

Curriculum Vitae

Katherine Brading

William J. and Dorothy K. O'Neill *Director, History and Philosophy*
Collegiate Professor of Philosophy *of Science Graduate Program*
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EMPLOYMENT HISTORY

July 2011 – present, Director, History and Philosophy of Science Graduate Program, John. J. Reilly Center for Science, Technology and Values, University of Notre Dame.

July 2010 – present, William J. and Dorothy K. O'Neill Collegiate Professor of Philosophy, Department of Philosophy, University of Notre Dame.

May 2010 – present, Associate Professor of Philosophy with tenure, University of Notre Dame.

July 2004 – May 2010, Assistant Professor of Philosophy, University of Notre Dame.

October 2000 – April 2004, Junior Research Fellow in Philosophy of Science, Wolfson College, Oxford.

1997 – 2002, tutoring and lecturing in philosophy for five Oxford Colleges, the Oxford University Department of Continuing Education, and the Stanford Program in Oxford.

October 1992 – September 1994, Nuclear Safety Engineer, Nuclear Electric plc, Gloucester, England.

HIGHER EDUCATION

D.Phil., Philosophy, University of Oxford (2003)

Thesis: 'Symmetries, Conservation Laws, and Noether's Variational Problem'

Supervisor: Dr. H. R. Brown (Reader in Philosophy of Physics, University of Oxford)

Examiners: Professor M. Redhead (London School of Economics)

Dr. S. Saunders (Lecturer in Philosophy of Science, University of Oxford)

B.Phil., Philosophy, University of Oxford (1996)

Thesis: 'The Metaphysics of Causation'

B.Sc., Physics and Philosophy, First Class Honours, King's College, University of London (1992)

Awards

Eunice Dutoil Turner Scholar in Philosophy, St Hugh's College, Oxford (October 1999 - October 2000).

British Academy Studentships (October 1994 - June 1996; October 1999 - December 2000).

EXTERNAL GRANTS

National Science Foundation grant (NSF SES-0724383 Brading 201201), project entitled 'Structuralist Approaches to Physics' (2007-2008).

PROFESSIONAL MEMBERSHIPS

British Society for the Philosophy of Science
Philosophy of Science Association
Aristotelian Society

BOOKS AND MONOGRAPHS

1. Co-editor: *Symmetries in Physics: Philosophical Reflections*, K. A. Brading and E. Castellani (eds.), Cambridge University Press, 2003.
Paperback: 2009.

REFEREED PUBLICATIONS

2. 'The development of the concept of hypothesis from Copernicus to Boyle and Newton', *Krisis* 8, 2000, pp. 5-16.
3. 'Which Symmetry? Noether, Weyl and Conservation of Electric Charge', *Studies in the History and Philosophy of Modern Physics* 33, 2002, pp. 3-22.
4. 'General Covariance from the Perspective of Noether's Theorems', with H. R. Brown, *Diálogos* 79, 2002, pp. 59-86.
5. 'Symmetry and Symmetry-Breaking', *The Oxford Companion to the History of Modern Science*, OUP, 2003, pp. 784-786.
6. 'Symmetry and Symmetry-Breaking', *Stanford Encyclopedia of Philosophy*, with E. Castellani, 2003 (11,000 words, approximately). See <http://plato.stanford.edu/entries/symmetry-breaking/>.
7. 'Symmetries and Noether's Theorems', with H. R. Brown, in (1) above, pp. 89-109.
8. 'Introduction', with E. Castellani, in (1) above, pp. 1-18.
9. 'Are gauge symmetry transformations observable?', with H. R. Brown, *The British Journal for the Philosophy of Science* 55, 2004, pp. 645-665.
10. 'Where lies the empirical significance of symmetry in physics?', *Symétries, Contributions au séminaire de Hans-Sur-Lesse*, P. Radelet (ed.), Brepols Publishers n. v., Turnhout, Belgium, 2005. pp. 63-71.
11. 'A Note on General Relativity, Energy Conservation, and Noether's Theorems', *The Universe of General Relativity, Einstein Studies Vol 11*, A. J. Kox and J. Eisenstaedt (eds.), 2005, pp. 125-135.
12. 'Scientific Structuralism: Presentation and Representation', with E. Landry, *Philosophy of Science* 73, 2006, pp. 571-81.
This paper fits a 5000 word limit. A longer version (7800 words approx.) is available at <http://philsci-archive.pitt.edu/archive/00002181/>.
- 12a. 'A minimal construal of scientific structuralism', with E. Landry, 2005.

