

George Andrew Davidson Briggs

Curriculum Vitae

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Date of birth 3rd June 1950 **Nationality** British
Married 1981; two daughters born 1983 and 1985

Higher Education

1968-1971 Clothworkers' Scholar, St. Catherine's College, Oxford, Physics, B.A., M.A.
1973-1976 P.C.S. Group, Cavendish Laboratory, Cambridge, Ph.D.
1976-1979 Queens' College Cambridge, Theology Tripos, Chase Prize for Greek

Appointments

1968 Glanzstoff A.G., Germany (Praktikant)
1971-1973 Canford School, Dorset (Physics and RE, House Tutor)
1979 Cambridge University, Engineering Department, Research Assistant
1980-1982 Oxford University, Department of Metallurgy, Research Fellow
1981-1993 Lecturer in Physics, St Catherine's College, Oxford
1982-1984 Research Associate, St Catherine's College, Oxford
1983-1984 Royal Society Research Fellow in the Physical Sciences
1984-1996 Lecturer in Metallurgy and Science of Materials, University of Oxford
1984-2002 Governing Body Fellow, Wolfson College, Oxford
1996-1999 Reader in Materials, University of Oxford
1999-2002 Professor of Materials, University of Oxford
2002- Professor of Nanomaterials, University of Oxford
2002- Professorial Fellow, St Anne's College, Oxford
2002-2009 Director, Quantum Information Processing Interdisciplinary Research Collaboration, (QIP IRC) and EPSRC Professorial Research Fellow
2003- Emeritus Fellow, Wolfson College, Oxford

Awards

1986 Holliday Prize, Institute of Metals, 'for his outstanding research and development in the field of scanning acoustic microscopy and for the application of this novel technique to the solution of materials problems.'
1994 Buehler Technical Paper Merit Award for Excellence. "Depth measurements of short cracks in perspex with the scanning acoustic microscope." *Materials Characterization* **31**, 115-126 (1993), reprinted in *Materials Characterization* **39**, 653-644 (1997).
1999 Metrology for World Class Manufacturing Awards: Winner (with Dr O.V. Kolosov), Category 1, Frontier Science and Measurement. "Ultrasonic Force Microscopy (UFM)", 'Kolosov and Briggs have demonstrated the effect on various materials and shown that UFM is capable of both high resolution and quantitative measurement.'
1999 Honorary Fellow of the Royal Microscopical Society. 'This award is in recognition of your many outstanding achievements in various scanned probe microscopy techniques and their applications to the study of the mechanical and structural properties of surfaces over a very wide dimensional scale. Your recent development of the ultrasonic force microscope is an example of your innovative achievements.'
2007 Oxfordshire Science Writing Competition: 2nd Prize for article 'Molecules are Real.'

Professional Activities

1985 British Council Visitor, New Zealand Vice-Chancellors' Committee
1986-1991 Council of Royal Microscopical Society, Chairman of Materials Section
1988 Organiser, Royal Microscopical Society International STM Conference, Oxford
1989-1991 Honorary Treasurer, Royal Microscopical Society
1989-1992 Research Executive Committee, British Institute of Non-Destructive Testing
1990, 1993 Visiting Faculty, Centre for Quantized Electronic Structures (QUEST), University of California at Santa Barbara
1991 Select Preacher, Trinity Term, University of Oxford
1992-2002 Professeur invité, Ecole polytechnique fédérale de Lausanne
1993-1994 Special Lectureship, University of Oxford
1995 Organiser, JSPS Symposium *Science and Society*, Oxford
1996-2006 Director, Oxford Toppan Centre

