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Julian Schwinger



Dates

February 12, 1918 – July 16, 1994

Authorized Form of Name

Schwinger, Julian, 1918-1994

Additional Forms of Names

Schwinger, J. S. (Julian Seymour), 1918-1994

Shvinger, IÜ., 1918-1994

Biography

Abstract

Julian Schwinger was Professor of Physics at University of California, Los Angeles (1972-1980). Other institutional affiliations include Harvard University, Purdue University, the Massachusetts Institute of Technology Radiation Laboratory and the Chicago Metallurgical Laboratory. His research interests included quantum electrodynamics and source theory.

Important Dates

February 12, 1918 Birth, New York (N.Y.).

1936 Obtained AB, Columbia University, New York (N.Y.).

1939 Obtained PhD in Physics, Columbia University, New York (N.Y.).

1939 – 1941 National Research Council (NRC) Fellow (1939-1940) and Research Associate (1940-1941), University of California, Berkeley.

1941 – 1943 Instructor to Assistant Professor, Purdue University.

1943 Researcher, Chicago Metallurgical Laboratory, Manhattan Project.

1943 – 1945 Researcher, Massachusetts Institute of Technology (MIT) Radiation Laboratory.

1945 – 1972 Associate Professor to Professor of Physics (1945-1966) and Higgins Professor of Physics (1966-1972), Harvard University, Cambridge (Mass.).

1949 Member, National Academy of Sciences.

1961 Visiting Professor, University of California, Los Angeles.

1964 Awarded National Medal of Science.

1965 Awarded Nobel Prize in Physics with Sin-Itiro Tomonaga and Richard Feynman "for their fundamental work in quantum electrodynamics, with deep-ploughing consequences for the physics of elementary particles".

1972 – 1994 Professor of Physics (1972-1980) and University Professor (1980-1994), University of California, Los Angeles, Los Angeles (Calif.).

July 16, 1994 Death, Los Angeles (Calif.).

Occupation

Theoretical physicist.

Places

Birth

[New York \(N.Y.\)](#)

Undergraduate Education

[New York \(N.Y.\)](#)

Graduate Education

[New York \(N.Y.\)](#)

Employment

[Cambridge \(Mass.\)](#)

[Los Angeles \(Calif.\)](#)

Death

[Los Angeles \(Calif.\)](#)

Subjects

[Electron accelerators.](#)

[Magnetic fields.](#)

[Nuclear physics.](#)

[Quantum electrodynamics.](#)

[Theoretical physics.](#)

Relationships

People

Family

Schwinger, Clarice Carrol

Wife, married in 1947.

Advisors & Collaborators

[Arnowitz, Richard](#)

Advised by Schwinger at Harvard University, "The hyperfine structure of hydrogen."

[Baym, Gordon](#)

Advised by Schwinger at Harvard University, "Field-theoretic approach to the properties of the solid state."

[Case, Kenneth M.](#)

Advised by Schwinger at Harvard University, "The Magnetic Moment of the Neutron and Proton."

Clark, Melville, Jr.

Advised by Schwinger at Harvard University.

[Deser, S. \(Stanley\)](#)

Advised by Schwinger at Harvard University on relativistic two-body interactions.

[Feynman, Richard P. \(Richard Phillips\), 1918-1988](#)

Won the 1965 Nobel Prize in Physics along with Sin-Itiro Tomonaga "for their fundamental work in quantum electrodynamics, with deep-ploughing consequences for the physics of elementary particles."

[Glashow, Sheldon L.](#)

Advised by Schwinger at Harvard University in quantum theory. Both employed at Harvard University.

[Glauber, Roy J., 1925-](#)

Advised by Schwinger at Harvard University, "The Relativistic Theory of Meson Fields" and both employed at Harvard University.

Johnson, K. (Kenneth), 1931-

Advised by Schwinger at Harvard University, "Quantum electrodynamics of the Scalar Field."

Kivelson, M. G. (Margaret Galland), 1928-

Advised by Schwinger at Harvard University.

[Kivelson, Steven](#)

Advised by Schwinger at Harvard University, "Studies of the Electronic Properties of Localized Stages in Disordered Insulators." Both employed at University of California, Los Angeles.

Klein, Abraham, 1927-

Advised by Schwinger at Harvard University, "On the relativistic theory of meson fields."