13. 'Symmetry in classical physics', with E. Castellani, in J. Butterfield and J. Earman (eds.), *Handbook of the Philosophy of Physics*, North-Holland, 2007, pp. 1331-1367.
14. Review article: L. Corry, *David Hilbert and the Axiomatization of Physics (1898-1918)*, in *Philosophia Mathematica* (III) 15, 2007, 1-16.
15. 'Hilbert's "Foundations of Physics": Gravitation and electromagnetism within the axiomatic method', with T. A. Ryckman, *Studies in the History and Philosophy of Modern Physics* 39, 2008, pp. 102-153.
16. Book review: 'Mathematical and aesthetic aspects of symmetry', G. Hon and B. R. Goldstein, *From symmetria to symmetry: the making of a revolutionary scientific concept*, in *Metascience* 19, 2010, pp. 277-280.
17. Book review: N. Huggett, *Everywhere and everywhen: adventures in physics and philosophy*, in the *American Journal of Physics* 78, 2010, pp.1071-1072.
18. 'Autonomous patterns and scientific realism', *Philosophy of Science* 77, 2010, pp. 827-839.
19. 'On composite systems: Descartes, Newton, and the law-constitutive approach', in *Vanishing Matter and the Laws of Nature: Descartes and Beyond*, ed. Dana Jalobeanu and Peter Anstey, *Studies in Seventeenth-Century Philosophy*, Routledge, 2011, pp. 130-152.
20. 'Structuralist approaches to physics: objects, models and modality', *Boston Studies in Philosophy of Science*, ed. Alisa and Peter Bokulich, 2011, pp.43-65.

FORTHCOMING

21. 'Newton's law-constitutive approach to bodies: a response to Descartes', in *Interpreting Newton: critical essays*, ed. A. Janiak & E. Schliesser, Cambridge University Press.
22. 'Hilbert's Axiomatic Method and his "Foundations of Physics": Reconciling Causality with the Axiom of General Invariance', with T. A. Ryckman, in *Einstein and the Changing Worldviews of Physics*, *Einstein Studies* Vol 12, ch. 8, pp. 175-199. (In proof)
23. 'Hilbert on general covariance and causality', with T. A. Ryckman, in *Beyond Einstein: Essays on Geometry, Gravitation, and Cosmology*, *Einstein Studies* Vol. 13, Birkhäuser (Boston), ch. 1. (In proof)
24. 'Underdetermination as a path to ontic structural realism', with Alex Skiles, forthcoming in E. Landry and D. Rickles (ed.), *Structure, Object, and Causality: Proceedings of the Banff Workshop on Structural Realism*. University of Western Ontario Series in Philosophy of Science, Springer. (In proof.)

CURRENT PROFESSIONAL ACTIVITIES

Section editor, Philosophy of science, for *Philosophy Compass* (since 2011).

Editorial Board, *European Journal for Philosophy of Science* (since 2009).

Advisory Committee, Cushing Memorial Prize (since 2008).

Editorial Advisory Board, *Studies in History and Philosophy of Modern Physics* (since 2007).

Reilly Fellow, John J. Reilly Center for Science, Technology and Values, University of Notre Dame (since 2005).

Associate Member, Research Centre for the Foundations of European Modernity, University of Bucharest (since 2000).

GRADUATE STUDENT SUPERVISION

Dissertation director: Pablo Ruiz de Olano (in progress).

Dissertation committees: Brandon Fogel (2008); Brian Pitts (2008), Elise Crull (2011), Iulian Toader (2011), Robby Gustin (in progress).

Dissertation proposal committees: Brian Pitts; Iulian Toader, Elise Crull, Robby Gustin.

Orals director: Robby Gustin.

Orals committees: Iulian Toader; Elise Crull (2009); Charles Pence (2010).

Directed readings: Elise Crull (Fall 2007); Robby Gustin (Spring 2009); Pablo Ruiz de Olano (Fall 2010).

UNDERGRADUATE STUDENT SUPERVISION

Senior thesis supervision: Beata Aldridge (2008/09); Kristina Sault (2009/10).

Directed readings: Katie Finley (Fall 2011); Shannon Hughes (Fall 2011).

CONFERENCE PAPERS: SUBMITTED

July 2011, "Space, time and unity", *British Society for the Philosophy of Science* annual conference.

