

Alain Aspect's Curriculum Vitae

Updated July 2019

PRESENT POSITION

- Augustin Fresnel Professor at Institut d'Optique Graduate School
- Professor at Ecole Polytechnique
- Senior fellow of the Institute of Advanced Studies and adjunct professor at City University, Hong Kong
- Distinguished scientist emeritus at CNRS

Office

Telephone :

Mail

EDUCATION

- 1965-69 Studies at Ecole Normale Supérieure de Cachan and Université d'Orsay.
- 1969 'Agrégation' in Physics
- 1969-1971 Master thesis (Thèse 3ème cycle), Orsay: "Fourier spectroscopy by holography"
- 1974-1983 PhD, Orsay: "Three experimental tests of Bell's inequalities with entangled photons"

POSITIONS HELD

- 1969-71 Assistant lecturer, Orsay University
- 1971-74 Teacher as voluntary service overseas in Yaoundé (Cameroon)
- 1974-85 Lecturer (Maître assistant), Ecole Normale Supérieure de Cachan
- 1985-92 Collège de France senior scientist (sous-directeur de laboratoire), associated with the chair of atomic physics held by C. Cohen-Tannoudji
- 1992- 2012 CNRS Senior scientist (directeur de recherche), at Laboratoire Charles Fabry de l'Institut d'Optique: head of the Atom Optics group.
Professor at Institut d'Optique and Ecole Polytechnique, Palaiseau

RESEARCH TOPICS, MAIN RESULTS

- 1969-1971 COHERENT OPTICS (S. Lowenthal advisor, at Institut d'Optique)
- Fourier transform spectroscopy by holography
- 1974-1985 NON CLASSICAL PROPERTIES OF LIGHT AS TESTS OF THE FOUNDATIONS OF QUANTUM MECHANICS (with P. Grangier, J. Dalibard, at Institut d'Optique)
- Tests of Bell's inequalities with pairs of entangled photons
 - Production of heralded single photons and test of the wave particle duality with single photons
- 1985-1992 LASER COOLING OF ATOMS (with C. Cohen-Tannoudji at ENS Paris and College de France)
- Blue molasses (with J. Dalibard, C. Salomon)
 - Atom channeling in a standing wave (with J. Dalibard, C. Salomon)
 - Laser cooling below the one photon recoil by Velocity Selective Coherent Population Trapping (with E. Arimondo)
- 1992- ATOM OPTICS and ULTRA-COLD ATOMS (with C. Westbrook, P. Bouyer, L. Sanchez-Palencia, at Institut d'Optique)
- Atomic mirrors: role of roughness; van der Waals-Casimir force
 - Atom lasers: ABCD matrices, M2 parameter, guided atom laser
 - First realization of Bose Einstein Condensation of metastable helium He* (still the only metastable atom BEC)
 - Quantum atom optics with He*: Hanbury Brown and Twiss effect for bosons and fermions; correlated atom pairs, Hong Ou and Mandel effect; two particle interference effect
 - Quantum transport and Anderson localization of matter waves in disordered optical potentials

PUBLICATIONS

More than 200 articles in international journals: more than 20 papers cited more than 100 times, (ISI web of science data).

The three papers on Bell's inequality tests have been selected as the "Physical Review Milestone Letters" of the year 1981: <http://prl.aps.org/50years/milestones> .

1. Aspect A., Grangier P., Roger G., Phys. Rev. Lett., 47 (1981) p.460:
"Experimental tests of realistic local theories via Bell's theorem"
2. Aspect A., Grangier P., Roger G., Phys. Rev. Lett., 49 (1982) p.91:
"Experimental realization of Einstein-Podolsky-Rosen gedankenexperiment;
a new violation of Bell's inequalities"
3. Aspect A., Dalibard J., Roger G., Phys. Rev. Lett., 49 (1982) p.1804:
"Experimental test of bell's inequalities using time-varying analyzers"

The main idea of the third experiment above had been proposed in

- A. Aspect, "Proposed Experiment To Test Separable Hidden-Variable Theories," Physics Letters A 54 (2), 117-118 (1975).
- A. Aspect, "Proposed Experiment To Test Nonseparability Of Quantum-Mechanics," Physical Review D 14 (8), 1944-1951 (1976).