[Kohn, Walter, 1923-2016](#)

Advised by Schwinger at Harvard University, "Collisions of Light Nuclei"; and both employed at Harvard University.

[Martin, Paul Cecil, 1931-](#)

Advised by Schwinger at Harvard University, "Bound state problems in electrodynamics." Both employed at Harvard University.

[Merzbacher, Eugen](#)

Advised by Schwinger at Harvard University.

[Mottelson, Ben R.](#)

Advised by Schwinger at Harvard University, "The Ground States of Lithium 6 and Lithium 7."

[Rabi, I. I. \(Isidor Isaac\), 1898-1988](#)

Ph.D. advisor at Columbia University on the magnetic scattering of neutrons.

Rohrlich, F.

Advised by Schwinger at Harvard University, "Neutron-Proton Scattering at Intermediate and High Energies."

Sommerfeld, Charles Michael

Advised by Schwinger at Harvard University, "The theory of the magnetic dipole moment of the electron."

[Tomonaga, Shin'ichiro, 1906-1979](#)

Awarded the 1965 Nobel Prize in Physics along with Richard Feynman "for their fundamental work in quantum electrodynamics, with deep-ploughing consequences for the physics of elementary particles."

Colleagues

[Adler, Stephen L.](#)

Both employed at Harvard University.

[Allison, Samuel King, 1900-1965](#)

Both employed at the Chicago Metallurgical Laboratory, Manhattan Project.

[Alvarez, Luis W., 1911-1988](#)

Both employed at University of California, Berkeley and the Chicago Metallurgical Laboratory, Manhattan Project.

[Anderson, Herbert Lawrence](#)

Both employed at the Chicago Metallurgical Laboratory, Manhattan Project.

[Bainbridge, Kenneth T. \(Kenneth Tompkins\), 1904-1996](#)

Both employed at Harvard University.

[Benedek, George Bernard, 1928-](#)

Both employed at Harvard University.

[Birge, Raymond T. \(Raymond Thayer\), 1887-](#)

Both employed at University of California, Berkeley.

[Bloembergen, N.](#)

Both employed at Harvard University.

[Branscomb, Lewis M., 1926-](#)

Both employed at Harvard University.

[Brewer, Richard G.](#)

Both employed at Harvard University.

[Bridgman, P. W. \(Percy Williams\), 1882-1961](#)

Both employed at Harvard University.

[Brillouin, Léon, 1889-1969](#)

Both employed at Harvard University.

[Brode, Robert B. \(Robert Bigham\), 1900-1986](#)

Both employed at University of California, Berkeley.

[Callan, Curtis G.](#)

Both employed at Harvard University.

[Chaikin, Paul M.](#)

Both employed at University of California, Los Angeles.

[Chen, Francis F., 1929-](#)

Both employed at University of California, Los Angeles.

[Coleman, Sidney, 1937-2007](#)

Both employed at Harvard University.

[Conant, James Bryant, 1893-1978](#)

Both employed at Harvard University.

[Cormack, Allan MacLeod, 1924-1998](#)

Both employed at Harvard University.

[Corson, Dale R.](#)

Both employed at University of California, Berkeley.

[Daniels, Farrington, 1889-1972](#)

Both employed at Chicago Metallurgical Laboratory, Manhattan Project.

[Dawson, J. M. \(John Myrick\), 1930-](#)

Both employed at University of California, Los Angeles.

[Dempster, Arthur Jeffrey](#)

Both employed at the Chicago Metallurgical Laboratory, Manhattan Project.

[Drake, James \(James F.\)](#)

Both employed at University of California, Los Angeles.

[Franck, James, 1882-1964](#)

Both employed at the Chicago Metallurgical Laboratory, Manhattan Project.

[Furry, W. H. \(Wendell Hinkle\), 1907-](#)

Both employed at Harvard University.

[Gallagher, Thomas F., 1944-](#)

Both employed at Harvard University.

[Georgi, Howard](#)

Both employed at Harvard University.

[Goldberger, Marvin L.](#)

Both employed at University of California, Los Angeles, and Chicago Metallurgical Laboratory, Manhattan Project.

[Gross, David J. \(David Jonathan\)](#)

Both employed at Harvard University.

[Helmholz, August Carl, 1915-2003](#)

Both employed at University of California, Berkeley.

