ARTHUR JAFFE

Current Activities:

Landon T. Clay Professor of Mathematics and Theoretical Science, Harvard University
Chair of the Board, Dublin Institute for Advanced Study, School of Theoretical Physics
Member of the Council, Dublin Institute for Advanced Study
Member U.S. National Committee for Mathematics
Member Science Board, Santa Fe Institute
Member of the International Advisory Board, Center for Mathematical Physics, Hamburg
Member Board of Directors, International University of Bremen Foundation of America
Member Board of Trustees, Institute for Schools of the Future
Communication in Mathematical Physics, Advisory Board
Reviews in Mathematical Physics, Associate Editor
Letters in Mathematical Physics, Editorial Board

Education:

AB in Chemistry, Princeton University 1959
BA in Mathematics, Cambridge University 1961
PhD in Physics, Princeton University 1966

Memberships/Awards:

Member US National Academy of Sciences
Fellow American Academy of Arts and Sciences
Fellow American Association for the Advancement of Science
Fellow American Physical Society
Medal from the Collège de France
Dannie Heineman Prize in Mathematical Physics (APS and AIP)
Prize in Mathematics and Physics (New York Academy of Science)
John Simon Guggenheim Foundation Fellow (twice)
Alfred P. Sloan Foundation Fellow

Selected Prior Activities:

Co-Founder, Member, Director, and President: The Clay Mathematics Institute, 1998–2002
President, American Mathematical Society, 1997–1998
Chair, Council of Scientific Society Presidents, 2000
Chair, American Association for the Advancement of Science Mathematics Section, 2001
President, International Association of Mathematical Physics, 1991-1996
President's Commission for the National Medal of Science, Member 1996–2002, Chair 2001–2002
Member of the Perspective Commission, International University of Bremen, 2006
Chair, Harvard University Department of Mathematics, 1987–1990
Board Member, International Mathematical Olympiad 2001, 1997–2003
Member Executive Committee, Mathematical Sciences Education Board (NRC)
Trustee, Mathematical Sciences Research Institute, Berkeley, 1991–1994
Board Member and Advisor, Project Euclid, 2000—2004
Committee on Resources for the Mathematical Sciences (David Committee) NRC 1980–1983
Co-Founder and Organizer of the Cargèse Summer School in Mathematical Physics, 1976, 1979, 1981, 1987, 1991, 1994, 1996.
Founder and Chair AMS Mathematics Advocacy Task Force, 1996–1997
Reviews: Penn State U. Math. (Chair); E.T.H. Mathematics; Princeton Physics (Chair); Princeton Mathematics; American University in Beirut (Chair); Brandeis University Science Programs; Dublin Institute for Advanced Study, School of Theoretical Physics (Chair).

Editorial:

Communications in Mathematical Physics, Editor 1976–1979; Chief Editor 1979–2000
Annals of Physics, Assistant Editor 1981–2000
Progress in Physics, Birkhäuser Boston, Founding Editor 1980–1983
Geometry and Functional Analysis, Editorial Board 1989–2000
*Journal of Mathematical Physic*s, Editorial Board 1973–1976

Prior Affiliations or Positions:

Boston University, Visiting Professor 2001–2002
University of Rome, Visiting Professor 1995
University of California, Distinguished Visiting Professor 1982
Rockefeller University, Visiting Professor 1979; Adjunct Professor 1980–1986
Princeton University, Visiting Professor 1971
Courant Institute, Visitor 1969
E.T.H. Zürich, Guest Professor 2005, 1968
Stanford University, Acting Assistant Professor 1966
Institute for Advanced Study, 1967
IBM Research, Yorktown Heights, 1959
American Cyanamid Corporation Research, Stanford, CT, 1958

Lecture Series:

Introduction of Constructive Quantum Field Theory, Zürich 2005
Class of 1927 Lectures, Rensselaer Polytechnic Institute, Troy 2000
Symposium on Mathematical Proof, Roskilde, Denmark 1998
Distinguished Lecture Series, Fields Institute 1996
Lecture Course, Collège de France 1990
Frank Hahn Lectures, Yale University 1985
Hedrick Lecturers at the Mathematical Association of America 1985
Lecture Tour, Soviet Academy of Sciences 1985
Lecture Tour, Chinese Academy of Sciences 1983
Alumni Lectures, Pennsylvania State University 1983
Porter Lectures, Rice University 1983
Poiana Brasov Summer School 1981
Bonn Mathematics Institute 1980
Summer School of the Australian Mathematics Society, Melbourne 1982
Accademia Nazionale dei Lincei 1977
Cargèse Summer School lectures 1996, 1991, 1987, 1981, 1979, 1976
Les Houches Summer School lectures 1995, 1970
Erice Summer School lectures 1985, 1983, 1973
Varenna Summer School 1968

Professional Society Invited Lectures:

American Mathematical Society, Washington 2000, New York 1978
Mathematische Gesellshaft in Hamburg, Anniversary 1990
International Congress of Mathematicians, Helsinki 1978
Australian Mathematical Society 1987
Canadian Mathematical Society 1984
International Association of Mathematical Physics 1994, 1991, 1988, 1981, 1979, 1977
International Congress on High Energy Physics 1986, 1984, 1973, 1970
International Congress on Information Theory 1979, 1976
American Physical Society, New York 1970

