

Philosophy of Physics Reading List October 2020

J. Butterfield: adapted from sections of the reading list on Philosophy of Science for the Philosophy Tripos Third-year (Part II) Paper 6.

Journals specifically devoted to foundations/philosophy of physics include:
Studies in History and Philosophy of Modern Physics,
Foundations of Physics.

Internet resources

1: Electronic archives:

Much of philosophical and foundational interest appears in the gr-qc, hep-th, and quant-ph parts of the arxiv;
and in the physics part, under history and philosophy of physics. Go to: <https://arxiv.org>

The main electronic archive for philosophy of physics is the Pittsburgh e-arXive. Go to:
<http://philsci-archive.pitt.edu>

The following also have strong listings in the philosophy of physics:

The Stanford Encyclopedia of Philosophy: <http://www.seop.leeds.ac.uk>

and (less specialist):

Routledge Encyclopedia of Philosophy Online: <http://www.rep.routledge.com>

2. John Earman is the world's leading philosopher of physics. Most of his papers can be downloaded from:

<http://pitt.edu/~jearman/>

Here you can also download the entirety of the collection: Butterfield, J and Earman, J. (eds) [2006], *Philosophy of Physics*; almost all the Chapters are individually downloadable from the Pittsburgh or Physics e-arXives.

3. Landsman's *Foundations of Quantum Theory* (Springer, 2017) is a masterly work: and freely downloadable anywhere, as a whole, or Chapter by Chapter: go to:

<https://link.springer.com/book/10.1007/978-3-319-51777-3>

INTRODUCTION TO THIS READING LIST

This syllabus considers space and time, and quantum theory; but ignores thermal physics.

It is an uplifting experience, for both the spacetime and the quantum parts of the course, to read some philosophical writings by the giants of twentieth-century physics. For example:

WEYL, Hermann, *Philosophy of Mathematics and Natural Science* (Princeton, NJ): Princeton University Press, 1949; new ed. 2009), ch. II.1 on space and time.

EINSTEIN, Albert, 'Autobiographical Notes', in P.A. Schilpp, ed., *Albert-Einstein: Philosopher-Scientist*. 3rd ed. (La Salle, IL.: Open Court, 1970). [this and other essays therein, written in Einstein's honour, e.g. by N. Bohr]

A historically oriented survey of the philosophy of physics, which is especially strong on the space

and time part of the syllabus is:

TORRETTI, Roberto, *The Philosophy of Physics* (Cambridge: Cambridge University Press, 1999). Also available online at: <https://doi.org/10.1017/CB09781139172981>.

Space-time and quantum mechanics are both addressed by particle physicists. Their work on gravity embodies conventional wisdom among many physicists, but is insufficiently considered in philosophy. Particle physics provides perspective on substantivalism vs. relationalism and on conventionality and gives a distinctive justification for Einstein's field equations akin to eliminative induction. The following selections are all short.

GUPTA, Suraj N., 'Einstein's and Other Theories of Gravitation', *Reviews of Modern Physics*, 29 (1957): 334-36. <https://journals.aps.org/rmp/pdf/10.1103/RevModPhys.29.334>

FEYNMAN, Richard P., Fernando B. MORINIGO, and William G. WAGNER, *Feynman Lectures on Gravitation* (Boulder, CO: Westview Press, 2002), pp. vii-xv, xxv-xxviii, 112-3, 166-7, 219-20.

SCHUCKING, Engelbert L., 'The Introduction of the Cosmological Constant', in A. Zichichi, V. de Sabbata and N. Sánchez, eds., *Gravitation and Modern Cosmology: The Cosmological Constant Problem* (New York, NY: Plenum, 1991), pp. 185-87.

BOULWARE, David G., and Stanley DESER, 'Inconsistency of Finite Range Gravitation', *Physics Letters B*, 40 (1972): 227-29. [https://doi.org/10.1016/0370-2693\(72\)90418-2](https://doi.org/10.1016/0370-2693(72)90418-2)

Readings are divided into (A) and (B) lists below. Some attempt is made to put material in the basic (A)-lists in a sensible *reading* order. (B)-lists are in *alphabetical* order, and for dipping into (no-one expects you to read everything).