May 2011, *Metaphysics and the Philosophy of Science*, Toronto, "Unity and change in Newton's physics", see <http://philsci-archive.pitt.edu/8607/>.

March 2009, *Integrated History and Philosophy of Science 2*, Notre Dame: 'Hilbert and Einstein's General Theory of Relativity: Two Communications on the Foundations of Physics'.

November 2008, *Philosophy of Science Association* biennial meeting, Pittsburgh: ‘Autonomous Patterns and the Objects of Physics’, as part of a symposium *Phenomena, Data, and Patterns*, jointly organized with James McAllister (Leiden).

March 2008, 11th Inland Northwest Philosophy Conference, *Carving Nature at its Joints*: ‘Objects of Physics’.

June 2007, *Newton and/as Philosophy*, Leiden: ‘Newton on bodies: a response to Descartes’.

November 2004, *Philosophy of Science Association* biennial meeting, Austin: ‘A Minimal Construal of Scientific Structuralism. With E. Landry.

June 2004, *HOPOS*, San Francisco: ‘Hilbert’s second communication on The Foundations of Physics’. With T. A. Ryckman.

January 2003, *Symmetries and Structures in Physics*, Oxford: ‘Some variations on a Noether theme’.

June 2002, *Sixth International Conference on the History of General Relativity*, Amsterdam: ‘General Relativity and Noether’s Variational Problem’.

May 2002, *Understanding Symmetry in Physics*, Joint Princeton-Oxford meeting, Princeton: ‘Some variations on a Noether theme’.

January 2001, *Oxford Workshop on Symmetries in Physics*: ‘Noether’s Theorems and Gauge Symmetries’. Joint presentation with H. R. Brown.

August 1999, 11th *International Congress on Logic, Methodology and History of Science*, Cracow, Poland: ‘All Alone in the Universe: Descartes, Newton, and the Introduction of Isolated Systems into Natural Philosophy’. Joint presentation with Dana Jalobeanu.

July 1999, 18th *Workshop on Geometrical Methods in Physics*, Bialowieza, Poland: ‘Philosophy of Physics: the early days of gauge theories’.

March 1999, *Representations: Philosophy, Art and Science*, Centre for History and Philosophy of Science, Stanford University in Florence: ‘Noether’s theorem’.

INVITED TALKS

October 2011, *Structuralism in Philosophy of Physics: Alternatives to Realism*, Workshop, Program in History and Philosophy of Science and Technology, Stanford University.
“Theory structuralism”

2011, University of Northern Illinois, Philosophy department colloquium.
“Oh dear, what can the matter be?”

2010, Program in History and Philosophy of Science and Technology, Stanford University. Colloquium.
“Oh dear, what can the matter be? Objects, individuals, and structures”

November 2009,
Department of Philosophy, Western Michigan University. Colloquium paper.

October 2009, Department of Philosophy, Macalester College.
'Epistemic structural realism and Poincare's philosophy of science'.

October 2009, Minnesota Center for Philosophy of Science, University of Minnesota
'In search of fundamental ontology: objects, individuals and structures', Center Colloquium.

March 2009, Department of Philosophy, University of Bristol
'The "Newman problem" in the context of structural realism'. Philosophy and History of Science Seminar.
'Objects, individuals and structures: in search of fundamental ontology'. Departmental Research Seminar.

February 2009, University of Oxford.
'Structural realism and the objects of physics'. Philosophy of Physics Seminar.

February 2009, University of Chicago.
'The "Newman problem" in the context of structural realism'. Workshop in Formal Philosophy.

September 2008, *Beyond Einstein: Historical Perspectives on Geometry, Gravitation, and Cosmology in the Twentieth Century*, Mainz, Germany.
'Hilbert and Einstein's General Theory of Relativity: Two Communications on the Foundations of Physics'. Plenary lecture.

June 2008, *Bucharest colloquium in Early Modern Philosophy*, Bucharest, Romania.
'On composite systems: Descartes, Newton, and the law-constitutive approach'.

June 2008, *Perspective in Physics and Philosophy*, Ecole Polytechnique, Paris, France.
'On epistemic structuralism: objectivity, conventionalism, and idealism in Poincare's philosophy of science'.

March 2008, Department of Philosophy, Duke University.
'Objects, individuals, and structures: in search of fundamental ontology'. Departmental colloquium.

