Quantum Feminicity: Modes of Countermanding Time

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Abstract

This article proposes the novel concept of quantum feminicity as a way to consider the modal engagement of feminist theory (a social and political movement) with quantum theory (a technological branch of physics). Engaging the modal logics of this intersection, the article explores one aspect of quantum literacy; the shift in the notion of the quiddity of time. With the quantum mode comes a countermanding of standard frameworks for measuring and discussing time; as quantum causes the observer not only to refigure systems of the temporal orders of things, but in the countering, new ways of thinking about systems and new conceptual models are opened. Focussing on quantum modalities that are being practised in relation to the situated nature of technological platforms, the article proposes that modelling a quantum feminicity can assist in disengaging modes of difference that are used to gender all kinds of bodies through a countermanding of the temporal, consideration of modes of superposition, and thinking through the differences between the experiences of bodies and experimental modes that use quantum vectors for feminist actions.

Keywords

afrofuturism, body, cognition, ecofeminism, experience, experiment, feminism, feminicity, interdisciplinary, new materialism, modes, modality, quantum philosophy, time

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Introduction: Modal Politics

What have quantum physics and feminist philosophy got in common? They are both practice-oriented sciences; naturally pragmatic, socially constructed, and both are contingent upon their contemporaneous technological platforms. Both are methodologically grounded in the observation of material artefacts, physical phenomenon, and committed to the development of conceptual frameworks that seek to find solutions to the modal problems of their respective worlds. In describing the nature of those modes (including the concept of "reality" held in their respective responsive and critical models), they have challenged classical assumptions about causality, measurement, and the meaning of matter and have overturned the historical frameworks that mandate certain forms of reality as "truths" of the world. As I argue elsewhere, modal logics are a branch of philosophy usually engaged in constructing and defending moral structures and methods concerning the judgement of notions of the "truth."[1] While modal logics are usefully employed for deductive reasoning in systems design (the "facts" and the "possibilities"), here I am engaging the reverse of those forms of modal logics used for determining a moral or qualifying "truth" of a judgment.[2] Instead of positing an absolute position, I am interested to explore the *conditions* that contribute to the different ethos of modal frameworks—which I believe must be discussed in relation to the technological platform that is supportive of that framework—whether it is analogue, digital, or quantum in nature.[3]

This article uses the concept of quantum feminicity as an interdisciplinary modal form comprised of two distinctive disciplinary fields, each with their own histories, yet having overlapping modal genealogies in their questioning of the construction of reality, and critique or rejection of inherited classical temporal frameworks. When quantum modes are considered, knowledge becomes more than a question of epistemology. Focussing on the mode and modality of any system necessarily invokes a consideration of time—as a modal that is used to define the property of a substance; it is a method for something that comes into being through conventions; the forms of knowledge acquired, and types of knowledge that are contingent upon other modes (such as aesthetics, information, or science). Consider the modal forms of the quiddity of time that Indo-European languages use; this is the "whatness" of time.[4] Time is typically described and used as a framework that measures, standardises, organises, and

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1   See F.J. Colman, "Modality," *Philosophy Today* 63, no. 4 "New Concepts for Materialism" (2019): 983–998.

2   For discussion of modal logics, see Kenneth J. Konyndik, *Introductory Modal Logic* (Notre Dame: University of Notre Dame Press, 1986).

3   For further discussion of technology and modality, see Hans Poser. "Technology and Modality," in *Applied Virtuality Book Series Printed Physics—Metalithikum I*, eds. Vera Bühlmann and Ludger Hovest (Springer: Vienna, 2013): 72–112.

4   The Latdict dictionary gives 303 possibilities for the English word "time" in Latin. For example: *aevum*; *dies*; *hora, memoria*; *locus*; *maturitas*; *numerus*; *percussion*; *tempus*; *seculum*; https://latin-dictionary.net/search/english/time

gives value to activities. In the physical sciences, with the discoveries of quantum, the classical and canonic scientific formulas and the standardised measurements of time have been called into question, and with that expressions of temporal notions reach for other forms to articulate the movement of bodies, and duration.[5] Across feminist texts, there can be discerned a similar critique, but with a focus on the androcentric organisation of time, those value frameworks are questioned. Directed by different twentieth-century theoretical frameworks, feminist philosophy describes systems ruptures but often the applied modality is not identified, and thus limited in its critical iteration of a condition. In particular, feminist-informed new materialism takes an approach that is complementary to the investigations of quantum physics, in that new materialism takes things in the world as relational yet dynamic, and knowledge is something that is constructed from observation techniques. This feminist position, as I discuss below, is no straight metaphorical adoption of the language of quantum physics, rather, the identification and engagement with the philosophy of physics by feminism reveal a modal overlap; a superposition of the mobilisation of experimental thinking; where the feminist modality that engages the core algorithmic coda: *what if*. While each disciplinary field (of feminism and quantum physics) works with different aspects and implications of the modal narratives used for describing their worlds, it is the potential of quantum feminicity as a worldmaking modal register of countermanded time; as a transformative technological platform that this article explores.