I: SPACE AND TIME

It is well worth reading some accessible introductions to relativity. Note that you do not need a very deep mathematical understanding of the theories in order to engage with the chosen philosophical issues at a Part II level. But on the other hand, you do need some grasp of what is going on in the physics! For helpful introductions to relativity with low mathematical content, see:

GEROCH, Robert, *General Relativity from a to B* (Chicago, IL: University of Chicago Press, 1978).

SARTORI, Leo, *Understanding Relativity* (Berkeley: University of California Press, 1996).

Geroch explains the idea of 'space-time' very well, Sartori will tell you a little more about the physics. Those with a mathematical background will find the classic:

RINDLER, Wolfgang, *Essential Relativity*. 2nd ed. (New York: Springer, 1977).

relatively approachable, and Rindler also pays more attention at the outset to the conceptual background than most textbooks. You'll find yards more of books on relativity on library shelves: browse till you find something that suits. A classic on the foundations and history of relativity theory is:

TORRETTI, Roberto, *Relativity and Geometry* (Oxford: Pergamon, 1983; New York, NY: Dover, 1996).

A good introduction to General Relativity that is also aware of the particle physics tradition is:

OHANIAN, Hans, and Remo RUFFINI, *Gravitation and Spacetime*. 3rd ed. (Cambridge: Cambridge University Press, 2013). Also available online at:

<https://doi.org/10.1017/CBO9781139003391>.

Three fairly recent books on cosmology that are worth mentioning are:

EARMAN, John, *Bangs, Crunches Whimpers and Shrieks* (Oxford: Oxford University Press, 1995).

HAKIM, Rémi, *An Introduction to Relativistic Gravitation* (Cambridge: Cambridge University Press, 1999). Also available online at: <https://doi.org/10.1017/CBO9781139174213>.

LIDDLE, Andrew R., *An Introduction to Modern Cosmology* (Chichester: John Wiley, 1999).

Even a quick browse that ignores the mathematical detail will be quite instructive.

I.A: The Metaphysics of Space and Spacetime

Two focal points of debate concern substantivalism and relationism (are all facts about space fixed by the facts about the spatial relations between actual—or actual-and-possible objects?), and conventionalism about geometry and topology (is the choice of a geometrical framework within which to do physics ultimately a matter of convention?). For either topic you will find the following useful introductory reading:

SKLAR, Lawrence, *The Philosophy of Physics* (Oxford: Oxford University Press, 1992), ch. 2 'Space, time, and motion'.

NORTON, John, 'The Philosophy of Space and Time', in M. Salmon, ed., *Introduction to the Philosophy of Science* (Englewood Cliffs, NJ: Prentice Hall, 1992; Indianapolis, IN: Hackett, 1999), pp. 179-213. Reprinted in J. Butterfield, M. Hogarth and G. Belot, eds., *Spacetime* (Aldershot: Dartmouth, 1996), pp. 3-56.

A slower, fuller treatment of the issues is to be found in:

DAINTON, Barry, *Time and Space*. 2nd ed. (Montreal, QC: McGill-Queen's University Press, 2010), chs. 9-21. Also available online at: <https://doi.org/10.1017/UPO9781844654437>.

The basic 'old' debate between Newton and Leibniz on absolute and relational theories is the topic in particular of Dainton's chs. 9–11. Historical material about this debate, indeed about the 'history of space' over two millennia, can be found in:

HUGGETT, Nick, ed., *Space: From Zeno to Einstein* (Cambridge, MA: MIT Press, 1999).

JAMMER, Max *Concepts of Space* (Cambridge, MA: Harvard University Press, 1954; 1969, New York, NY: Dover, 1993).

But in this paper, we look at the 'new' debate, as it arises in the context of modern spacetime theories. This debate is also enriched by considering literature from particle physicists, pondering the century-long controversy about gravitational energy and conservation laws in General Relativity, and exploring the claimed absence of change in a formulation of General Relativity perhaps best suited for a merger with quantum mechanics.

