

## Date and Place of Birth

29 May 1929 at Elswick, Newcastle upon Tyne, Northumbria, United Kingdom

## Childhood

- Birmingham 1930-1941
- Bristol 1941-1946

## Secondary Education

- Halesowen Grammar School, Worcestershire 1940-1941
- Cotham Grammar School, Bristol 1941-1946
- City of London School 1946-1947

## University Education

- King's College, University of London 1947-1954

## Degrees

- BSc (First Class Honours) in Physics 1950
- MSc 1951
- PhD 1954

## Professional Career

- Royal Commission for the Exhibition of 1851 Senior Student –  
King's College London 1953-1954  
University of Edinburgh 1954-1955
- Senior Research Fellow, University of Edinburgh 1955-1956
- ICI Research Fellow, University of London  
University College 1956-1957  
Imperial College 1957- Dec 1958
- Temporary Lectureship in Mathematics, University College Jan 1959-1960
- Lecturer in Mathematical Physics, University of Edinburgh 1960-1970  
(On leave University of North Carolina, Chapel Hill) (1965-1966)
- Reader in Mathematical Physics, University of Edinburgh 1970-1980

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|---|----------------|
| (On leave at CERN, Geneva)                                  | (Oct-Dec 1976) |
| • Professor of Theoretical Physics, University of Edinburgh | 1980-1996      |
| • Professor Emeritus, University of Edinburgh               | 1996-          |

## Fellowships

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|---|------|
| • Fellow of the Royal Society of Edinburgh (FRSE)       | 1974 |
| • Fellow of the Royal Society, London (FRS)             | 1983 |
| • Fellow of the Institute Of Physics (FInstP)           | 1991 |
| • Fellow of King's College London                       | 1998 |
| • Honorary Fellow of the Institute Of Physics           | 1999 |
| • Fellow of the University of Swansea                   | 2008 |
| • Honorary Fellow of the Royal Scottish Society of Arts | 2013 |
| • Honorary Member of the Saltire Society                | 2013 |
| • Honorary Fellow of the Science Museum                 | 2013 |
| • Honorary Patron of the James Clerk Maxwell Foundation | 2016 |

## Prizes

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|---|------|
| • Hughes Medal, Royal Society (with T W B Kibble)   | 1981 |
| • Rutherford Medal, Institute of Physics (with T W B Kibble)  | 1984 |
| • Scottish Science Award, Saltire Society and Royal Bank of Scotland  | 1990 |
| • James Scott Prize Lectureship, Royal Society of Edinburgh<br>(delivered April 1995)                                 | 1993 |
| • Paul Dirac Medal and Prize, Institute of Physics  | 1997 |
| • High Energy and Particle Physics Prize, European Physical Society<br>(with R Brout, F Englert)                      | 1997 |
| • Royal Medal, Royal Society of Edinburgh   | 2000 |
| • Wolf Prize in Physics (with R Brout and F Englert)  | 2004 |
| • Oskar Klein Memorial Lecture and Medal, Stockholm Academy of<br>Sciences  | 2009 |
| • J J Sakurai Prize, American Physical Society (with R Brout, F<br>Englert, G S Guralnik, C R Hagen and T W B Kibble) | 2010 |
| • Higgs Medal, Royal Society of Edinburgh   | 2012 |
| • Nonino Prize "Man of Our Time"  | 2013 |

- Edinburgh Medal, Edinburgh International Science Festival (with CERN) 2013
- Prince of Asturias Award for Technical and Scientific Research (with F Englert and CERN) 2013
- Nobel Prize in Physics (with F Englert) 2013
- Galileo Galilei Prize 2014
- Copley Medal, Royal Society, London 2015
- Royal Commission for the 1851 Exhibition Commission Medal 2017
- Carla Fendi Foundation Award 2018

### **Honorary Degrees**

- DSc University of Bristol 1997
- DSc University of Edinburgh 1998
- DSc University of Glasgow 2002
- DSc King's College London 2009
- DSc University College London 2010
- DSc University of Cambridge 2012
- DSc Heriot-Watt University 2012
- PhD Scuola Internazionale Superiore di Studi Avanzati, Trieste 2013
- DSc University of Durham 2013
- DSc University of Manchester 2012
- DSc University of St Andrews 2014
- DSc Université Libre de Bruxelles 2014
- DSc University of North Carolina at Chapel Hill 2015
- DSc Queens University of Belfast 2015
- DSc Trinity College Dublin 2016

## Other Awards

- Edinburgh Award, City of Edinburgh 2011
- Member of the Order of Companions of Honour 2013
- Freedom of the City of Bristol 2013
- Freedom of the City of Newcastle 2014
- Freedom of the City of Edinburgh 2014

