

Curriculum Vitae

Name: Philip David Welch

Date of birth: 6/1/54

(2) Present appointment

- Professor in Pure Mathematics, the University of Bristol.
(Appointed Lecturer Jan.86, Reader Aug.96, Professor Aug.04.)

(3) Previous permanent appointment

- Chair in Mathematical Logic, Graduate School of Science & Technology, Kobe University.
(Appointed Apr.97. Held till Sep.00.)

Visiting positions held abroad since January 1986:

- Feb.02 - Jan.03 Mercator Professor at Mathematical Institute of the University of Bonn.
- Oct.00 - Jan.02 Gastprofessur at the Kurt Gödel Research Centre for Mathematical Logic, University of Vienna.
- Jan.93 - Sep.94 Visiting Professor, UCLA, Los Angeles.
- Nov.92 - Dec.92 Visiting Professor, University of Nagoya, Japan.
- Oct.92 Visiting Research Fellow, University of Kobe, Japan.
- Dec.89 - Sep.90, Aug.00 - Mar. 01 Visiting Research Scholar, Department of Mathematics UC Berkeley.

Visiting appointments

- Sep.16 - Dec.16 Simons Foundation Research Fellow, CRM Barcelona.
- Aug.15 - Dec.15 Simons Foundation Research Fellow, Isaac Newton Institute, Cambridge.
- Feb.12 - Jul.12 Visiting Research Fellow, Isaac Newton Institute, Cambridge.
- Jan.06 - Apr.06 Visiting Research Fellow, New College, Oxford.
- Oct.87 - Sep.88 Lecturer in Mathematics, St.Catherine's College, Oxford (part-time).
- Oct.84 - Dec.85 Assistant Professor at UCLA, Los Angeles.
- Apr.84 - Sep.84 Royal Society European Research Fellowship at the Freie Universität, Berlin.
- Oct.83 - Mar.84 Royal Society European Research Fellowship at the Mathematical Institute of the University of Bonn.
- Oct.81 - Sep.83 SERC Postdoctoral Research Fellow at Wolfson College, Oxford.
- Oct.80 - Sep.81 Assistant at the Seminar für Logik of the University of Bonn.

(4) Academic qualifications

D.Phil. in Mathematical Logic, University of Oxford,	Nov. 79.
M.Sc. in Mathematical Logic, University of Oxford,	June 76.
B.Sc.(1st Class) in Mathematics, University College, London.	June 75.

(5) Special awards, honours and distinctions

- Inamori Foundation Young Researcher's Prize; April 1998.
- Templeton Foundation Award for research into "*Philosophical Theories of Truth, Transfinite Computation and Infinite Games*" on the interface of Mathematics and Philosophy.
- Elected President of the British Logic Colloquium (the national society representing Logic in the UK), 2017, Vice-President since Jan. 2014.
- Elected Vice-President of the European Set Theory Society, 2018.
- Honorary 60th Birthday Conference, Hausdorff Centre for Mathematics, Bonn, May 2014.

(6)(D) Postgraduate Supervision

Bristol:

M.Sc. Five dissertations supervised, two in 1987, one in 1991, two 1998.

Ph.D.

John Vickers, '*Some topics in Core Model Theory*', Oct.90 - Sep.93,

Ian Sharpe, '*On Chang's Conjecture, Indiscernibles, and the Core Model*', Oct.04-Sep.07.

Barnaby Dawson, '*Ordinal Time Turing Computation*', Oct.06-Sep.09.

Richard Pettigrew, '*Natural, Rational, and Real Arithmetic in a Finitary Theory of Finite Sets*', Oct.04-Jan.08. (co-supervisor with, but actually supervised by, J.P. Mayberry).

Chris Le Sueur '*Some extension of determinacy in the difference hierarchy of co-analytic sets*', Oct.12-Aug.15.

Hazel Brickhill '*Generalising the notions of closed unbounded, and stationary sets*' Sep. 13 - Aug 17.

(E) Postdoctoral Supervision

- Dr. John Vickers on EPSRC Postdoctoral Fellowship; 1994-1996:
- Dr. David Aspero in EPSRC Research Grant "*Interactions between combinatorics of stationary sets, bounded forcing axioms and inner models*", 2003-2005:
- Dr Andrey Bovykin; Gödel PostDoctoral Prize Winner, 2011 ; 2011-2015.
- Dr. Peter Holy in EPSRC Grant: "*Inner Model Theory in Outer Models*" Mar. 2012.
- Dr. T. Meadows in a Marie-Curie Fellowship: "*The Set Theory of Semantic Theories of Truth* "; Aug 2012.
- Dr A. Brooke-Taylor on an EPSRC ECR Fellowship "*Bringing Set Theory and Algebraic Topology together*"; Oct. 2013.
- Dr Benedict Easthaugh (Leverhulme PostDoc) June 2016 - Feb. 2018.
- *Currently*: Dr Philipp Schlicht in a Marie-Curie Fellowship: "*The Logic and Mathematics of Infinity: from Foundations to Real-World Applications*"; July 2018 - June 2020.