I.B: Absolute and Relational Theories of Space and Spacetime

For further reading, beyond Dainton, see:

A

SKLAR, Lawrence, *Space, Time and Spacetime* (Berkeley, CA: University of California Press, 1974), ch.

3 'Absolute motion and substantival spacetime', especially sects. D-F.

- EARMAN, John, 'Who's Afraid of Absolute Space?' *Australasian Journal of Philosophy*, 48 (1970): 287-319. <https://doi.org/10.1080/00048407012341291>. Reprinted in J. Butterfield, M. Hogarth and G. Belot, eds., *Spacetime* (Aldershot: Dartmouth, 1996).
- TELLER, Paul, 'Substance, Relations and Arguments About the Nature of Space-Time', *Philosophical Review*, 100 (1991): 363-97. <http://www.jstor.org/stable/2185065>. Reprinted in J. Worrall, ed., *The Ontology of Science* (Aldershot: Dartmouth, 1996).
- EARMAN, John, and John NORTON, 'What Price Space-Time Substantivalism? The Hole Story', *British Journal for the Philosophy of Science*, 38 (1987): 515-25. <http://www.jstor.org/stable/687356>. Reprinted in J. Worrall, ed., *The Ontology of Science* (Aldershot: Dartmouth, 1996).
- BUTTERFIELD, Jeremy, 'The Hole Truth', *British Journal for the Philosophy of Science*, 40 (1989): 1-28. <http://www.jstor.org/stable/687461>. Reprinted in J. Worrall, ed., *The Ontology of Science* (Aldershot: Dartmouth, 1996).

B

- BELOT, Gordon, *Geometric Possibility* (Oxford: Oxford University Press, 2011), esp. chs. 1 & 2. Also available online at: <https://doi.org/10.1093/acprof:oso/9780199595327.001.0001>.
- BRADING, Katherine, and Elena CASTELLANI, 'Symmetries and Invariances in Classical Physics', in J. Butterfield and J. Earman, eds., *Handbook of the Philosophy of Science: Philosophy of Physics* (Amsterdam: Elsevier, 2007), pp. 1331-67.
- CATTANI, Carlo, and Michelangelo DE MARIA, 'Conservation Laws and Gravitational Waves in General Relativity (1915-1918)', in J. Earman, M. Janssen and J.D. Norton, eds., *The Attraction of Gravitation: New Studies in the History of General Relativity, Einstein Studies*. Vol. 5 (Boston, NJ: Birkhäuser, 1993), pp. 63-87.
- EARMAN, John, 'Thoroughly Modern McTaggart: Or, What McTaggart Would Have Said If He Had Read the General Theory of Relativity', *Philosophers' Imprint*, 2, no. 3 (2002). <http://hdl.handle.net/2027/spo.3521354.0002.003> and see Maudlin below.
- EARMAN, John, *World Enough and Spacetime* (Cambridge, MA: MIT Press, 1989). [Especially chs. 1-3, 5, 6, 8 & 9]
- FRIEDMAN, Michael, *Foundations of Space-Time Theories* (Princeton, NJ: Princeton University Press, 1983), ch. 6 'Relationalism'.
- HOEFER, Carl, 'Energy Conservation in GTR', *Studies in History and Philosophy of Modern Physics*, 31, no. 2 (2000): 187-99. [https://doi.org/10.1016/S1355-2198\(00\)00004-6](https://doi.org/10.1016/S1355-2198(00)00004-6)
- KASTRUP, Hans A., 'The Contribution of Emmy Noether, Felix Klein and Sophus Lie to the Modern Concept of Symmetries in Physical Systems', in M.G. Doncel, ed., *Symmetries in Physics (1600-1980)* (Barcelona: Universitat Autònoma de Barcelona, 1987), pp. 113-41.
- MAUDLIN, Tim, 'Thoroughly Muddled McTaggart: Or, How to Abuse Gauge Freedom to Generate Metaphysical Monstrosities, with a Reply by John Earman', *Philosophers' Imprint*, 2, no. 4 (2002): 1-23. <http://hdl.handle.net/2027/spo.3521354.0002.004>
- MAUDLIN, Tim, 'Buckets of Water and Waves of Space', *Philosophy of Science*, 60 (1993): 183-203. <http://www.jstor.org/stable/188350>. Reprinted in J. Butterfield, M. Hogarth and G. Belot, eds., *Spacetime* (Aldershot: Dartmouth, 1996).
- NORTON, John D., 'Did Einstein Stumble? The Debate over General Covariance', *Erkenntnis*, 42 (1995): 223-45. <https://doi.org/10.1007/BF01128809>
- WILSON, Mark, 'There's a Hole and a Bucket, Dear Leibniz', *Midwest Studies in Philosophy*, 18 (1993): 202-41. <https://doi.org/10.1111/j.1475-4975.1993.tb00265.x>. Reprinted in J. Butterfield, M. Hogarth and G. Belot, eds., *Spacetime* (Aldershot: Dartmouth, 1996).

