamber"

1961	HOFSTADTER, ROBERT, U.S.A., Stanford University, Stanford, CA, b. 1915, d. 1990:	"for his pioneering studies of electron scattering in atomic nuclei and for his thereby achieved discoveries concerning the structure of the nucleons"; and
	MÖSSBAUER, RUDOLF LUDWIG, Germany, Technische Hochschule, Munich, and California Institute of Technology, Pasadena, CA, U.S.A., b. 1929:	"for his researches concerning the resonance absorption of gamma radiation and his discovery in this connection of the effect which bears his name"
1963	WIGNER, EUGENE P., U.S.A., Princeton University, Princeton, NJ, b. 1902 (in Budapest, Hungary), d. 1995:	"for his contributions to the theory of the atomic nucleus and the elementary particles, particularly through the discovery and application of fundamental symmetry principles";
	GOEPPERT-MAYER, MARIA, U.S.A., University of California, La Jolla, CA, b. 1906 (in Kattowitz, then Germany), d. 1972; and JENSEN, J. HANS D., Germany, University of Heidelberg, b. 1907, d. 1973:	"for their discoveries concerning nuclear shell structure"
1965	TOMONAGA, SIN-ITIRO, Japan, Tokyo, University of Education, Tokyo, b. 1906, d. 1979;	"for their fundamental work in quantum electrodynamics, with deep-ploughing consequences for the physics of elementary particles"
	SCHWINGER, JULIAN, U.S.A., Harvard University, Cambridge, MA, b. 1918, d. 1994; and FEYNMAN, RICHARD P., U.S.A., California Institute of Technology, Pasadena, CA, b. 1918, d. 1988:	
1967	BETHE, HANS ALBRECHT, U.S.A., Cornell University, Ithaca, NY, b. 1906 (in Strasbourg, then Germany):	"for his contributions to the theory of nuclear reactions, especially his discoveries concerning the energy production in stars"
1968	ALVAREZ, LUIS W., U.S.A., University of California, Berkeley, CA, b. 1911, d. 1988:	"for his decisive contributions to elementary particle physics, in particular the discovery of a large number of resonance states, made possible through his development of the technique of using hydrogen bubble chamber and data analysis"
1969	GELL-MANN, MURRAY, U.S.A., California Institute of Technology, Pasadena, CA, b. 1929:	"for his contributions and discoveries concerning the classification of elementary particles and their interactions"

1975	BOHR, AAGE, Denmark, Niels Bohr Institute, Copenhagen, b. 1922; MOTTELSON, BEN, Denmark, Nordita, Copenhagen, b. 1926 (in Chicago, U.S.A.); and RAINWATER, JAMES, U.S.A., Columbia University, New York, NY, b. 1917, d. 1986:	"for the discovery of the connection between collective motion and particle motion in atomic nuclei and the development of the theory of the structure of the atomic nucleus based on this connection"
1976	RICHTER, BURTON, U.S.A., Stanford Linear Accelerator Center, Stanford, CA, b. 1931; TING, SAMUEL C. C., U.S.A., Massachusetts Institute of Technology (MIT), Cambridge, MA, (European Center for Nuclear Research, Geneva, Switzerland), b. 1936:	"for their pioneering work in the discovery of a heavy elementary particle of a new kind"
1979	GLASHOW, SHELDON L., U.S.A., Lyman Laboratory, Harvard University, Cambridge, MA, b. 1932; SALAM, ABDUS, Pakistan, International Centre for Theoretical Physics, Trieste, and Imperial College of Science and Technology, London, Great Britain, b. 1926, d. 1996; and WEINBERG, STEVEN, U.S.A., Harvard University, Cambridge, MA, b. 1933:	"for their contributions to the theory of the unified weak and electromagnetic interaction between elementary particles, including inter alia the prediction of the weak neutral current"
1980	CRONIN, JAMES, W., U.S.A., University of Chicago, Chicago, IL, b. 1931; and FITCH, VAL L., U.S.A., Princeton University, Princeton, NJ, b. 1923:	"for the discovery of violations of fundamental symmetry principles in the decay of neutral K-mesons"
1983	CHANDRASEKHAR, SUBRAMANYAN, U.S.A., University of Chicago, Chicago, IL, b. 1910 (in Lahore, India), d. 1995: FOWLER, WILLIAM A., U.S.A., California Institute of Technology, Pasadena, CA, b. 1911, d. 1995:	"for his theoretical studies of the physical processes of importance to the structure and evolution of the stars" "for his theoretical and experimental studies of the nuclear reactions of importance in the formation of the chemical elements in the universe"
1984	RUBBIA, CARLO, Italy, CERN, Geneva, Switzerland, b. 1934; and VAN DER MEER, SIMON, the Netherlands, CERN, Geneva, Switzerland, b. 1925:	"for their decisive contributions to the large project, which led to the discovery of the field particles W and Z, communicators of weak interaction"

1988	<p>LEDERMAN, LEON M., U.S.A., Fermi National Accelerator Laboratory, Batavia, IL, b. 1922;</p> <p>SCHWARTZ, MELVIN, U.S.A., Digital Pathways, Inc., Mountain View, CA, b. 1932; and</p> <p>STEINBERGER, JACK, U.S.A., CERN, Geneva, Switzerland, b. 1921 (in Bad Kissingen, FRG):</p>	<p>”for the neutrino beam method and the demonstration of the doublet structure of the leptons through the discovery of the muon neutrino”</p>
1990	<p>FRIEDMAN, JEROME I., U.S.A., Massachusetts Institute of Technology, Cambridge, MA, b. 1930;</p> <p>KENDALL, HENRY W., U.S.A., Massachusetts Institute of Technology, Cambridge, MA, b. 1926; and</p> <p>TAYLOR, RICHARD E., Canada, Stanford University, Stanford, CA, U.S.A., b. 1929:</p>	<p>”for their pioneering investigations concerning deep inelastic scattering of electrons on protons and bound neutrons, which have been of essential importance for the development of the quark model in particle physics”</p>
1992	<p>CHARPAK, GEORGES, France, École Supérieure de Physique et Chimie, Paris and CERN, Geneva, Switzerland, b. 1924 (in Poland):</p>	<p>”for his invention and development of particle detectors, in particular the multiwire proportional chamber”</p>
1995		<p>”for pioneering experimental contributions to lepton physics”</p>
	<p>PERL, MARTIN L., U.S.A., Stanford University, Stanford, CA, U.S.A., b. 1927,</p> <p>REINES, FREDERICK, U.S.A., University of California at Irvine, Irvine, CA, U.S.A., b. 1918, d. 1998:</p>	<p>”for the discovery of the tau lepton”</p> <p>”for the detection of the neutrino”</p>

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