(7i) Publications

Authored Books

- 1 'Coding the Universe' co-author with R.B.Jensen, (All Souls' College,Oxford) and A.Beller, (Dept.of Decision Sciences,Univ. of Penn.); *London Mathematical Society Lecture Notes in Mathematics Series* No.47, Cambridge University Press 1982, pp360.

Thesis

- 2 'Some Combinatorial Principles in the Core Model', D.Phil. thesis, Oxford University, November 1979.

Research Papers

- 3 'Recognizable sets and Woodin cardinals', with M. Carl and P. Schlicht, to appear in *Annals of Pure and Applied Logic*, pp21.
- 4 'The Ramified Analytical Hierarchy using Extended Logics', submitted. May 2017, pp12.
- 5 'Rethinking Revision', to appear in *Journal of Philosophical Logic*, pp.17.
- 6 'Global Reflection Principles' in *Logic, Methodology and Philosophy of Science - Proceedings of the 15th International Congress, 2015*, Eds. H. Leitgeb, I. Niiniluoto, P. Seppälä and E. Sober. College Publications, pp18, July 2017.
- 7 'Lower consistency bounds for mutual stationarity with divergent uncountable cofinalities' with D. Adolf and S. Cox, *Israel Journal of Mathematics*, pp18, to appear.
- 8 'Obtaining Woodin's Cardinals' in "Logic at Harvard (in honor of Hugh Woodin's 60th birthday)", Eds. A. Caicedo, J. Cummings, P. Koellner, and P. Larson, AMS Contemporary Mathematics Series, 2017, 161-176.
- 9 ' $G_{\delta\sigma}$ games and generalised recursion' submitted Sep 2015, pp30.
- 10 'Reflecting on Absolute Infinity' with Leon Horsten, in *J. of Philosophy*, **113**, No.2, Feb. 2016, 89-111.
- 11 'Global Reflection Principles' currently in the Isaac Newton Institute pre-print series, No. NI12051-SAS, to appear as part of the Harvard "Exploring the Frontiers of Incompleteness" Series volume, 2016?, Ed. P. Koellner, pp28.
- 12 'Local Club Condensation and L-likeness' with P. Holy and L. Wu, in the *Journal of Symbolic Logic*, **80**, No.4, 2015, 1361-1378.
- 13 'The complexity of dependence', in *Journal of Philosophical Logic*, June 2014, 337-340.
- 14 'Some observations on truth hierarchies', in *Review of Symbolic Logic*, **7**, No 1, Mar. 2014, 1-30.
- 15 'Turing's Mathematical Work' in the *Proceedings of the 6th European Congress of Mathematics*, EMS Publishing House, Summer 2013, 763-778.
- 16 ' $G_{\delta\sigma}$ games' in the Isaac Newton Institute Pre-print series, No. NI12050-SAS, July 2012, pp10.
- 17 'Revision Revisited', with L. Horsten, G. Leigh, & H. Leitgeb, in *Review of Symbolic Logic*, **5**, No. 4, Dec. 2012, 642-664.
- 18 'Truth, Logical Validity, and Determinateness: a commentary on Field's Saving Truth from Paradox' in *Review of Symbolic Logic*, Sep. 2011.
- 19 'A Generalised Dynamical System, Infinite Time Register Machines, and Π_1^1 -Comprehension', with P. Koepke, in *Models of Computation in Context*, Eds. B. Löwe et al., *Lecture Notes in Computer Science* **6735**, 2011, 152-159.
- 20 'Global Square and Mutual Stationarity at the \aleph_n ', with P. Koepke, in the *Annals of Pure and Applied Logic*; **162**, Nov. 2011, 787-806.
- 21 'Greatly Erdős Cardinals and some generalisations to the Chang and Ramsey properties' with I. Sharpe, in the *Annals of Pure and Applied Logic*, **162**, No.11, Nov. 2011, 863-902.
- 22 'Determinacy in Strong Cardinal Models', in the *Journal of Symbolic Logic*, **76**, No.2, 2011, 719-728.