1997 Organiser, European Workshop on Surface Brillouin Spectroscopy, Oxford
 1997-1998 Visiting Scientist, Hewlett-Packard Laboratories, Palo Alto, California
 1998-2000 Chairman, Sub-Faculty of Materials, University of Oxford
 1999 Guest Editor, *Ultrasonics*
 1999- Board of Electors, Wilde Lectureship in Natural and Comparative Religion
 2000-2002 External Examiner, Cranfield University, BSc (Hons) in Applied Science
 2000-2008 Founding Director and Vice-Chairman, OxLoc Ltd
 2001- Board of Management, Ian Ramsey Centre, Faculty of Theology, University of Oxford
 2001- Editorial Board, *Science & Christian Belief*
 2002- Editorial Board, *Current Opinion in Solid State and Materials Science*
 2002 Visiting Professor, University of New South Wales
 2002- Freeman, Clothworkers' Company and City of London
 2003 International Advisory Committee, International Conference on Solid State Quantum Information Processing, Amsterdam
 2004- Fellow, Institute of Physics
 2004 Organiser, Entanglement and Transfer of Quantum Information, Isaac Newton Institute, Cambridge
 2005-2006 Editorial Board, *Nanotechnology*
 2005- Liveryman, Clothworkers' Company
 2005- Guest Professor, State Key Laboratory, Wuhan University of Technology, China
 2006-9, 2010-13 EPSRC Peer Review College
 2006 International Scientific Advisory Committee, Symposium on Quantum Technologies, Cambridge
 2006- Science & Engineering Fellowships Committee, Royal Commission for the Exhibition of 1851
 2007-9, 2011-13 International Board of Advisors, John Templeton Foundation
 2007 International Advisory Board, Workshop on Measurement-Based Quantum Computing, Oxford
 2008- Engineering Panel, Newton International Fellowships
 2008- Advisory Council, McDonald Centre for Theology, Ethics, and Public Life
 2009-12 Editorial Board, *Journal of Physics D: Applied Physics*
 2009 Quantum Information Science, Kavli Institute of Theoretical Physics, Santa Barbara.
 2010 Organiser, Quantum Physics and the Nature of Reality, Oxford, 26-29 September 2010.
 2010-12 Under a contract between Templeton World Charity Foundation (TWCF) and the University of Oxford, I am developing the inaugural proposals from institutions world wide for grants from this major research foundation, which has assets of over \$1.25B.

Web sites

www.materials.ox.ac.uk/peoplepages/briggs.html

Funding

EPSRC grants are listed on <http://gow.epsrc.ac.uk/NGBOViewPerson.aspx?PersonId=77862>

Grants started or awarded since 2001 (I am the Principal Investigator except where indicated):

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| Nanotube quantum logic gate: pump-priming proof-of-principle. EPSRC ROPA: £146,411. | Quantum computing using molecularly self-assembled nanostructures. MoD/dstl: £520,800. |
| Anti-corrosive paints: studies by scanning acoustic microscopy and scanning Kelvin probe (P.I. Dr John Sykes). EPSRC: £337,591. | ERA-Pilot QIST: Structuring the European Research Area within Quantum Information Science and Technology (P.I. Dr Christian Monyk). EU FP6: €905,000. |
| Strategic Relationship in Nanomaterials. Toppan Printing Company: additional £2,153,856 (bringing total to over £5M). | Applications of Slow Light to Information Processing. Hewlett Packard/DARPA: \$1,622,463. |
| Nanoelectronics at the Quantum Edge. Foresight LINK Award: £3,744,692. | Diamond microstructures for quantum information technologies (P.I. Dr J.M. Smith). EPSRC: £42,698. |
| Nanointegration through semiconductor and interconnection self-assembly (P.I. Dr Toshio Ogino, NTT). NEDO: ¥56,900,000. | Quantum Information Processing IRC, Director. EPSRC: £723,328. |
| Improved ink jet printing by control of ink-media interactions (P.I. Dr David Bucknall). EU Growth: €5,133,787. | Interdisciplinary Research Collaboration in Quantum Information Processing. EPSRC: £10,081,417. |
| Use of electric fields for controlled patterning of thin polymer films (P.I. Dr David Bucknall). EPSRC: £122,580. | Quantum information processing early stage training network (P.I. Dr Dieter Jaksch). EU FP6: €713,870. |
| New materials for nanoelectronics. Royal Society/Wolfson Foundation Laboratory Refurbishment Scheme: £179,600. | Supramolecular self-assembly of 1-10 nm templates for biofunctional surfaces, quantum information processing and nanoelectronics (P.I. Prof. P.H. Beton). RCUK £3,458,241. |
| Cryogenic instrumentation for quantum electronics. RCUK Basic Technology: £1,941,692. | Intra-molecular propagation of electron spin states. European Science Foundation: €1,276,379. |
| Properties of supported metal nanoclusters and incar-fullerenes for catalysis, sensor and quantum information applications / Proprietà di nanocluster metallici e di endofullereni su superfici per applicazioni di catalisi, sensoristica e quantum information (P.I. Dr A. Ardavan). British Council-MIUR/CRUI. £4,000. | Templated ordered endohedral fullerenes as building blocks for quantum computing. EPSRC: £754,380. |
| | Platform Grant Support for Materials Characterisation at Oxford (P.I. Prof. A. Kirkland). EPSRC: £1,161,597. |
| | Putting spin into carbon nanoelectronics. EPSRC: £369,310. |
| | Molecular quantum devices, EPSRC: £1,202,659. |

Invited lectures

In the past 30 years I have given over 400 invited papers and lectures at national and international conferences, workshops and seminars. The following is a selection out of a total of 191 since 2001.