I.C: Geometry and Conventionalism

A

- CARNAP, Rudolf, *An Introduction to the Philosophy of Science* (New York, NY: Dover, 1995), chs. 13-18.
- NAGEL, Ernest, *Structure of Science: Problems in the Logic of Scientific Explanation* (London: Routledge & Kegan Paul, 1961), chs. 8 & 9.
- REICHENBACH, Hans, *Philosophy of Space and Time* (New York: Dover, 1958), sects. 1-8 & 27.
- SKLAR, Lawrence, *Space, Time and Spacetime* (Berkeley, CA: University of California Press, 1974), ch. 2, 'The epistemology of geometry', especially sects. C, D, F-H; also ch. 4 sect. C.
- DAINTON, Barry, *Time and Space* (Chesham: Acumen, 2010), ch. 13 'Curved space'. Also available online at: <https://doi.org/10.1017/UPO9781844654437.015>.
- NERLICH, Graham, *The Shape of Space*. 2nd ed. (Cambridge: Cambridge University Press, 1994). Also available online at: <https://doi.org/10.1017/CBO9780511621130>. [Especially chs. 6 & 7]

B

- BEN-MENACHEM, Yemima, *Conventionalism: From Poincare to Quine* (Cambridge: Cambridge University Press, 2006), ch. 3 'Relativity: from "experience and geometry" to "geometry and experience"'. Also available online at: <https://doi.org/10.1017/CBO9780511584404.004>.
- BROWN, Harvey R., *Physical Relativity: Space-Time Structure from a Dynamical Perspective* (Oxford: Oxford University Press, 2005), ch. 9 'The View from General Relativity'. Also available online at: <https://doi.org/10.1093/0199275831.003.0009>.
- EINSTEIN, Albert, *Geometry and Experience*, Lecture before the Prussian Academy of Sciences, January 27, 1921. Available online at: http://www.relativitycalculator.com/pdfs/einstein_geometry_and_experience_1921.pdf.
- FRIEDMAN, Michael, *Foundations of Space-Time Theories* (Princeton, NJ: Princeton University Press, 1983), ch. 7 'Conventionalism'.
- GLYMOUR, Clark, 'The Epistemology of Geometry', *Noûs*, 11 (1977): 227-51. <http://www.jstor.org/stable/2214764>. Reprinted in J. Butterfield, M. Hogarth and G. Belot, eds., *Spacetime* (Aldershot: Dartmouth, 1996). Also in R. Boyd, P. Gasper and J.D. Trout, eds., *The Philosophy of Science: The Central Issues* (Cambridge, MA: MIT Press, 1991). Or see his *Theory and Evidence* (Princeton, NJ: Princeton University Press, 1980), ch. 9.
- GLYMOUR, Clark, 'Topology, Cosmology and Convention', *Synthese*, 24 (1972): 195-218. <http://www.jstor.org/stable/20114832>. Reprinted in J. Butterfield, M. Hogarth and G. Belot, eds., *Spacetime* (Aldershot: Dartmouth, 1996).
- GRÜNBAUM, Adolf, 'Space, Time and Falsifiability: Critical Exposition and Reply to "a Panel Discussion of Grünbaum's Philosophy of Science", Part I', *Philosophy of Science*, 37 (1970): 469-588, excerpt of 70-73. <https://doi.org/10.1086/288327>
- NORTON, John D., 'Observationally Indistinguishable Spacetimes: A Challenge for Any Inductivist', in G.J. Morgan, ed., *Philosophy of Science Matters: The Philosophy of Peter Achinstein* (Oxford: Oxford University Press, 2011), pp. 164-76.
- PUTNAM, Hilary, 'The Refutation of Conventionalism', *Noûs*, 8 (1974): 25-40. <http://www.jstor.org/stable/pdf/2214643>. Reprinted in his *Philosophical Papers*. Vol. 2: *Mind, Language and Reality* (Cambridge: Cambridge University Press, 1975), pp. 153-91. Also available online at: <https://doi.org/10.1017/CBO9780511625251>.
- TORRETTI, Roberto, *Relativity and Geometry* (Oxford: Pergamon, 1983; New York, NY: Dover, 1996), ch. 7.2 'Geometric conventionalism'.