- 23 'Hypermachines' with S-D Friedman, in the *Journal of Symbolic Logic*, **76**, No.2, June 2011, 620-636.
- 24 'Ramsey-like Cardinals II' with V. Gitman, in the *Journal of Symbolic Logic*, **76**, No.2, June 2011, 541-560.
- 25 'Weak systems of Determinacy and Quasi-Inductive definitions' in the *Journal of Symbolic Logic*, **76**, No.2, June 2011, 418-436.
- 26 'Games for Truth' in the *Bulletin of Symbolic Logic*, **15** No.4, Dec. 2009, 410-427.
- 27 'Necessities and Necessary Truths: A Prolegomenon to the Use of Modal Logic in the Analysis of Intensional Notions' with Volker Halbach, in *Mind*, **118**, No.469, Jan. 2009, 71-100.
- 28 'Relativistic Computers and Transfinite Computation' in *Unconventional Computation 2009*, Eds. C. Calude et al., *Lecture Notes in Computer Science* **5715**, 2009, 39-41.
- 29 'Basic characteristics of discrete transfinite time Turing Machine models', invited paper for Proceedings of CiE 2007, in issue of *Theoretical Computer Science*, **410**, Jan. 2009, 426-442.
- 30 'The Strength of the Inner Model Hypothesis', with S-D. Friedman, W.H. Woodin, in the *Journal of Symbolic Logic*, **73**, No.2, 2008, 391-400.
- 31 'Bounding lemmata for non-deterministic halting times of transfinite Turing machines', invited paper for Proceedings of CiE 2006, in issue of *Theoretical Computer Science*, **394**, 2008, 223-228.
- 32 'Turing Unbound: the extent of computation in Malament-Hogarth spacetimes' in the *British Journal for the Philosophy of Science*, **59**, No.4, Dec. 2008, 659-674.
- 33 'Ultimate truth vis à vis stable truth', in the *Review of Symbolic Logic*, **1**, No. 1, June 2008, 126-142.
- 34 'Field on Revenge', with Agustin Rayo, in *Revenge and the Liar*, Ed. J.C. Beall, Oxford University Press, Dec. 2007
- 35 'The Undecidability of Propositional Adaptive Logic' with L. Horsten, in *Synthese* **158**, No. 1, Sep. 2007, 41-60.
- 36 'On the strength of mutual stationarity', with P. Koepke, in *CRM Set Theory Year, Barcelona*, Ed. J. Bagaria, S. Todorcevic, Basel, Birkhäuser, *Trends in Mathematics* Series, 2006, 307-318
- 37 'Some open problems in mutual stationarity involving inner model theory: a commentary' in *Proceedings of the Banff Conference on Singular Cardinal Combinatorics*. in the *Notre Dame J. of Formal Logic*, **46**, No.3, 2005, 375-379.
- 38 'Possible Worlds Semantics for Predicates', with V.Halbach & H.Leitgeb, in *Proceedings of Munich Conference on Intensionality*, Ed. R. Kahle, in the series: *Lecture Notes in Logic, ASL/Peters*, Oct.2005.
- 39 'Comparing inductive and circular definitions: parameters, complexity and games', with K.-U. Kühnberger, B. Löwe, M. Möllerfeld, in *Studia Logica*, **81**, 2005, 79-98.
- 40 'On the transfinite action of 1 tape Turing machines', in "New Computational Paradigms" Computation in Europe 2005, Eds. S.B.Cooper, B. Löwe, L. Torenvliet, LNCS **3526** 532-539.
- 41 'On the possibility, or otherwise, of hypercomputation', in the *British Journal for the Philosophy of Science*, **55**, no. 4, Dec. 2004, 739-746.
- 42 'Post's and other problems of supertasks of higher type' in *Classical and New Paradigms of Computation and their Complexity hierarchies* Papers of the Conference Foundations of the Formal Sciences III Eds. Löwe, Piwinger, Räsch, in "Trends in Logic" Series, **23**, Oct. 2004, Kluwer, 223-237.
- 43 'On Unfoldable cardinals, omega-closed cardinals, and the beginning of the Inner Model Hierarchy' in *Archive for Mathematical Logic*, **43**, No. 4, 2004, 443-458.
- 44 'Possible Worlds Semantics for Modal Notions conceived as Predicates', with V.Halbach & H.Leitgeb, in the *Journal of Philosophical Logic*, **32**, No.3, April 2003, 179-223.
- 45 ' $P^f \neq NP^f$ almost everywhere for infinite time Turing computations' co-authored with J. Hamkins, in *Mathematical Logic Quarterly*, **49**, No. 5, 2003, 536-540.
- 46 'On Revision Operators', in the *Journal of Symbolic Logic*, **68**, No.3 June 2003, 689-711.