- A nanostructure diagram for the equilibrium size and shape distribution of epitaxial islands. *6th International Symposium on Advanced Physical Fields*, Tsukuba, Japan, 6-9 March 2001.
- How to design epitaxial quantum dots. *6th International Conference on Atomically Controlled Surfaces, Interfaces and Nanostructures*, North Lake Tahoe, California, 9-12 July 2001.
- Nanotube quantum computing. *Nanoelectronics – Electronics in the 21st Century*, 9th Hitachi – Cambridge Seminar (in cooperation with Japan 2001), Cambridge, 16 July 2001.
- Acoustic microscopy: where has it come from and where is it going? (Opening plenary lecture) *26th International Acoustical Imaging Symposium*, Windsor, Canada, 9 - 13 September 2001.
- Methods of acoustic microscopies. *Dreiländertagung für Elektronmikroskopie*, Innsbruck, 12-14 September 2001.
- How to control the growth of epitaxial quantum dots. *Nanostructures for quantum computing*, Ørsted Symposium, Copenhagen, 19 September 2001.
- Epitaxial semiconductor nanostructures: their size and shape distributions. *Semiconductors, Nanostructures & Devices*, Japan-UK 10+10 Meeting, Stamford, 14-15 January 2002.
- Nanomechanical imaging by ultrasonic force microscopy. *UK Scanning Probe Microscopy*, Lancaster, 9-10 April 2002.
- Nanoscale solid state quantum computing. *Practical realisations of quantum information processing*, The Royal Society, London, 13-14 November 2002.
- Quantum computing with nanoelectronics structures. *Int. Conf. Nanoelectronics*, Lancaster University, 4-9 January 2003.
- Nanostructures for quantum computing. *Microscopy of Semiconductor Materials*, Cambridge 31 March - 3 April 2003.
- Nanomaterials for quantum information. *Clusters, Nanocrystals & Nanostructures*, Gordon Research Conference, New London, Connecticut, 3-8 August 2003.
- Carbon nanomaterials for quantum scale computing. *International Symposium of Functional Semiconductor Nanosystems*, Atsugi, Japan, 12-14 November 2003.
- Nanomaterials for quantum information processing. *The International Conference of Solid State Quantum Information Processing*, Amsterdam, 15-18 December 2003.
- Endohedral fullerene qubits: self-assembly and ESR. *Japan-UK 10+10 Meeting on Nanophysics and Nanoelectronics*, Oxford University, 12-13 March 2004.
- Cryogenic instrumentation for quantum electronics. *Advances in Quantum Information*, 11th Hitachi – Cambridge Seminar, Cambridge University, 30 November 2004.
- Nanotechnology – Grey goo or great God? *CiS Templeton Lecture*, St Edmund's College, Cambridge, 10 March 2005.
- Endohedral fullerenes as spin qubits. *Molecular nanostructures*. XIXth IWEPNM, Kirchberg, Tirol, Austria, 12-19 March 2005.
- Quantum nanomaterials. *China-UK Bilateral Conference in Nano-materials, devices and nano-systems and nano-scale modeling and measurement*, Wuhan, China, 11-13 June 2005.
- A happy marriage: theory and experiment of quantum nanomaterials. *Defects and More*. IoP London 27-28 June 2005.
- Nanotube based structures for quantum integrated systems. *Future Integrated Systems*, Trinity Hall, Cambridge, 8-11 August 2005.
- Advanced nanomaterials for quantum information processing. *Materials for the New Millennium*, Biopolis, Singapore, 12-13 September 2005.
- Nanotechnology: Bleak House or Great Expectations? *Brave New Britain: New Technologies and the Future of Human Nature*, Roy. Soc. Medicine, London 15 November 2005.
- Spin qubits in carbon nanomaterials. *Quantum Nanotechnology*, Oliphant Conf., Noosa Heads, Australia, 21-26 January 2006.
- Carbon nanomaterials for quantum technologies. *Quantum Technologies Workshop*, Royal Society, London 24 April 2006.