The paper on laser cooling below the one photon recoil has been selected as:
<http://prl.aps.org/50years/milestones> .

Aspect A., Arimondo E., Kaiser R., Vansteenkiste N., Cohen-Tannoudji C.,
phys. Rev. Lett., 61 (1988) p.826: "Laser cooling below the one-photon recoil
energy by velocity-selective coherent population trapping"

The paper on production and characterization of heralded single photons, and test
of wave particle duality, belongs to "the most cited papers" of EuroPhysics Letters:

<http://iopscience.iop.org/0295-5075/page/Most%20Cited%20Articles>

Grangier P., Roger G., Aspect A., Europhys. Lett., 1 (1986) p.173-179:
"Experimental evidence for a photon anticorrelation effect on a beam
splitter: a new light on single-photon interferences"

Selection of papers in the last decade

- W. Guerin, J. F. Riou, J. P. Gaebler, V. Josse, P. Bouyer, and A. Aspect, Guided
quasicontinuous atom laser, Physical Review Letters 97 (2006)
- D. Clement, A. F. Varon, M. Hugbart, J. A. Retter, P. Bouyer, L. Sanchez-
Palencia, D. M. Gangardt, G. V. Shlyapnikov, and A. Aspect, Suppression of

transport of an interacting elongated Bose-Einstein condensate in a random potential, *Physical Review Letters* 95 (2005)

- M. Schellekens, R. Hoppeler, A. Perrin, J. V. Gomes, D. Boiron, A. Aspect, and C. I. Westbrook, Hanbury Brown Twiss effect for ultracold quantum gases, *Science* 310 (2005) 648.
- T. Jelten, J. M. McNamara, W. Hogervorst, W. Vassen, V. Krachmalnicoff, M. Schellekens, A. Perrin, H. Chang, D. Boiron, A. Aspect, and C. I. Westbrook, Comparison of the Hanbury Brown-Twiss effect for bosons and fermions, *Nature* 445 (2007) 402.
- Perrin, H. Chang, V. Krachmalnicoff, M. Schellekens, D. Boiron, A. Aspect, and C. I. Westbrook, Observation of atom pairs in spontaneous four-wave mixing of two colliding Bose-Einstein condensates, *Physical Review Letters* 99 (2007)
- V. Jacques, E. Wu, F. Grosshans, F. Treussart, P. Grangier, A. Aspect, and J. F. Roch, Experimental realization of Wheeler's delayed-choice gedanken experiment, *Science* 315 (2007) 966.
- J. Billy, V. Josse, Z. C. Zuo, A. Bernard, B. Hambrecht, P. Lugan, D. Clement, L. Sanchez-Palencia, P. Bouyer, and A. Aspect, Direct observation of Anderson localization of matter waves in a controlled disorder, *Nature* 453 (2008) 891.
- J. C. Jaskula, M. Bonneau, G. B. Partridge, V. Krachmalnicoff, P. Deuar, K. V. Kheruntsyan, A. Aspect, D. Boiron, and C. I. Westbrook, Sub-poissonian number differences in four-wave mixing of matter waves, *Physical Review Letters* 105 (2010) 190402.
- F. Jendrzejewski, A. Bernard, K. Muller, P. Cheinet, V. Josse, M. Piraud, L. Pezze, L. Sanchez-Palencia, A. Aspect, and P. Bouyer, Three-dimensional localization of ultracold atoms in an optical disordered potential, *Nature Physics* 8 (2012) 398.
- F. Jendrzejewski, K. Muller, J. Richard, A. Date, T. Plisson, P. Bouyer, A. Aspect, and V. Josse, Coherent Backscattering of Ultracold Atoms, *Physical Review Letters* 109 (19) (2012).
- R. Lopes, A. Imanaliev¹, A. Aspect¹, M. Cheneau¹, D. Boiron¹ & C. I. Westbrook¹, Atomic Hong–Ou–Mandel experiment, *Nature* (2015)
- P. Dussarrat, M. Perrier, A. Imanaliev, R. Lopes, A. Aspect, M. Cheneau, D. Boiron, and C. I. Westbrook, "Two-Particle Four-Mode Interferometer for Atoms," *Physical Review Letters* 119 (17) (2017).