- 47 'Non-deterministic halting times of Hamkins-Kidder Turing machines' in *Logical Approaches to Computational Barriers*, Proceedings of CiE2006, Eds. A. Beckmann, U. Berger, B. Löwe, J.V. Tucker; LNCS **3988**, 571–574.
- 48 'Bounded Martin's Maximum, weak Erdős cardinals, and ψ_{AC} ', with D. Asperó, in the *Journal of Symbolic Logic*, **67** No. 3, Sep. 2002, 1141-1152.
- 49 'On Possible Non-homeomorphic substructures of the real line,' in *Proceedings of the American Mathematical Society*, **130** (2002), no. 9, 2771-2775.
- 50 'Elementary Embeddings from a submodel into the Universe', co-authored with J.Vickers (Humboldt, Berlin) in the *Journal of Symbolic Logic*, **66**, No.3, Sep. 2001, 1090-1116.
- 51 'On Gupta-Belnap Revision Theories of truth, Kripkean Fixed points, and the Next Stable Set,' a Communication in the *Bulletin of Symbolic Logic*, **7**, No.3, Sep.2001, 345-360.
- 52 'Set-Theoretic Absoluteness and the Revision Theory of Truth', with Benedikt Löwe, invited article for *Studia Logica* (special issue on "Theories of Truth") **68**, No.1, June 2001, 21-41.
- 53 'The Length of Infinite Time Turing Machine Computations', in the *Bulletin of the London Math.Soc.* **32**, No. 2, Mar. 2000, 129-136.
- 54 'On Successors of Jónsson Cardinals', co-author with J. Vickers, in the *Archive for Mathematical Logic*, **39**, No.6, 2000, 465-473.
- 55 'Eventually Infinite Time Turing Machine Degrees', in the *Journal of Symbolic Logic.*, **65**, No.3, 2000, 1193-1203.
- 56 'Friedman's trick: Minimality Arguments in the Infinite Time Turing degrees', in 'Sets and Proofs' Eds. S.B.Cooper & J.K.Truss, London Math. Soc. Lecture Notes in Mathematics Series, **259**, Cambridge University Press, 1999, pp. 425-436.
- 57 'Some Remarks on the Maximality of Inner Models' in Proceedings of the 1998 European Meeting of the Association for Symbolic Logic, Praha, Ed. P. Pudlak & S. Buss, Lecture Notes in Logic, **13**, Kluwer, 1999, 516-540.
- 58 ' Σ_3^1 -absoluteness and the Second Uniform Indiscernible', jointly co-authored with J.R.Steel (UCLA), in the *Israeli Journal of Mathematics*, **104**, 1998, 157-190.
- 59 'Determinacy in the Difference Hierarchy of Co-analytic sets' in the *Annals of Pure and Applied Logic*, **80**, 1996, 69-108.
- 60 'Countable Unions of Simple Sets in the Core Model' in the *Journal of Symbolic Logic* **61**, No.1, 1996, 293-312.
- 61 'Characterising subsets of ω_1 ' in the *Journal of Symbolic Logic* **59**, No.4, 1994, 1420-1432.
- 62 'Doing without Determinacy - Aspects of Inner Models' in the *Proceedings of the Hull Logic Colloquium*, Ed. F.Drake & J.Truss, North-Holland Studies in Logic Series, Amsterdam, 1988, 333-342.
- 63 'Some descriptive set theory and Core Models' in the *Annals of Pure and Applied Logic* 1988, **39**, 273-290.
- 64 'Coding that preserves Ramseyness' in *Fundamenta Mathematicae*, 1988, **129**, 1-7.
- 65 'The reals in Core Models' in the *Journal of Symbolic Logic*, **52**, No.1 1987, 64-67.
- 66 'Minimality in the Δ_3^1 degrees' in the *Journal of Symbolic Logic*, **52**, No.4,1987, 908-915.
- 67 'The Natural Hierarchy and Quasi-Hierarchy of Constructibility Degrees' in the *Journal of Symbolic Logic*, **51**, No.1, 130-134, 1986.
- 68 'Comparing incomparable Kleene degrees' in the *Journal of Symbolic Logic*, **50**, No.1,1985 55-58.

Chapters in Books

- 69 'Gödel' in 'A History of Formal and Philosophical Logic', Ed. M. Antonutti, A. Malpass, Bloomsbury, June 2017, 269-291.
- 70 'Discrete Transfinite Computation' in 'Turing's Revolution: the impact of his ideas about computability'; Eds. G. Sommaruga & T. Strahm, Birkhäuser/Springer, Zurich, Jan. 2016, 161-185.
- 71 'Turing Transcendent: Beyond the Event Horizon', in 'The Once and Future Turing - Computing the World', Eds. S.B.Cooper & A.Hodges, Cambridge University Press, 345-371, 2016.
- 72 'Transfinite Machine Models' in: 'Turing's Legacy' Ed. R. Downey, Lecture Notes in Logic Series, vol. 42, Association for Symbolic Logic, Cambridge University Press, 2014, 493-529.
- 73 'Truth and Turing' in 'Alan Turing: his work and impact' Eds S.B Cooper & J. v Leeuwen; Elsevier, Amsterdam, Oxford, New York, 202-205; 2013.
- 74 'Towards the Unknown Region: On computing infinite numbers' in 'Alan Turing: his work and impact', Eds. S.B Cooper & J. v Leeuwen; Elsevier, Amsterdam, Oxford, New York, pp 109-116, 2013.
- 75 ' Σ^* -Fine Structure', Mar. 2010 in the *Handbook of Set Theory*, Vol 1, Eds., M. Foreman, A. Kanamori, & M. Magidor, Springer Verlag, Heidelberg, New York, 657-745.
- 76 'Discrete Transfinite Computation' in 'Computation in Context: Computation and Logic in the Real World' Eds. S.B. Cooper & A. Sorbi, Imperial College Press/WorldScientific Press, 375-414, 2010.