II: THE INTERPRETATION OF QUANTUM MECHANICS

We focus on three clusters of issues: why is the old orthodox interpretation of quantum mechanics

(apparently) in trouble? What are the prospects for the Everett (many-worlds) interpretation? And how should we respond to non-locality results?

For helpful introductions to Quantum Mechanics with a very low mathematical content, see, for example, the following:

- RAE, Alastair I.M., *Quantum Physics: Illusion or Reality?* (Cambridge: Cambridge University Press, 1986; 2nd ed. 2004). Also available online at: <https://doi.org/10.1017/CBO9780511815676>.
- RAE, Alastair I.M., *Quantum Physics: A Beginner's Guide* (Oxford: OneWorld Press, 2005).
- ALBERT, David Z., *Quantum Mechanics and Experience* (Cambridge, MA: Harvard University Press, 1992).
- STYER, Daniel F., *The Strange World of Quantum Mechanics* (Cambridge: Cambridge University Press, 2000). Also available online at: <https://doi.org/10.1017/CBO9781107050709>.
- DAVIES, Paul C.W., and Julian R. BROWN, eds., *The Ghost in the Atom* (Cambridge: Cambridge University Press, 1986).

The Davies and Brown volume contains a series of interviews with 'big name' physicists who defend differing views of quantum mechanics.

HUGHES, R. I.G., *The Structure and Interpretation of Quantum Mechanics* (Cambridge, MA: Harvard University Press, 1992).

is written by a philosopher, and proceeds gently, explaining e.g. complex numbers and vectors. Those with a mathematical background who want a straight, non-philosophical, introduction to the physics will find the choice of texts almost limitless. It really is a question of browsing to find a book that suits your mathematical level. One fine short book is:

BOWMAN, Gary, *Essential Quantum Mechanics* (Oxford: Oxford University Press, 2008).

II.A: Interpreting quantum mechanics

A

- BELL, John Stewart, 'Six Possible Worlds of Quantum Mechanics', *Foundations of Physics*, 22, no. 10 (1992): 1201-15. <https://doi.org/10.1007/BF01889711>. Reprinted in his *Speakable and Unspeakable in Quantum Mechanics* (Cambridge: Cambridge University Press, 1987; 2nd ed. 2004), pp. 181-195.
- CUSHING, James T., *Philosophical Concepts in Physics* (Cambridge: Cambridge University Press, 1998), chs. 19-21. Also available online at: <https://doi.org/10.1017/CBO9781139171106>.
- BOHR, Niels, 'Discussion with Einstein on Epistemological Problems in Atomic Physics', in P. Schilpp, ed., *Albert Einstein: Philosopher-Scientist* (Evanston, IL: Library of Living Philosophers, 1949), pp. 199-241. Also available online at: <http://minerva.tau.ac.il/bsc/3/3144/bohr.pdf>.
- NAGEL, Ernest, *Structure of Science: Problems in the Logic of Scientific Explanation* (London: Routledge & Kegan Paul, 1961), ch. 10 'Causality and indeterminism in physical theory'. Also available on [Moodle](#).
- SKLAR, Lawrence, *The Philosophy of Physics* (Oxford: Oxford University Press, 1992), ch. 4 'The quantum picture of the world'. Also available on [Moodle](#).
- WHITAKER, Andrew, *The New Quantum Age* (Oxford: Oxford University Press, 2012).