[Hilberry, Norman, 1899-](#)

Both employed at the Chicago Metallurgical Laboratory, Manhattan Project.

[Holstein, Theodore David, 1915-1985](#)

Both employed at University of California, Los Angeles.

[Jackiw, Roman W.](#)

Both employed at Harvard University.

[Jaffe, Arthur, 1937-](#)

Both employed at Harvard University.

[Kemble, Edwin C. \(Edwin Crawford\), 1889-](#)

Both employed at Harvard University.

[Kennel, Charles F., 1939-](#)

Both employed at University of California, Los Angeles.

[Kleppner, Daniel](#)

Both employed at Harvard University.

[Lawrence, Ernest Orlando, 1901-1958](#)

Both employed at University of California, Berkeley.

[Leggett, A. J. \(Anthony J.\)](#)

Both employed at Harvard University.

[Loeb, Leonard B. \(Leonard Benedict\), 1891-](#)

Both employed at University of California, Berkeley.

[Lyman, Theodore, 1874-1954](#)

Both employed at Harvard University.

[McMillan, Edwin M. \(Edwin Mattison\), 1907-](#)

Both employed at University of California, Berkeley.

[Morrison, Philip](#)

Both employed at the Chicago Metallurgical Laboratory, Manhattan Project.

[Oppenheimer, J. Robert, 1904-1967](#)

Both employed at University of California, Berkeley.

[Patel, C. Kumar N.](#)

Both employed at University of California, Los Angeles.

[Pierce, George Washington, 1872-1956](#)

Both employed at Harvard University.

[Pound, Robert V.](#)

Both employed at Harvard University.

[Purcell, Edward M.](#)

Both employed at Harvard University.

[Quinn, Helen R.](#)

Both employed at Harvard University.

[Ramsey, Norman, 1915-2011](#)

Both employed at Harvard University.

[Raney, William P.](#)

Both employed at Harvard University.

[Rudnick, Isadore, 1917-](#)

Both employed at University of California, Los Angeles.

[Sachs, Robert Green, 1916-](#)

Both employed at University of California, Berkeley.

[Schiff, Leonard I. \(Leonard Isaac\), 1915-1971](#)

Both employed at University of California, Berkeley.

[Seaborg, Glenn T. \(Glenn Theodore\), 1912-1999](#)

Both employed at Chicago Metallurgical Laboratory, Manhattan Project.

[Segrè, Emilio](#)

Both employed at University of California, Berkeley.

[Simpson, John A. \(John Alexander\), 1916-2000](#)

Both employed at the Chicago Metallurgical Laboratory, Manhattan Project.

[Smyth, Henry De Wolf, 1898-1986](#)

Both employed at the Chicago Metallurgical Laboratory, Manhattan Project.

[Street, Jabez Curry, 1906-](#)

Both employed at Harvard University.

[Szilard, Leo](#)

Both employed at the Chicago Metallurgical Laboratory, Manhattan Project.

[Tinkham, Michael](#)

Both employed at Harvard University.

[Turkevich, Anthony, 1916-2002](#)

Both employed at the Chicago Metallurgical Laboratory, Manhattan Project.

[Van Vleck, J. H. \(John Hasbrouck\), 1899-1980](#)

Both employed at Harvard University.

[Weinberg, Alvin Martin, 1915-2006](#)

Both employed at the Chicago Metallurgical Laboratory, Manhattan Project.

[Wheatley, John Charles](#)

Both employed at University of California, Los Angeles.

[Wigner, Eugene Paul, 1902-1995](#)

Both employed at the Chicago Metallurgical Laboratory, Manhattan Project.

[Wilson, Kenneth G. \(Kenneth Geddes\), 1936-2013](#)

Both employed at Harvard University.

[Wilson, Robert R., 1914-2000](#)

Both employed at Harvard University.

[Wu, C. S. \(Chien-shiung\), 1912-1997](#)

Both employed at University of California, Berkeley.

[Wu, Tai Tsun](#)

Both employed at Harvard University.

Additional

[Anderson, P. W. \(Philip W.\), 1923-](#)

Blatt, John Markus

[Bohm, David, 1917-1992](#)

Buck, Paul Herman, 1899-1978

Clapp, Roger Edge, 1919-1990

Clarke, Edward N.