Conference contributions in mathematical logic

- 77 'Two Observations on Infinite Time Turing Machines' with S-D.Friedman in *Bonn International Workshop on Ordinal Computability*, Eds. I. Dimitriou, J. Hamkins, & P. Koepke; Bonn Reports, 44-48, 2007.
- 78 'On Σ_3^1 sets of reals' in *Proceedings of the Aachen Logic Colloquium*, Ed.G.Müller & M.Richter; Springer Lecture Notes in Mathematics **1103**, 473-484, Springer 1984.

Edited Book

- 79 'Gödel's Disjunction', with L. Horsten; A collection of papers from two conferences on the *Scope and the Limits of Mathematical Knowledge*, Bristol 2012, 2013, Oxford University Press, 2016, pp. x + 277.

Expository, Survey, & Other Publications:

- 80 "Large Cardinals, Inner Models and Determinacy: an introductory overview" lectures for the *Set Theory and Higher Order Logic Meeting*, Birkbeck, London, 2011, in *Notre Dame J. for Formal Logic*, **56**, 1, 2015, 213-242.
- 81 "The Aftermath" with Leon Horsten in the *Mathematical Intelligencer*, 35, no. 1, 2013, 16-20.
- 82 "Truth and Turing: Systems of Logic based on Ordinals" in "Selected Work of Alan Turing: His Work and Impact", Eds: S.B. Cooper & J. van Leeuwen, Elsevier, 2013, 202-205.
- 83 "Some Reflections on Alan Turing's Centenary" in the *European Mathematical Society's Newsletter*, 85, Sep. 2012, 32-38.
- 84 "Towards the Unknown Region: On computing Infinite Numbers" in "Turing: His Work and Impact", Eds: S.B. Cooper & J. van Leeuwen, Elsevier, 2013, 109-116.
- 85 "5 Answers" in "Philosophers of Mathematics: 5 Questions" Eds. V. Hendriks, H. Leitgeb (Some philosophers of mathematics are asked to give answers on 5 interview questions), Automatic Press, 2008, pp342.

Media Contribution

- 86 Broadcast on "Gödel and Hilbert's Program", BBC Radio 4, Melvyn Bragg "In Our Time."

(7ii) Research Grants: all awarded as Principle Investigator unless otherwise stated

- H2020 Postdoctoral Incoming International Research Fellowship, “*The Logic and Mathematics of Infinity: from Foundations to Real-World Applications*” (held by Dr. P. Schlicht), Jul.18 - Jun.20, £183,455.
- ICMS Conference Grant, “*New Directions in the Higher Infinite*”, Edinburgh, Jul. 2017, £16,500.
- Leverhulme Grant ‘*Set Theoretic Pluralism: indeterminacy & foundations*’, Sep.15-Mar.18, £178,000.
- Marie-Curie Postdoctoral Incoming International Research Fellowship 302083, in Philosophical Logic “*The Set Theory of Semantic Theories of Truth*” (held by Dr. T Meadows) Jul.12 - Jun.14, £261,308.
- AHRC Research Grant “*Inexpressibility and Reflection in the Formal Sciences*”, Co-investigator, collaboration with Faculty of Philosophy, University of Oxford, Oct.11 - Dec. 13, Overhead to Bristol:£26,000.
- EPSRC Research Grant “*Inner Model Theory in Outer Models*” EP/J005630/1, Nov.10 - Apr. 14, £255,957.
- Templeton Foundation Award for research into “*The Scope and Limits of Mathematical Knowledge*” on the interface of Mathematics and Philosophy; Dec.10 £48,000.
- ESF-ERCOM Conference Grant for Third European Conference in Set Theory, ICMS Edinburgh, Jul.11, 55,000 Euro.
- EPSRC Mathematics Small Grants Scheme, for visiting Kurt Gödel Research Institute, Oct.08 - Sep.09. EP/G020841/1, £15,500.
- Templeton Foundation Award for research into “*Philosophical Theories of Truth, Transfinite Computation and Infinite Games*” on the interface of Mathematics and Philosophy; Jan.08 £24,000.
- London Mathematical Society (Scheme 1 Conference Grant) for *Mathematical Philosophy* Conference, Sep.08.
- Royal Society International Travel Grants: Jan. 07, Kolkata India; May 09, Notre Dame, Indiana. £2,500.
- EPSRC Fellowship “*Mathematics into Philosophy: analysing complexity theoretic issues in current philosophical theories of epistemology, semantics, and truth*”, UK £41,900, EP/C531485/1 Mar.05
- London Mathematical Society (Scheme 1 Conference Grant) for the British Logic Colloquium (held in Bristol) Sep.05.
- British Academy Grant “*Logical methods in epistemology, semantics, and philosophy of mathematics*”, UK £11,500, Mar.05 - Sep.09.
- EPSRC of the UK INTERACT Research Grant GR/S72399 to develop collaborative research links with the Academy of Sciences, Beijing. Mar. 04.
- EPSRC of the UK Research Grant GR/S44334 to study “*Interactions between combinatorics of stationary sets, bounded forcing axioms, and inner models of set theory.*” UK £104,700. Oct. 03.
- Japan Society for the Promotion of Science, Grant for Research Project “*Applications of Class Forcing over Fine-Structural Inner Models*” ¥997,000. Aug. 00.
- NATO Collaborative Linkage Grant PST.CLG 975324, Bff. 221,000, joint application with colleagues from UK, USA and Hungary, May 99.
- Japan Society for the Promotion of Science, for a Visiting Fellow #P 98355 UK £62,000, Sep.98.
- Japan Society for the Promotion of Science, Visiting Fellowship PU97304 for Prof. Joel Hamkins, UK £36,200, Jan. 1998.
- Monboushou Kakenhi Research Grant “*Large Cardinals and Inner Models*” # 10640118 UK £21,700, Jun.97.
- Japan Society for the Promotion of Science, ‘*Higher Infinity axioms and related propositions of various fields of mathematics*’, #09440078, Jt. PI with Y. Kakuda, J. Brendle, ¥6,400,000 Jan. 97.
- EPSRC Visiting Fellowship Research Grant No. GR/L05594 for Prof. Kai Hauser, Berlin. Project Title: “*Inner Models and the descriptive set theory of the projective hierarchy.*” UK £560 June 1996.
- London Mathematical Society Scheme 4 Research Grant May 1996.