B

- BUB, Jeffrey, *Interpreting the Quantum World* (Cambridge: Cambridge University Press, 1997), sect. 7.1.
- CUSHING, James, *Quantum Mechanics: Historical Contingency and the Copenhagen Hegemony*

- (Chicago, IL: University of Chicago Press, 1994), chs. 2 & 3.
- HUGHES, R. I.G., *The Structure and Interpretation of Quantum Mechanics* (Cambridge, MA: Harvard University Press, 1992), chs. 6 & 7.
- REDHEAD, Michael, *Incompleteness, Nonlocality and Realism* (Oxford: Oxford University Press, 1987), ch. 2 'The interpretation of quantum mechanics'.
- VAN FRAASSEN, Bas C., *Quantum Mechanics: An Empiricist View* (Oxford: Oxford University Press, 1991), chs.1, 6 & 8. Also available online at: <https://doi.org/10.1093/0198239807.001.0001>.
- WALLACE, David, 'Philosophy of Quantum Mechanics', in D. Rickles, ed., *The Ashgate Companion to Contemporary Philosophy of Physics* (Aldershot: Ashgate, 2016). Also available online at: <https://www.routledgehandbooks.com/doi/10.4324/9781315612676.ch2>.

II.B: The Everett Interpretation

A

- ALBERT, David Z., *Quantum Mechanics and Experience* (Cambridge, MA: Harvard University Press, 1992), pp. 112-125 (first part of ch. 6). Also available on [Moodle](#).
- DEUTSCH, David, 'Comment on Lockwood', *British Journal for the Philosophy of Science*, 47 (1996): 222-28. <http://www.jstor.org/stable/687943>
- BUTTERFIELD, Jeremy, 'Critical Notice Of: Many Worlds? Edited by J. Barrett, A. Kent, S. Saunders and D. Wallace', *Philosophy*, 86 (2011): 451-63. <http://www.jstor.org/stable/23014826>. Preprint available at: <http://philsci-archive.pitt.edu/10758/>
- BUTTERFIELD, Jeremy, 'Some Worlds of Quantum Theory', in J. Russell, *et al.*, eds., *Quantum Mechanics (Scientific Perspectives on Divine Action, Vol. 5)* (Vatican: Vatican Observatory Publications, 2002), pp. 111-40.
- WALLACE, David, 'Worlds in the Everett Interpretation', *Studies in the History and Philosophy of Modern Physics*, 33 (2002): 637-61. [https://doi.org/10.1016/S1355-2198\(02\)00032-1](https://doi.org/10.1016/S1355-2198(02)00032-1)
- WALLACE, David, 'Everett and Structure', *Studies in the History and Philosophy of Modern Physics*, 34 (2003): 87-105. [http://doi.org/10.1016/S1355-2198\(02\)00085-0](http://doi.org/10.1016/S1355-2198(02)00085-0)

B

- ALBERT, David Z., and Barry LOEWER, 'Interpreting the Many Worlds Interpretation', *Synthese*, 77 (1988): 195-213. <http://www.jstor.org/stable/20116589>. [Another version of the Many Minds theory]
- BARRETT, Jeffrey A., *The Quantum Mechanics of Minds and Worlds* (Oxford: Oxford University Press, 1999), especially chs. 3 & 6. Also available online at: <https://doi.org/10.1093/acprof:oso/9780199247431.001.0001>. What is essentially a precis of ch. 3, with some added sections which precis other bits of the book, can be found in his article: 'Everett's Relative-State Formulation of Quantum Mechanics', in E.N. Zalta, ed., *The Stanford Encyclopedia of Philosophy (Winter 2016 ed.)* [Online] available at: <http://plato.stanford.edu/archives/win2016/entries/qm-everett> (a clear exegesis of Everett's original paper and a variety of comments on later versions of the interpretation).
- KENT, Adrian, 'Against Many-Worlds Interpretations' [Online]. Available at: <http://xxx.arxiv.org/abs/gr-qc/9703089> (Accessed: 26 September 2017). [Critical survey of Everett-type interpretations from a physicist's perspective] This is a 1997 update on Kent's paper of the same name in *International Journal of Modern Physics*, A5 (1990), 1745-62.
- LOCKWOOD, Michael J., "'Many Minds" Interpretations of Quantum Mechanics', *British Journal for the Philosophy of Science*, 47 (1996): 159-88. <http://www.jstor.org/stable/687940>. [Lockwood's version of the Everett interpretation, emphasizing considerations from the philosophy of mind. See also the many commentaries in the same issue]
- SAUNDERS, Simon, *et al.*, eds., *Many Worlds? Everett, Quantum Theory and Reality* (Oxford: Oxford University Press, 2010). [especially chs. 1,6,7,10,12 & 18, by (respectively) Wallace, Saunders,