Corngold, Noel Robert David, 1929-

[Gell-Mann, Murray](#)

Gerjuoy, Edward

Krause, Ernst Henry, 1913-

[Kroll, Norman Myles, 1922-](#)

[MacDonald, Gordon J. \(Gordon James\), 1929-2002](#)

Manley, John Henry, 1907-

[Marshak, Robert E. \(Robert Eugene\), 1916-1992](#)

[Nierenberg, William Aaron, 1919-2000](#)

[Pauli, Wolfgang, 1900-1958](#)

Roe, Anne, 1904-1991

Salpeter, Edwin E.

Saxon, David S.

Scully, Marlan O. (Marlan Orvil), 1939-

Slack, L. (Lewis), 1924-

[Teller, Edward, 1908-2003](#)

[Uhlenbeck, George Eugène, 1900-1988](#)

[Wentzel, Gregor, 1898-1978](#)

[Zacharias, Jerrold Reinach, 1905-1986](#)

Institutions

Major Positions

[Harvard University, Department of Physics](#)

Associate Professor to Professor of Physics and Higgins Professor of Physics.

Manhattan Project (U.S.)

Researcher, Chicago Metallurgical Laboratory.

Massachusetts Institute of Technology. Radiation Laboratory

Researcher.

Purdue University. Department of Physics

Instructor to Assistant Professor.

United States. Office of Scientific Research and Development. Metallurgical Laboratory

Researcher, Manhattan Project.

[University of California, Berkeley, Department of Physics](#)

National Research Council (NRC) Fellow and Research Associate.

[University of California, Los Angeles, Department of Physics](#)

Visiting Professor; Professor of Physics; and University Professor.

Professional Activities & Affiliations

[Columbia University. Department of Physics](#)

Obtained AB (1936) and PhD in Physics (1939).

[National Academy of Sciences \(U.S.\)](#)

Member.

Resources

Archival Resources

Author

[AIP Physics Programs Division records of Lewis Slack, 1968-1988.](#)

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

Brandeis University Summer Institute in Theoretical Physics 1959 lecture notes, 1959.

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

David Allen Park collection of lectures and lecture notes, 1940-1952.

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

Fritz Rohrlich notes from the Pocono Conference on Physics, 1948.

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

Invited papers [sound recording] : American Physical Society Meeting, 1966 April 28.

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

John Markus Blatt nuclear physics, part 1, quantum mechanics notes, 1946-1947.

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

[Julian S. Schwinger papers, 1920-1994.](#)

University Research Library. Department of Special Collections

University of California, Los Angeles

Los Angeles, CA 90024-1575, USA

Martin J. Klein's Nuclear physics course notes, 1946-1947.

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

Notes on physics courses given at Los Alamos, 1943-1946.

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

Subject

[Anne Roe papers, 1949-1971 \(bulk\).](#)

Library.

American Philosophical Society

105 South Fifth Street, Philadelphia, PA 19106, USA

Ben Bederson interview of Larry Spruch, Sidney Borowitz and Ed Gerjuoy [videorecording], 26 July 2004.

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

Conference notes prepared informally and unofficially by John A. Wheeler, 1948.

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

Jerrold R. Zacharias papers, 1912-1986.

Institute Archives and Special Collections

Massachusetts Institute of Technology

M.I.T. Libraries, Rm. 14N-118, Cambridge, MA 02139, USA

[Oral history interview with David Bohm, 1981 May 8.](#)

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

[Oral history interview with David Bohm, 1986 June 6, 12, July 7, September 25, October 3, December 22, 1987 January 30, February 6, 27, March 6, April 3 and 16.](#)

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

[Oral history interview with Edward Mills Purcell, 1977 June 8 and 14.](#)

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

[Oral history interview with Edward N. Clarke, 2010 September 27.](#)

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

[Oral history interview with Edwin Ernest Salpeter, 1978 March 30.](#)

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

[Oral History interview with Ernst Henry Krause, 1982 August 10.](#)

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

[Oral history interview with George Eugene Uhlenbeck, 1962 March 30, 31, April 5, May 10 and 1963 December 9.](#)

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

[Oral history interview with Gordon J. MacDonald, 1986 April 16.](#)

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

Oral history interview with John Henry Manley, 1976 July 9 and 11.