The article is divided into sections; firstly, considering what quantum modes are, and the implications of their modal operations, then sketching out feminist and quantum physics's respective modal phases and considering how these contribute to our understanding of the shift in the quiddity of time. As the article moves through the address of what constitutes the temporal, quantum, and feminist modal registers, the various conceptions of "time" and its places within an androcentric, classical framework are considered in terms of how adequate it is as an expression, and consideration of the scales of quiddity and haecceity[6] of different modal registers are posited as more expressive paradigmatic frameworks.

5   See the discussion of the philosophical and scientific variations and change in the conception and expression of "time" in Ilya Prigogine, with Isabelle Stengers, *The End of Certainty: Time, Chaos and the New Laws of Nature* (New York: The Free Press, 1997); Giovannetti, Vittorio, Seth Lloyd, and Lorenzo Maccone, "Quantum time," *Physical Review* D 92, no. 4 (August, 2015): 045033. DOI: 10.1103/PhysRevD.92.045033; Maccone, Lorenzo, and Krzysztof Sacha, "Quantum measurements of time," *Physical Review Letters* 124, no. 11 (2020): 110402; Reydams-Schils, Gretchen J. *Plato's Timaeus as cultural icon*(Notre Dame, IN: University of Notre Dame Press, 2002).

6   Quiddity refers to the universal qualities of a thing and haecceity to the particular qualities of a thing. These terms are attributed to Duns Scotus's use, which is in relation to a humanist and Christian modal account—which I do not go into in this article for the sake of economy but which present as useful categories for further discussion of modal properties. See, for example, the discussion in Nicole Wyatt. "Did

The article pivots around the feminist quest for the dissolution of androcentric modalities.

1. Quantum Modes: Information and Transformation

Quantum physics is a branch of physics that deals with the behaviour of matter and energy on a very small scale, such as individual atoms and subatomic particles. It describes the strange and seemingly paradoxical behaviour of particles called qubits[7] that can entangle with other particles, leading to multiple, superpositioned states and fields of information. This entangled behaviour of microscopic particles has implications for how the act of measurement itself influences the state of a system and vice versa. This is the significant point for a change in classical conceptions of time; where "time" is measured by the movement of a body.[8] In quantum observations, the measurement of any body is uncertain and unstable and also contingent upon the technological platform enabling the observation of that body. Physicists have observed that the properties of one particle change the property of the other. For larger numbers of particles, not only can each pair be entangled, but all of them can be entangled with each of the others as well. While invisible to most, the implications of quantum physics suggest that there are many possible outcomes for a given physical system, contingent upon how a system is being measured and that the actual outcome is just one of these possibilities. The state of superposition; the multiple possible combinations of states of particles, hold the quiddity of modal forms that medieval cosmologists (Fakhr Al-din Al-razi) and classical philosophers (Aristotle) spoke of; there are no certainties; there are actualities (particles, matter), and possibilities, and a lot of uncertainty (contingency). It is the specificities of things that are dynamic and contemporaneously contingent.

While quantum physics is still in a developmental stage, quantum descriptions of the physical world have been circulating across a range of media forms; from pure science journals to popular culture magazines, since the start of the 19th Century. In his Nobel lecture on 100 years of light quanta, Glauber notes that light interference phenomena were very well understood by about 1820.[9] Disproving

Duns Scotus Invent Possible Worlds Semantics?" *Australasian Journal of Philosophy* 78, no.2, (2000): 196–212, DOI: 10.1080/00048400012349481

7   Qubits are quantum particles (rendered as data) that can be entangled together where all possible states can perform a computation. See the use of the term in Karmela Padavic-Callaghan, "Record-Breaking Number of Qubits Entangled in a Quantum Computer," *New Scientist*, (July 12, 2023). https://www.newscientist.com/article/2382022-record-breaking-number-of-qubits-entangled-in-a-quantum-computer/

8   Cf. Francis MacDonald Cornford, *Plato's cosmology: The Timaeus of Plato* (New York: Routledge, 2014); David A. Kolb, "Time and the timeless in Greek thought," *Philosophy East and West* 24, no.2 (1974): 137–143.