- SERC Research Grant No. GR/H96393 awarded to study *Fine Structural Aspects of Inner Models* at UCLA, UK £12,000 Jan. 93 - Sept. 93.
- SERC Research Grant No. GR/F66276 was awarded to study “*Inner Models of set theory and their associated descriptive set theory*” at Mathematical Sciences Research Institute, Berkeley, UK £9,000, Jan. 90 - Sept. 90.

(7iii) Speaking Invitations

(i) Principal invitations to speak at international meetings, or for lecture courses or longer visits to non-UK institutions.

- Conference “*Logical Perspectives 2018*”, Euler Institute, St Petersburg, Invited Lecture May 18
- 15th Congress of Logic, Methodology and Philosophy of Science, Helsinki, Invited Lecture. Aug.15
- Joint Meeting Deutsche Mathematiker Vereinigung and the Polish Mathematical Society Special Session Speaker. Sep.14
- 4th European Set Theory Meeting, Plenary Session speaker. Jul. 13
- Cosmology Meeting, Cambridge, Invited speaker, “*The limits of computation in relativistic space-times.*” Mar. 13
- 6th European Congress of Mathematicians, Invited Speaker, “*Mechanising the Mind.*” Jul. 12
- Computability in Europe, CiE-2011 Sofia, CiE-2012 Manchester Special Session Speaker. Jun. 11 & Jul. 12
- Truth Conference, “Pillars of Truth”, Dept. of Philosophy, Princeton University, Panellist. Mar.11
- Annual East Coast Meeting of the *American Philosophical Association* “*An author meets his critics*” - invited panellist discussing Field’s recent work. Dec. 09
- Conference on *Unconventional Computation 09*, Ponto La Guarda, Azores Plenary Session Speaker. Sep. 09
- Conference in Honour of Ronald Jensen, Polish Academy of Sciences, Bedlewo, Poland Plenary Session Speaker. Jul. 09
- Annual Meeting of the Association for Symbolic Logic, Notre Dame. Special Session Speaker. May 09
- Conference on *Science and Philosophy of Unconventional Computation*, Cambridge Plenary Session Speaker. Mar. 09
- Conference in Honour of Yuzuru Kakuda, Kobe University, Japan Plenary Session Speaker. Mar. 09
- *Zermelo/Russell Centenary Conference*, Brussels Plenary Session Speaker. Nov. 08
- Conference on *Computable Model Theory*, CUNY New York Plenary Session Speaker. Aug. 08
- Computability in Europe, CiE-2007 Siena, Plenary Session Speaker. Jun. 07
- Computability in Europe, CiE-2006 Swansea, Speaker Special Session on: “*Mathematical models of computers.*” Jun. 06
- “*Interactive Logic: Games and Social Software*” King’s College London 7th Augustus de Morgan Workshop, Plenary Session Speaker. Nov. 05
- Joint AMS-DMV-ÖMV Meeting Special Session Speaker Special Session on Set Theory, Mainz. Jun. 05
- Fourth New York Logic Conference, Plenary Session Speaker. Jun. 05
- American Mathematical Society, National Meeting Speaker Special Session on Infinite Combinatorics and Inner Models, Phoenix. Jan. 04
- SWIFT Bonn Summer School in Fine Structural Set Theory. Jul. 03
- American Mathematical Society. Invited Speaker in Special Session on “*Beyond classical boundaries of computability*” San Francisco. May. 03
- “*Foundational Theories in Mathematics*” Trento Series of 6 lectures at a Centro Internazionale per la Ricerca Matematica-Trento Workshop. Sep. 01
- Italian Association of Logic and Applications (AILA), Siena, Oct. 01