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

Oral history interview with Margaret G. Kivelson, 1988-1992. But you don't look like a physicist: oral history transcript, 1988-1992 Margaret G. Kivelson interviewed by Neil D. Hathaway and Raymond J. Walker.

The Bancroft Library

University of California, Berkeley

Berkeley, CA, 94720-6000, USA

[Oral history interview with Marlan O. Scully, 2004 July 15 and 16.](#)

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

[Oral history interview with Murray Gell-Mann, 1997 July 17 and 18.](#)

Institute Archives

California Institute of Technology

1201 East California Blvd. (Mail Code 015A-74), Pasadena, CA 91125, USA

[Oral history interview with Nicolaas Bloembergen, 1977 March 22.](#)

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

[Oral history interview with Nicolaas Bloembergen, 1983 June 27.](#)

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

Oral history interview with Noel R. Corngold, 2002 October 11 and 16.

Institute Archives

California Institute of Technology

1201 East California Blvd. (Mail Code 015A-74), Pasadena, CA 91125, USA

[Oral History interview with Norman M. Kroll, 1986 June 28.](#)

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

[Oral history interview with Norman M. Kroll, 1987 March 29.](#)

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

[Oral history interview with P. W. Anderson, 1988 May 10.](#)

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

[Oral history interview with Paul Buck, 1977 March 2.](#)

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

[Oral history interview with Richard Phillips Feynman, 1966 March 4 to 4 February 1973.](#)

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

[Oral history interview with Robert Marshak, 1970 June 15, 16, September 19, and October 4.](#)

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

[Oral History interview with Robert V. Pound, 2003 May 22 and 23.](#)

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

Oral history interview with Roy J. Glauber, 1976 December 9 and 1977 March 3.

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

Oral history interview with Stanley Deser, 2011 March 12.

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

Recollections of Oppenheimer and Schwinger [videorecording], 2009 November 11.

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

Rochester Conference on High Energy Nuclear Physics proceedings, 1952 and 1955.

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

[Roger Edge Clapp papers, 1914-1991 \(bulk 1940-1991\).](#)

Niels Bohr Library & Archives

American Institute of Physics

One Physics Ellipse, College Park, MD 20740, USA

University of California President : David S. Saxon : oral history transcript / interviewed by James V. Mink and Dale E. Treleven ; completed under the auspices of the Oral History Program, University of California, Los Angeles, 1994.

University Research Library. Department of Special Collections

University of California, Los Angeles

Los Angeles, CA 90024-1575, USA

Published Resources

Author

[Climbing the mountain : the scientific biography of Julian Schwinger / Jagdish Mehra and Kimball A. Milton.](#)

[Discontinuities in waveguides; notes on lectures by Julian Schwinger \[by\] Julian Schwinger \[and\] David S. Saxon.](#)

[Lectures on quantum field theory / by Julian Schwinger at Center for Theoretical Studies, January 1-31, 1966 ; \[notes by C. Angas Hurst ; edited by Arnold Perlmutter\].](#)

[Particles and sources \[by\] Julian Schwinger. Notes by Tung-mow Yan.](#)

[Particles, sources, and fields / \[by\] Julian Schwinger.](#)

[Quantum kinematics and dynamics \[by\] Julian Schwinger.](#)

[Quantum legacy : seminal papers of Julian Schwinger / editor Kimball A. Milton.](#)

[Quantum mechanics : symbolism of atomic measurements / Julian Schwinger ; edited by Berthold-Georg Englert.](#)

[Selected papers \(1937-1976\) of Julian Schwinger / edited by M. Flato, C. Fronsdal, and K. A. Milton.](#)

[Selected papers on quantum electrodynamics.](#)

Subject

["In Appreciation: Julian Schwinger: From Nuclear Physics and Quantum Electrodynamics to Source Theory and Beyond," Physics in Perspective 5 \(2003\): 124-126](#)

["Julian Schwinger, 1918-1994", Biographical Memoirs of the National Academy of Sciences](#)

[Julian Schwinger: Prodigy, Problem Solver, Pioneering Physicist Physics Today obituary.](#)

[Julian Schwinger: The Physicist, the Teacher, and the Man \(River Edge, NJ: World Scientific, 1996\)](#)

[Q.E.D. and the Men Who Made It: Dyson, Feynman, Schwinger, and Tomonaga \(Princeton: Princeton University Press, 1994\)](#)

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[The Society of Rheology](#)

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