Papineau, Kent, Price and Deutsch]

WALLACE, David, *The Emergent Multiverse* (Oxford: Oxford University Press, 2012) 125-42. Also available online at: <https://doi.org/10.1093/acprof:oso/9780199546961.001.0001>. [especially Parts I & II (Part II, on probability, includes revised versions the following two items)]

WALLACE, David, 'Epistemology Quantized: Circumstances in Which We Should Come to Believe in the Everett Interpretation', *British Journal for the Philosophy of Science*, 57 (2006): 655-89. <https://doi.org/10.1093/bjps/axl023>

WALLACE, David, 'Quantum Probability from Subjective Likelihood: Improving on Deutsch's Proof of the Probability Rule', *Studies in the History and Philosophy of Modern Physics*, 38 (2007): 311-32. <https://doi.org/10.1016/j.shpsb.2006.04.008>

II. C: Non-Locality

A

BELL, John Stewart, 'Bertlmann's Socks and the Nature of Reality', in his *Speakable and Unsayable in Quantum Mechanics* (Cambridge: Cambridge University Press, 1987), pp. 139-58. Also available online at: <https://doi.org/10.1017/CBO9780511815676>.

CUSHING, James T., *Philosophical Concepts in Physics* (Cambridge: Cambridge University Press, 1998), ch. 22 'The EPR paper and Bell's theorem'. Also available online at: <https://doi.org/10.1017/CBO9781139171106>.

CUSHING, James, and E. McMULLIN, eds., *Philosophical Consequences of Quantum Theory: Reflections on Bell's Theorem* (Notre Dame, IN: Notre Dame University Press, 1989). [especially Chapters by Cushing, Shimony, Mermin Jarrett, van Fraassen and McMullin]

BUTTERFIELD, Jeremy, 'Bell's Theorem: What It Takes', *British Journal for the Philosophy of Science*, 43 (1992): 41-83. <http://www.jstor.org/stable/687884>

MAUDLIN, Tim, *Quantum Non-Locality and Relativity: Metaphysical Intimations of Modern Physics* (Oxford: Blackwell, 1994), chs. 3-5.

B

BUB, Jeffrey, *Interpreting the Quantum World* (Cambridge: Cambridge University Press, 1997), ch. 2 'Bell's 'no go' theorem'.

CUSHING, James, *Quantum Mechanics: Historical Contingency and the Copenhagen Hegemony* (Chicago, IL: University of Chicago Press, 1994), ch. 10 'An alternative scenario?'

MERMIN, N. David, 'Is the Moon There When Nobody Looks', *Physics Today*, 38 (1985): 38-47. <https://doi.org/10.1063/1.880968>. Reprinted in R. Boyd, P. Gasper and J.D. Trout, eds., *Philosophy of Science* (Cambridge, MA: MIT Press, 1991).

REDHEAD, Michael, *Incompleteness Nonlocality and Realism: A Prolegomenon to the Philosophy of Quantum Mechanics* (Oxford: Clarendon Press, 1987), chs. 3 & 4.

SHIMONY, Abner, 'Metaphysical Problems in the Foundations of Quantum Mechanics', *International Philosophical Quarterly*, 18 (1978): 3-17. <https://dx.doi.org/10.5840/ipq19781818>.

Reprinted in R. Boyd, P. Gasper and J.D. Trout, eds., *Philosophy of Science* (Cambridge, MA: MIT Press, 1991).