- Molecular qubits as building blocks for a quantum computer. *Organic, Inorganic and Biomolecular Nanostructures: from Fundamental Science to Applications*, Jožef Stefan Institute, Ljubljana, 20-21 September 2006.
- Molecular qubits as building blocks for a quantum computer. *Towards Novel Nanostructure-based Devices*, 50th IUUVSTA Workshop, Dubrovnik, Croatia, 22-26 October 2006.
- Solid state quantum computing in endohedral fullerenes. *Rare-Earth-Ion-Doped Solids for Quantum Information*, Laboratoire de Chimie de la Matière Condensée, Ecole Nationale Supérieure, Paris, 25-27 April 2007.
- Spins for qubits in carbon nanomaterials. *SPIN&QUBIT2007*, Niels Bohr Institute, Copenhagen, 28 August 2007.
- How is small different from big? *The Sixth National Conference on Functional Materials and Application*, Wuhan, Hubei, 15-16 November 2007.
- The emerging discipline of quantum nanoscience. *IOM3 3rd International Nanomaterials and Nanotechnology Conference*, Trinity College, Dublin, 17-18 December 2007.
- What is the fundamental nature of our world? and The unity of the human being. *Science, Cultures and the Future of Humanity*, Doha, Qatar, 30 May - 1 June 2008.
- Manipulation of spin qubits in molecular nanomaterials. *Quantum Information Science*, Gordon Research Conference, Big Sky Resort, Montana, 31 August - 5 September 2008.
- Nanotechnology, Information and God. 纳米技术 信息与上帝. Faraday Course, Beijing, 16 October 2008.
- Outstanding problems in using spin states for practical quantum information science. Kavli Institute for Theoretical Physics, Santa Barbara, California, 24 November 2009.
- Quantum control in carbon nanomaterials. *14th Israel Materials Engineering Conference*, Tel-Aviv, 13-14 December 2009.
- The quantum resource of spin control in nanostructures. *Novel Phenomena and techniques in Semiconductor Nanostructures*, University of Tokyo, 22 January 2010.
- Storing information in collective spin states. *International Conference on Nanoscience and Nanotechnology*, Sydney, 22-26 February 2010.
- Storing excitations in collective spin states. *Quantum information processing with spins and superconductors*, Institute for Quantum Computing, Waterloo, Canada, 17-19 May 2010.
- Nanocarbon materials for spin-based quantum technologies. *Japan/UK Workshop on Nano-carbon based Electronics*, Tokyo, 17 February 2011.
- Quantum control of spins in condensed matter. *WEH Seminar on Diamond Photonics, Spintronics, Bioapplications*, Bad Honnef, 6 April 2011.
- Nanotechnology: ethics and realities. *Belief in Dialogue: Science, Culture and Modernity Conference* (British Council/ISSR/American University of Sharjah), Sharjah, 21-23 June 2011.
- How can experiments elucidate reality? *Concepts of reality in the foundations of quantum mechanics workshop*, Traunkirchen, 1-2 July 2011.
- Carbon-based quantum nanoelectronic devices. *NANO-DDS 2011*, New York, 29 August - 1 September 2011.
- Violation of a Leggett-Garg inequality with a finite temperature ensemble. *International Workshop on Foundations of Quantum Theory*, NITheP, South Africa, 26-28 October 2011.
- Meanwhile, back in the lab *Why Quantum Mechanics? Beyond Center 'Big Questions' Workshop*, Arizona State University, 12-13 December 2011.
- Quantum Nanotechnology, *Industrial Physics Form*, ICTP, Trieste, 16-19 April 2012.
- Quantum Electronic Materials, *Frontiers in Electronic Materials: Correlation Effects and Memristive Phenomena*, at Eurogress Aachen, June 17-20, 2012,
- Experimental implementations of quantum paradoxes, *Yakir Aharonov's 80th Birthday Conference*, Chapman University, California 17-18 August 2012.
- The search for evidence-based reality, *The Science and Religion Dialogue: Past and Future*, University of Heidelberg 25-29 October 2012.