Selected Symposium Lectures
    John Lewis Symposium, Dublin 2005
    Panel on Mathematical Physics, Royal Irish Academy, Dublin September 2005
    John von Neumann Symposium, Budapest 2003
    International Symposium on Education, National Academy of Sciences, Washington 2003
    Konrad Osterwalder Symposium, Zurich 2002
    Elliott Lieb Symposium, Vienna 2002
    Richard Kadison Symposium, Durham NH 2001
    Sergio Doplicher Symposium, Sienna 2000
    Symposium on "Proof," New York 2000
    Robert Schrader Symposium, Berlin 2000
    Marshall Stone Symposium, New York 1999
    Harry Lehmann Symposium in Hamburg 1999
    Roland Dobrushin Symposium, Vienna 1998
    Kurt Symanzik Symposium, Hamburg 1984
    John von Neumann symposium, New York 1988
    IBM Mathematics Research Center Anniversary Celebration, Yorktown Heights 1988
    Balomenos Lecture, University of New Hampshire 1985
    The Mathematical Heritage of Henri Poincaré 1980
    Mathematics for the Millennium, American University of Beirut, January 2000
    Visions in Mathematics Meeting, Tel Aviv 1999
    Leipzig Mathematics Institute Opening Symposium 1998
    Boston University Symposium on the Conceptual Developments of 20th Century Field Theories 1996
    Mathematical Sciences Research Institute, Berkeley, Sponsors Day 1995
    Arthur Wightman symposium, Princeton 1992
    Distinguished Lecture Bard College 1990

Mentoring:
    Trained over 50 graduate students and post-doctoral fellows

Publications:
    Co-author of 4 books and more than 150 articles.
    Editor of 7 other books.

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Arthur Jaffe

Arthur Jaffe grew up in Pelham, NY, where he attended the local schools and enjoyed music and science. As a Princeton undergraduate he majored in chemistry, graduating summa cum laude and with highest honors. Some years earlier, his parents had brought back souvenirs from their 1953 trip to England, where Arthur's father made a tour as *Coronation Lecturer* for the Royal Society of Medicine, part of its celebration surrounding the investiture of the British Queen.

This boyhood experience aroused Arthur's interest to study in England, which he realized beginning in 1959 as a Marshall Scholar at Clare College, Cambridge. There Arthur switched from chemistry to study mathematics. Returning two years later to Princeton, he worked with Arthur Wightman and obtained a doctorate in theoretical physics, completing his degrees in a trio of sciences. During his graduate training, Arthur was lucky to spend the 1963-1964 academic year with his advisor (and as one of the first students) at the newly-founded I.H.E.S. in Bures-sur-Yvette, France.

During that year he began to investigate the question: Is quantum theory compatible with special relativity and interaction? Another version of this question is: Does "quantum field theory" make mathematical sense? He solved this problem in space-time of less than four dimensions, in a long series of papers, many together with J. Glimm and other collaborators. This work gave the basis to the subject known as *constructive quantum field theory*.

Through this work various related questions also were solved: One result was to give a mathematical foundation for the *theory of renormalization*, independent from perturbation theory. Another result demonstrated that with different values of the parameters in the field equations, one had either unique or non-unique solutions. In the latter case, this meant that one has *phase transitions* in quantum field theory. Corresponding questions concerning the compatibility of relativity and quantum theory in space-time of four-dimensions remain one of the major unsolved challenges in mathematics and in physics; they would be resolved through providing a quantum-theory solution to the famous *Yang-Mills equations*.

Currently Arthur Jaffe is also interested in super-symmetry, field theory on curved space, and the possible role of non-commutative geometry (NCG) in physics. He has contributed to the mathematical structure of NCG, by finding a universal representation for the only known co-cycle for entire cyclic cohomology, and in doing this he also obtained a path integral representation relating this construction to physics.

After spending a year at Stanford University and the Institute for Advanced Study, he came to Harvard University in 1967, becoming Professor of Physics in 1970 and a member of the Department of Mathematics in 1973. In 1985 he succeeded George Mackey as the "Landon Clay Professor of Mathematics and Theoretical Science."

In 1968 he was Guest Professor at the E.T.H. Zurich; shortly afterward Robert Schrader, Konrad Osterwalder, and Jürg Frõhlich came to Harvard, beginning a long-lasting collaboration in mathematical physics between these two institutions. Ultimately Frõhlich became the Chairman of Physics at the E.T.H., and Osterwalder became Rektor and Präsident.

Over the years, Arthur has worked with over fifty graduate students and postdoctoral fellows. He has been adept in recognizing and encouraging exceptional research talent at an early stage. In 1976 he co-founded a series of Cargèse summer schools in mathematical physics. He served as visiting professor at several institutions, including Princeton University, Rockefeller University, the Swiss Federal Institute of Technology, the University of Rome, and Boston University.

Jaffe served as Chair of the Harvard Mathematics Department, for six years as President of the International Association of Mathematical Physics, as president of the American Mathematical Society, and as Chair of the Council of Scientific Society Presidents. He served for twenty one years as Chief Editor of Communications in Mathematical Physics. He conceived the Clay Mathematics Institute, serving as a Founding Member as well as its Founding President. In this role he designed their programs, including the *Millennium Prize Problems* in mathematics.

He is a member of the American Academy of Arts and Sciences and of the U.S. National Academy of Sciences.