## Publications

- “Theoretical Determination of Electron Density in Organic Molecules” (with C A Coulson, S L Altmann and N H March) *Nature* 168 1039 (1951)
- “Perturbation Method for the Calculation of Molecular Vibration Frequencies I” *J. Chem. Phys.* 21 1131 (1953)
- “A Method for Computing Zero-Point Energies” *J. Chem. Phys.* 21 1330 (1953)
- “Vibration Spectra of Helical Molecules” *Proc. Roy. Soc. A* 220, 472 (1953)
- “Vibrational Modifications of the Electron Density in Molecular Crystals I” *Acta. Cryst.* 6 232 (1953)
- “Perturbation Method for the Calculation of Molecular Vibration Frequencies II” *J. Chem. Phys.* 23 1448 (1955)
- “Perturbation Method for the Calculation of Molecular Vibration Frequencies III” *J. Chem. Phys.* 23, 1450 (1955).
- “Vibrational Modifications of the Electron Density in Molecular Crystals II” *Acta. Cryst.* 8 99 (1955)
- “A Method for Calculating Thermal Vibration Amplitudes from Spectroscopic Data” *Acta. Cryst.* 8 619 (1955)
- “Vacuum Expectation Values as Sums over Histories” *Nuovo Cimento* (10) 4 1262 (1956)
- “On Four-Dimensional Isobaric Spin Formalisms” *Nuclear Physics* 4 1262 (1957)
- “Integration of Secondary Constraints in Quantized General Relativity” *Phys. Rev. Lett.* 1 373 (1958)
- “Integration of Secondary Constraints in Quantized General Relativity” *Phys. Rev. Lett.* 3 66 (1959)
- “Quadratic Lagrangians and General Relativity” *Nuovo Cimento* (10) 11 816 (1959)
- “Broken Symmetries, Massless Particles and Gauge Fields” *Physics Letters* 12 132 (1964)508 (1964)

- “Spontaneous Symmetry Breakdown without Massless Bosons” Phys. Rev. 145 1156 (1966)
- “Spontaneous Symmetry Breaking” two lectures at the 14<sup>th</sup> Scottish Universities Summer School in Physics, 1973, published in “Phenomenology of Particles at High Energy” 529-552 Academic Press (1974) ISBN 9780121971502
- “Dynamical Symmetries in a Spherical Geometry I” J. Phys. A12 309 (1979)
- “Inventing an Elementary Particle” INFN Eloisatron Project 9th Workshop “Higgs Particles - Physics Issues and Experimental Searches in High Energy Collisions”, Erice, Italy (15-26 Jul 1989). Published in “Higgs Particle(s): Physics Issues and Experimental Searches in High-Energy Collisions” A Ali (ed.) Ettore Majorana International Science Series 50 1-5 Plenum Press (1990) ISBN 9780306435898
- “Spontaneous Symmetry Breaking 25 Years Ago” 28<sup>th</sup> International School of Subnuclear Physics “Physics up to 200 TeV”, Erice, Italy (Jul 1990). Published in “Physics up to 200 TeV” A Zichichi (ed.) The Subnuclear Series 28 439-444 (1990) ISBN 9780306439353
- Panel Session “Spontaneous Breaking of Symmetry” (with L M Brown, R Brout, T Y Cao, Y Nambu) 3<sup>rd</sup> International Symposium on the History of Particle Physics “The Rise of the Standard Model” (1992). Published in “The Rise of the Standard Model”, L Hoddesdon, L M Brown, M Riordan, M Dresden (eds.) Cambridge University Press, (1997) ISBN 978052157165
- “SBGT and All That” International Conference on “50 Years of Weak Interactions from the Fermi Theory to the W” Wingspread, Racine, Wisconsin USA (29 May - 1 Jun 1984). Published by University of Wisconsin at Madison. Reproduced in AIP. Conf. Proc. 300 159-163 (1994)
- “My Life as a Boson: The Story of The Higgs” Inaugural Conference of the Michigan Center for Theoretical Physics “2001 A Spacetime Odyssey” Ann Arbor, Michigan (21-25 May 2001). Published in “2001: A Spacetime Odyssey” M J Duff, J T Liu (eds.) World Scientific (2002) ISBN 9789810248062 and reproduced in Int. J. Mod. Phys. A17S1 86-88 (2002)
- “Prehistory of the Higgs Boson” Comptes Rendus Physique 8 970-972 (2007)
- “Evading the Goldstone Theorem” Rev. Mod. Phys. 86 851 (2014)
- “Evading the Goldstone Theorem” Annalen der Physik 526 211 (2014)
- “Maxwell’s Equations: the Tip of an Iceberg” The James Clerk Maxwell Foundation Newsletter Issue No. 7 Autumn 2016 ISSN 2058-7503