ARTHUR JAFFE

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Education:

AB in Chemistry, Princeton University, 1959
BA in Mathematics, Clare College, Cambridge University, 1961
PhD in Physics with advisor Arthur S. Wightman, Princeton University, 1966

Current Positions:

Landon T. Clay Professor of Mathematics and Theoretical Science at Harvard University, 1985—
Member of the Council and Chairman of the Board of STP, Dublin Institute for Advanced Study, 2005—
Director: Mathematical Picture Language Project at Harvard, 2017—
Distinguished Visiting Professor of Mathematics: AMSS, Chinese Academy of Sciences, 2017—
Member Editorial Board: ***SCIENCE CHINA Mathematics*****,** 2018—

Membership Awards:

Honorary Member of the **Royal Irish Academy**
Member of the **US National Academy of Sciences**
Member of the **American Academy of Arts and Sciences**
Fellow of the **American Association for the Advancement of Science**
Fellow of the **American Mathematical Society**
Fellow of the **Society of Industrial and Applied Mathematicians**
Fellow of the **American Physical Society**

Other Awards:

ICCM award (details at the end of next page), 2018
Medal Collège de France, 1990
Dannie Heineman Prize in Mathematical Physics, APS and AIP, 1980
Prize in Mathematics and Physics, New York Academy of Science, 1979

Prior Activities:

Co-Founder, Member, Director, and **Founding President, Clay Mathematics Institute**, 1998–2002
President, American Mathematical Society, 1997–1998
President, International Association of Mathematical Physics, 1991-1996
Chair, Harvard University Mathematics Department, 1987—1990
Chief Editor of *Communications in Mathematical Physics,* 1979—2001
Co-Founder of the Cargèse Summer Schools in Mathematical Physics, 1974—1996
Professor of Mathematical Physics, Harvard University, 1974—1985
Assistant to Full Professor of Physics, Harvard University, 1967—1970
Acting Assistant Professor of Mathematics, Stanford University, 1966--1967

Selected Lectureships:

Distinguished Public Lecture, **Chinese Academy of Sciences 2018**
Statutory Public Lecture, **Dublin Institute for Advanced Study 2016**
Friedrich Hirzebruch Lecture, **Bonn 2015**
Schrödinger Lecture, **Schrödinger Institute Vienna 2012**
Class of 1927 Lecturer, **Rensselaer Polytechnic Institute 2000**
Distinguished Public Lecture, **Bard College 1990**
Frank Hahn Lecturer, **Yale University 1985**
Hedrick Lecturer, **Mathematical Association of America 1985**
Porter Lecturer, **Rice University 1983**
Lecture Series, **Accademia Nazionale dei Lincei 1977**

Publications:

Over 200 papers, 4 books, edited 7 other books. **Link to full publication list.**

Narrative

Arthur Jaffe grew up in Pelham, NY, where he attended the local schools and had interests in science, music, and photography. He received an AB in chemistry from Princeton University and a BA in mathematics from Cambridge University, where he was a Marshall Scholar at Clare College. He then returned to Princeton for his doctorate in physics. After spending a year in the mathematics department of Stanford University, he received an invitation to move to Harvard, where he has been based ever since.

Jaffe received the Dannie Heineman Prize for Mathematical Physics from the American Institute of Physics. He received the Physical Science Prize from the New York Academy of Sciences. He has been a lecturer at the Collège de France. Jaffe is a member of the National Academy of Sciences, he is a Fellow of the American Academy of Arts and Sciences, and he is an Honorary Member of the Royal Irish Academy. He was a Visiting Scholar at Clare College Cambridge in 2017.

On the retirement of George W. Mackey in 1985, Jaffe was appointed his successor as the "Landon T. Clay Professor of Mathematics and Theoretical Science." Two years later he began a three-year term as Chair of the Mathematics Department at Harvard. Jaffe has been a guest professor in some other universities, including the ETH Zürich, UC San Diego, Princeton University, Boston University, and the University of Rome. In 2017 Jaffe was named a Distinguished Visiting Professor in the Academy of Mathematics and Systems Science (AMSS) of the Chinese Academy of Sciences.

Arthur Jaffe's research crosses the boundaries between mathematics and physics. One of the major problems in theoretical science is to show the compatibility of the two most important "theories" in 20th century physics: relativity and quantum theory. Although many Nobel prizes have been given in this area, it is still not known whether quantum fields (the putative mathematical framework) makes logical sense. Jaffe gave the mathematical solution to this problem for space-time of less than four dimensions, in joint work with James Glimm. Their work established the existence of non-linear quantum fields, and founded the subject called "constructive quantum field theory." Later with Thomas Spencer they established properties of these examples, including giving the first mathematical proof for the existence of a "phase transition" and symmetry breaking for a quantum field theory. In addition, Jaffe made seminal contributions to the mathematics of non-commutative geometry and to infinite-dimensional analysis.

Many mathematical physicists have studied with Jaffe as doctoral students or postdoctoral collaborators, including Tadeusz Balaban, Jonathan Dimock, Joel Feldman, Jürg Fröhlich, Kryzstof Gawedzki, Ezra Getzler, John Imbrie, Christian Jäkel, Antti Kupiainen, Andrew Lesniewski, Chiara Nappi, Konrad Osterwalder, Robert Schrader, Roland Sénéor, Clifford Taubes, Eugene Wayne, Jonathan Weitsman. Students and postdoctoral collaborators **since 2015** include Kaifeng Bu, Weichen Gu, Bas Janssens, Davis Lazowski, Zhengwei Liu, Yunxiang Ren, Michele Tienni, Fei Wei, Alex Wozniakowski, and Jinsong Wu.

In 1974 Jaffe cofounded a series of mathematical physics schools in Cargèse, Corsica, bringing together mathematicians, physicists, and students. The resulting interactions at that series of schools led to many later developments both in mathematics and physics. Jaffe served as President of the American Mathematical Society.

Jaffe conceived the Clay Mathematics Institute and served as its first president. During that time, he designed most of its programs, including the Millennium Problems in Mathematics. This initiative encouraged many talented youth to consider aspiring to a career in mathematics.

In 2000 he served as a board member and a sponsor to bring the 2001 International Mathematics Olympiad to Washington, DC. He organized the closing ceremony around the theme of bringing the high-school teams into motivational contact with leading American research mathematicians. In 2000 Jaffe assisted Martin Seligman, recent past president of the American Psychological Association, in initiating the Pinnacle Project for gifted children.

Jaffe served from 1979 to 2000 as Chief Editor of *Communications in Mathematical Physics;* during that time he appointed approximately 30 editors. Since 2005 Jaffe has served as Chair of the Board of the Dublin Institute for Advanced Studies, School of Theoretical Physics, succeeding Cathleen Morawetz and later Michael Atiyah in that role.

In 2017, Jaffe initiated the Picture Language Project at Harvard with his postdoctoral fellow Zhengwei Liu. Their goal is to find new picture languages within which they can establish mathematical theorems, and use intuition from this point of view to discover and prove interesting new results for mathematics and physics. In 2018 he organized a one-month working research group at AMSS in Beijing for his Harvard researchers and a few other mathematicians.

Jaffe's paper with Zhengwei Liu, "A Mathematical Picture Language Program," published in the *Proceedings of the National Academy of Sciences* was recently selected in 2018 by the International Consortium of Chinese Mathematicians (ICCM) as one of the best mathematical papers published in the prior five years, with at least one author of Chinese descent. Also in September 2018, a poster describing the research in Jaffe's Picture Language Project was voted the "best poster" by the participants in a one-day retreat for research scholars at Harvard.