BOOKS

- G. Grynberg, A. Aspect, C. Fabre, "[An Introduction to Quantum Optics: From the Semi-classical Approach to Quantized Light](#)" (revised with help of F. Bretenaker and A. Browaeys), 2010, Cambridge University Press (CUP).
- F. Bardou, J.-P. Bouchaud, A. Aspect and C. Cohen-Tannoudji, « Lévy Statistics and Laser Cooling: How Rare Events Bring Atoms to Rest », CUP (2002).
- A. Aspect, author of the chapter "Bell's theorem: the naïve view of an experimentalist", in "Quantum [un]speakables, from Bell to Quantum information", R.A. Bertlmann and A. Zeilinger edit. (Springer 2002). Available at <http://arxiv.org/abs/quant-ph/0402001> .
- A. Aspect, "John Bell and the second quantum revolution": introduction to the second edition of "Speakable and Unspeakable in Quantum Mechanics", J.S. Bell, Cambridge University Press (2004).
- A. Aspect, in "Demain la Physique", (ed. O. Jacob 2004; revised 2009), author of the chapter: « Une nouvelle révolution quantique ».

MOOC (Massive Online Open Course)

- Quantum Optics 1 : Single photons (2017-) :
<https://www.coursera.org/learn/quantum-optics-single-photon>
- Quantum Optics 2 : Two photons and more :
<https://www.coursera.org/learn/quantum-optics-two-photons>

CD AUDIO

<http://devivevoix.com/sciences/einstein-et-les-revolutions-quantiques-alain-aspect>

DISTINGUISHED MEMBERSHIP OR FELLOWSHIP

1995 /2002 Académie des Sciences (France): corresponding member / member
2000 2008 Académie des Technologies (France): founding member
2009 2015 National Academy of Sciences (USA): Foreign Associate
Austrian Academy of Sciences: corresponding member abroad
Académie Royale des Sciences, des Lettres, et des Beaux-Arts de Belgique: associé étranger
2015 Royal Society (London): Foreign Member
2018 Accademia Nazionale dei Lincei (Italy): foreign member
2002 Optical Society of America Fellow
2005 American Physical Society Fellow
2010 European Optical Society fellow

AWARDS

- 1983 Prix Servan de l'Académie des Sciences, France
- 1985 Commonwealth Award for Science and Invention, USA
- 1987 International Commission for Optics Award
- 1991 Holweck Prize (Société Française de Physique and Institute of Physics)
- 1999 Max Born Award of the Optical Society of America, USA
- 1999 Humboldt-Gay Lussac Prize, Germany
- 2000 Carnegie trust centenary professor, U. of Strathclyde, Scotland
- 2005 CNRS Gold Medal, France <http://www2.cnrs.fr/en/394.htm> ou <http://www2.cnrs.fr/presse/communiqu/781.htm>
- 2007 iXcore research foundation laureate
- 2009 European Physical Society Quantum Electronics Prize:
<http://qeod.epsdivisions.org/QEOD%20Prizes/eps-quantum-electronics-prize>
- 2010 Wolf prize in Physics:
<http://www.wolffund.org.il/index.php?dir=site&page=winners&cs=285>
- 2010 ERC Advanced grant
- 2011 Médaille grand vermeil de la Ville de Paris
- 2011 Herbert Walther award (OSA and DPG): http://www.osa.org/en-us/awards_and_grants/awards/award_description/walther/
- 2012 Einstein medal of the Albert Einstein Society: <http://www.einstein-bern.ch/index.php?lang=en&show=medaille>
- 2013 Ives medal / Quinn prize of the OSA:
http://www.osa.org/awards_and_grants/awards/award_description/ivesquinn/
- 2013 Tommasoni prize, University of Rome La Sapienza:
<http://www.phys.uniroma1.it/DipWeb/tommasoni/prizes.html>
- 2013 Niels Bohr Gold Medal of Danish Academy of Engineers / Niels Bohr Institute / Royal Danish Society of Sciences and Letters:
<http://bohr2013.nbi.ku.dk/english>
- 2013 Balzan Prize in Quantum Information:
<http://www.balzan.it/fr/laureats/alain-aspect>
- 2013 Unesco-Niels Bohr Gold medal
- 2015 Galileo Ferraris Prize (INRM, Torino)