- Annual Meeting of the Association for Symbolic Logic, Philadelphia Mar. 01
Plenary session speaker. Special Section Co-Organiser.
- The European Meeting of the Association for Symbolic Logic, Praha. Aug. 98
Plenary session speaker.
- The European Meeting of the Association for Symbolic Logic, Leeds. Jul. 97
Special Session on set theory speaker.
- Meeting of the Japan Mathematical Society Apr. 92 & Apr. 97
Section Speaker, Tokyo, Nagano.
- American Math. Society Western Section Spring Meeting, Apr. 99
Special Session speaker.
- New York City Logic Conference. Nov.99
Plenary Session speaker.
- First Annual Conference of the British Logic Colloquium, Oxford Jul. 96
Opening speaker.
- University of Nevada at Las Vegas. Jul. - Aug. 95
An invitation to give a series of research seminars on recent results in [12] below.
- Oberwolfach Meeting on Set Theory Jan. 96

Other principal invitations in the past include

- European Meeting of the Association for Symbolic Logic at Hull. June 86
Plenary Session Speaker.
- Polish Academy of Sciences Warsaw Mar. 88
The latter was an invitation for a week to give a series of lectures to Polish logicians on my and current work in the West on set theory.
- Mathematical Sciences Research Institute, Berkeley Calif. Apr.-May 90
The latter invitation was to give a 14 seminar course on Fine Structural Set Theory.

A list of some previous invited conference lectures *etc.*:

Conference in Honour of Robin Gandy, at the University of Wales (Sept.86); Research Seminar series, Oxford (Autumn 87); Oberwolfach Meeting on Determinacy (Nov. 87); Conference on Set Theory, Paris VII (Apr. 88); German Logic Union, Berlin (Sep. 88); Oberwolfach Meeting on Set Theory (Jan. 89, Jan. 96); Centre International des Rencontres Mathématiques, Marseille (Sep. 90, Sep. 96); Meetings of the British Logic Colloquium, at Leeds (Apr. 91); at Manchester (Sep.01); at Birmingham (Sep.10); Université du Caen (May 91 This invitation was for a week of research lectures and seminars at the Mathematics Department.) Japan Logic Society Meeting, Kyoto (Jul. 92) University of Kōbe (Oct. 92 This invitation was to give a five week lecture course on Inner Models of Set Theory.) University of Nagoya (Nov. - Dec. 92 This visit was to give a lecture course on Fine-Structural Inner Models) Meeting of the Japanese Logic Society, Ehime (Dec. 92); Topology Conference, Matsuyama (Dec. 92); Conference on Set Theory, University of Kōbe (Jan. 96). Workshop on Singular Cardinal Combinatorics, BIRS, Banff, Canada (May. 04); Workshop on Foundations of Mathematics, Barcelona (Jun.04); Research Visit (3 Weeks) Academy of Sciences, Beijing (Mar. 05); Conference on the Effective Mathematics of the Uncountable, CUNY (Aug. 08, 09 & Feb.12); Princeton (Apr. 11); Traunkirchen (Templeton Meeting Jul. 12); Infinity Meeting Barcelona (Jul . 12); Budapest, I. Nemeti 70'th Birthday Conference (Sep. 12); Freiburg Meeting on Set Theory (Jun. 14); Chiemsee Workshop on Theories of Truth (Jul. 14); Neuchâtel Workshop on Theories of Truth (Sep.14); Munich Workshop on Modalities in Theories of Truth (Sep. 14); Workshop on Language and Logic, Helsinki Inst. for Advanced Study (May 15); M. Magidor 70'th Birthday Meeting, Hebrew University, Jerusalem (Feb. 16); Meeting in Honour of J. Kennedy Helsinki (Jun. 16); FOMUS Conf. on Foundations of Maths, Bielefeld (Jul. 16); Young Researchers in Maths, St. Andrews (Aug.16); Meeting in Memoriam Y. Kakuda, Kobe (Sep. 16); Comp. Theory Conf., Tokyo (Sep.16); UC Irvine (Mar. 18)

(ii) Invitations for single lectures at universities outside the UK include the following universities: Bonn; Heidelberg; UCLA; Caltech; Matsuyama; Ōsaka; Tsukuba; Waseda; University of Nevada; Torin University; Humboldt University, Berlin; UC Berkeley, UC Irvine; Bonn (Dept. of Philosophy); Konstanz; Brussels; Kiel; Göttingen; Amsterdam (ILLC, Dept. of Logic); Amsterdam-Utrecht (Joint Logic Colloquium); Paris; Cheng-Du; Leuven; Vienna; Münster; München (Dept. of Philosophy); Helsinki; Harvard (Dept. of Philosophy); Gothenburg; Malta; Paris VI; Bern; UC Irvine (Dept. of Logic & Phil. of Science).