October 2007, *Symposium on Time and Relativity*, Institute for Advanced Studies, University of Minnesota.
'What's in a theory? Hilbert and the "Harvey Brown pedagogy"'.
'Structuralist approaches to physics: objects, models and modality'.

April 2007, *Philosophical and formal foundations of modern physics*, conference organized by the Centre de Recherche en Epistemologie Appliquée.
'Hilbert, the Foundations of Physics, and Einstein's General Theory of Relativity'.

December 2006, Department of History and Philosophy of Science, Indiana University at Bloomington.

‘Hilbert, Causality, and the Foundations of Physics’.

May 2006, *The metaphysics of physics: philosophical implications of contemporary physical theories*,
28th Annual Philosophy Conference, Santa Clara University.
‘Objects of Physics’.

February 2005, *Boston Colloquium for Philosophy of Science*.
‘Structuralism and the Objects of Physics’.

December 2003, *British Society for the Philosophy of Science*, London.
‘Powerful Structures’.

February 2003, University of Minnesota, Minneapolis.
‘Powerful Structures’. Philosophy seminar.

February 2003, University of Chicago, Illinois.
‘Powerful Structures’. Philosophy seminar.

February 2003, University of Notre Dame, Indiana.
‘Powerful Structures’. Philosophy seminar.

May 2002, University of Notre Dame, Indiana.
‘Some Philosophical Reflections on Symmetries in Physics’, Philosophy Seminar.
‘Noether’s Theorems: Origins and Unfamiliar Consequences’, Physics Seminar.

May 2002, *Seven Pines Symposium VI*, Minneapolis: Symmetry and Symmetry Breaking in Physics.
‘Some Philosophical Reflections on Symmetries in Physics’.

February 2002, University of Calgary, Canada.
‘How to see that *The Universe Doesn’t Care*’, Philosophy Seminar.
‘Noether’s Theorems: Origins and Unfamiliar Consequences’, Physics Seminar.
‘All Alone in the Universe: Individuals in Descartes and Newton’, History and Philosophy of
Science Research Group.

November 2001, Catholic University of Louvain, Belgium.
‘The history of the gauge concept from Weyl to Yang-Mills’, as part of a seminar series in history of
physics, ‘Fondements et notions fondamentales’.

April 2001, Centre for Research in Applied Epistemology (CREA), Paris.
‘A Theme from Weyl’s ‘Grand Symphony’ and some Noether Variations’, as part of the series
‘Transcendental Arguments in Physics’.

December 2000, University of Leeds.
‘Galileo’s Ship and Descartes’ Stone: Symmetries and Conservation Laws in Physics’, Philosophy
Seminar.

October 2000, University of Berkeley, California.
‘A Theme from Weyl’s ‘Grand Symphony’ and some Noether Variations’, History and Philosophy of
Logic, Mathematics and Science Seminar.

'Noether's Theorems: Origins and Unfamiliar Consequences', Lawrence Berkeley National Laboratory, Centre for Beam Physics Seminar.

June 2000, University of Bristol.

'Which Symmetry? Noether, Weyl, and conservation of electric charge', Philosophy of Physics Seminar.

February 2000, Catholic University of Louvain, Belgium.

'Which Symmetry? Noether, Weyl, and conservation of electric charge', Physics Seminar.

'All Alone in the Universe: The concept of an isolated system in Descartes and Newton', as part of the Inter-disciplinary Seminar Series "*Les mots pour le dire - La terminologie scientifique*."

January 2000, University of Concordia, Montreal, Canada.

'Galileo's Ship and Descartes' Stone: Symmetries and Conservation Laws in Physics', *Annual Joint Symposium of the Mathematics and Philosophy Departments*.

January 2000, University of Western Ontario, Canada.

'Which Symmetry? Noether, Weyl, and conservation of electric charge', Philosophy Seminar.

November 1999, University of Oxford.

'Which Symmetry? Noether, Weyl, and conservation of electric charge', Philosophy of Physics Seminar.

April 1999, New Europe College, Bucharest, Romania.

'All Alone in the Universe: Descartes, Newton, and the Introduction of Isolated Systems into Natural Philosophy'. Joint presentation with Dana Jalobeanu.

February 1999, University of Cambridge.

'All Alone in the Universe: Descartes, Newton, and the Introduction of Isolated Systems into Natural Philosophy', History and Philosophy of Science Department. Joint presentation with Dana Jalobeanu.