DISTINGUISHED LECTURESHIP

1992	Loeb lecturer, Harvard University, USA
2000	Carnegie centennial professor, University of Strathclyde, Scotland
2002	Klosk lecturer, New York University, USA
2006	Norman Hascoe distinguished lecturer, UConn, USA
2006	Yale University distinguished lecturer in quantum information physics
2006	Wenner-Gren distinguished lecturer, Sweden
2009	Lecturer at the "Troisième cycle de la physique en Suisse romande"
2009	Asher Peres memorial lecturer, Technion, Israel
2009	University of Toronto distinguished lecturer
2010	Elliott W. Montroll lecturer, U of Rochester
2010	Schrödinger lecturer, Imperial College, London
2010	Wright lecturer, Geneva
2011	Session chair and contributor to the centennial Solvay Conference in Physics on "The Theory of The Quantum World"
2012	Lecturer of the "XX Jornadas de Optica Cuàntica y Fudamentos de Mecànica Cuàntica", University of Bilbao
2012	Invited professor at the Joint Quantum Institute of University of Maryland and National Institute of Standard and Technology
2012	Rochester lecturer, University of Durham
2014	Hans Jensen lecture, University of Heidelberg
2015	Max von Laue Kolloquium of the Physikalische Gesellschaft zu Berlin
2015	McPherson Lecture at McGill University, Montreal
2015	Yearly Physics Lecture, University of Innsbruck
2016	Balzan lecture, Lugano
2017	Spanish Royal Physics Society Lecture, Madrid
2017	France-Hong Kong distinguished lecture, Hong Kong
2017	Andrew Carnegie Lecture, University of Glasgow
2018	Rosenthal lecture, Yale University

INDUSTRY CONNECTIONS

- 1998-2010 Independent member of the board of Essilor
- 2006-2008 Member of the scientific advisory board of France Telecom
- 2010-2018 Member of the scientific advisory board of Safran
- 2018- Member of the scientific advisory board of Quandela (a start up on single photons sources)
- 2018 Member of the quantum scientific advisory board of ATOS
- 2019 Co-founder of Pasqal (a start up on Rydberg atoms programmable quantum simulators)

HONORARY DEGREES

- 2006 Honorary doctor of the Ecole Polytechnique and University of Montreal
- 2008 Honorary doctor of the Australian National University, Canberra
- 2008 Honorary doctor of the Herriot-Watt University, Edimburgh
- 2010 Honorary doctor of the University of Glasgow
- 2011 Honorary doctor of Technion (Haifa)
- 2014 Honorary doctor of the University of Waterloo, Canada
- 2018 Honorary doctor of City University Hong-Kong

DECORATIONS

- 2005 Chevalier de la Légion d'Honneur
- 2011 Officier de l'Ordre National du Mérite
- 2011 Commandeur des palmes académiques (teaching decoration)
- 2014 Officier de la Légion d'Honneur