(iii) Some contributed talks at international meetings:

- European Meeting of the Association for Symbolic Logic at Aachen July 83
- European Meeting of the Association for Symbolic Logic at Manchester July 84
- US Annual Spring Logic Meeting, at MIT Apr. 85
- International Congress of Mathematicians, Kyoto 90, Berlin 98, Beijing 03
- Fourth Asian Logic Conference, Tokyo Sep. 90
- CIRM Marseilles, Sep. 98
- Deutsche Logik Verein, Berlin Aug. 98
- Computability in Europe, CiE 2005, Amsterdam, on New Computational Paradigms. Jun. 05
- Joint AMS-Deutsche Mathematische Verein, Bonn Sep. 06

8(ii) Administrative Leadership in Bristol:

- (i) Senior Tutor (Aug.13 - Jul.14)
- (ii) Pure Group Postgraduate Admissions officer (Feb.03).
- (iii) Programme Director for Philosophy & Mathematics, instrumental in setting up new 4 year M.Sci Joint degree program (Aug.03).
- (iv) Staff Reviewer, Oct. 04 onwards.
- (v) Director of Graduate Studies. (Mathematics Dept.) (Oct.04- Oct.05).
- (vi) Chair of Departmental Teaching Committee (Mathematics Dept.) (Oct.05 -Sep.06).
- (vii) Member of Departmental Management Committee (Oct. 04 - 05.)

(8iii) External professional activities

- (i) EPSRC Peer Review College Member (2010 -).
- (ii) University of Bonn Diplomprüfungsausschuß. (Apr.02-Feb.03).
- (iv) Elected President of the British Logic Colloquium 2017,
(Comm. member since Dec. 89; re-elected Feb.93; Vice-President Jan.14, President Jan.17).
- (v) Elected Vice-President of the European Set Theory Society (Jan.18).
Elected member of the Board of Trustees (Jan 15-18).
- (vi) Conference organisation:
 - Co-organiser: of a small set theory conference in Oxford Aug. 79
 - Organiser: Conference in Honor of John Shepherdson, Bristol Apr. 92
 - Japan Set Theory Meeting Apr. 98, Sep. 98, Apr. 00
 - Association for Symbolic Logic Meeting 2001, Philadelphia, USA.
Section in Set Theory Co-organiser. Mar. 01
 - Programme Committee Chair: Workshop on *Logical Methods in Epistemology, Semantics, and Theories of Truth.* (Supported by the British Academy) Bristol. Jan. 05
 - Chair of Program Committee: British Logic Colloquium Annual Meeting. Bristol, Sep. 05
 - Organiser *B.I.G. Bristol Set Theory Workshop* Sep. 05
 - Programme Committee member: Workshop on *Logical Methods in Epistemology, Semantics, and Theories of Truth.* (Supported by the British Academy) Oxford Sep. 06
 - Programme Committee Member: *ILC2007: Infinity in Logic & Computation* Cape Town Conference, Nov. 07

- Programme Committee Chair: Conference on *Mathematical Philosophy*
(Supported by the British Academy, London Mathematical Society, and UoB) Bristol. Sep. 08
 - Programme Committee member and Special Session Organiser
Computation in Europe 2009 (CiE2009), Heidelberg. Jul. 09
 - Conference Chair: *Third European Conference in Set Theory*, ERS-ERCOM/ICMS Funded
at the International Centre for Mathematical Research, Edinburgh. Jul. 11.
 - Workshop Chair: *The Limits and Scope of Mathematical Knowledge*, Templeton
funded Research Workshop Bristol, Mar.12, 13.
 - Programme Committee member: *Fifth European Conference in Set Theory*,
at the Isaac Newton Institute, Cambridge. Aug. 15.
 - Programme Committee: *Symposium on Set-Theoretic Pluralism*,
at University of Bristol. Jun. 17.
 - Conference Chair: *New Directions in the Higher Infinite*, ICMS funded
at the International Centre for Mathematical Research, Edinburgh. Jul. 17.
- (vii) Editorial Board Membership
- *Scientiae Mathematicae* (May 98)
 - *Mathematica Japonica* (Jan. 99)
 - A Subject Editor (Philosophy of Mathematics) for the
Stanford Encyclopaedia of Philosophy (Sep. 05)
 - *Journal for Symbolic Logic* Editor for Set Theory (Jan. 14)
 - *Journal for Symbolic Logic* Managing Editor (Jan. 16)
- (viii) Advisory Editor Springer Book Series in '*Theory and Applications of Computability*' (Jul.09).
- (ix) External Examiner
- For Manchester University M.Sc. in Mathematics and Computer Science. (Sep.05-07)
- (x) External Advisor
- NYU Special University Professorship Appointment Committee (Philosophy Dept.; Jan 06.)
- (xi) For the Association of Symbolic Logic:
- Member of Nominating Committee for: Presidency and Vice-Presidency (Aug.12);
 - for: Secretary, Exec. Comm and Council Elections (Aug.13);
 - Member of the Council (Jan. 16).