9   Roy J. Glauber, "One hundred years of light quanta," *Nobel Lecture* 8 [2005], *ChemPhysChem i7,* (2006): 1618–1639. DOI: 10.1002/cphc.200600329.

Newton's theory that light is a constant stream of particles, Thomas Young's double-slit experiment (1801) showed light to be acting in a wave-like manner which, similar to the movement of water, is subject to the interference of other waves. This led to a series of thought and physics experiments that conceptualised this movement of light-wave actions in terms of how waves might overlay each other, enabling a narrativisation of light as diffracted.[10] Observation of the movements of light particles develops into quantum theories of superposition, oscillation, displacement, "destructive interference,"[11] and conceptions of decoherence and uncertainty.[12] Such words and their descriptions of the physical nature of the particles of things, are entering into common parlance and are part of the growing lexicon of quantum.[13]

Quantum concepts have captured the attention of a wide array of disciplines outside of the natural sciences, including education, security studies, gaming theory, international relations, and different branches of social science, theory and philosophy.[14] What is emerging through these connections of the physical science concept of quantum through the disciplines of physics (Bohr, Einstein, Heisenberg), philosophy (Everett, Whitehead, Foucault, Plotnitsky), semantics (Peirce), and the humanities social science of feminist ethics (Foucault, Haraway, Barad) is an interdisciplinary genealogy for engaging the critical implications of quantum mechanics for knowledge systems and metaphysical processes. While the memes of Einstein's "spooky entanglement" and "Schrödinger's cat" circulate in the popular science media, it has been the work of Karen Barad who brought together a number of feminist and physics

10   Thomas Young, "II. The Bakerian Lecture. On the theory of light and colours," *Philosophical transactions of the Royal Society of London* 92, (1802): 12–48.http://doi.org/10.1098/rstl.1802.0004

11   Glauber, "One hundred years of light quanta," 1619.

12   Stacey Moran, "Quantum Decoherence," *Philosophy Today* 63, no.4 "New Concepts for New Materialism" (Fall 2019): 1051–1068, doi: 10.5840/philtoday20191220295

13   Interdisciplinary discussion of quantum implications for the arts, humanities and social sciences include; for example, Ilya Prigogine and Isabelle Stengers, *The end of certainty* (New York: Simon and Schuster, 1997); James Der Derian, and Alexander Wendt, eds., *Quantum International Relations: A Human Science for World Politics* (Oxford: Oxford University Press, 2022); Rasheedah Phillips, "Black Quantum Futurism," *Journal of Architectural Education* 77, no. 1 (2023): 9–19.

14   A small selection of such interdisciplinary work: Elise M. Crull, "Exploring philosophical implications of quantum decoherence," *Philosophy Compass* 8, no. 9 (2013): 875–885; Indranil Ghosh, "Quantum Game Theory—I: A Comprehensive Study," *Resonance* 26, no. 5 (2021): 671–684. Murphy, Michael PA. "Entangled observers? A quantum perspective on authority in critical security studies," *Critical Studies on Security* 10, no. 3 (2022): 119–131; Fox, Michael F.J, Benjamin M. Zwickl, and H. J. Lewandowski, "Preparing for the quantum revolution: What is the role of higher education?" *Physical Review Physics Education Research* 16, no. 2 (2020): 020131; James Der Derian and Alexander Wendt, "'Quantizing international relations': The case for quantum approaches to international theory and security practice," *Security Dialogue* 51, no. 5 (2020): 399–413; and a literature review done in 2021: Zeki C Seskir, and Arsev U. Aydinoglu, "The landscape of academic literature in quantum technologies," *International Journal of Quantum Information* 19, no. 02 (2021): 2150012.

philosophical positions to generate her concept of "agential realism."[15] Barad's narrative of a feminist physics-informed quantum philosophy has accessibly articulated the decentring of "the universalist man" and "the human" as the centrality of knowledge. Building upon other feminist thinkers, Barad's work mobilised a vigorous period of feminist and new materialist modal re-thinking that considers the material and virtual worlds and all that inhabit them as comprised of entangled phenomena.[16] Rather than just observing these worlds, there is an active engagement with them by their communities, who engage in activist interventions into the neoliberal materialist drivers of consumption. Their critique is directed at the information-driven society of the 21st century, which operates within the value systems generated by data infrastructures that are designed to generate "successful" outcomes.[17] What does success look like when generated by computing power? As Katherine N. Hayles argues: "we see only what our systemic organization allows us to see."[18] Hayles identifies the question of *what modes* form and direct perception and knowledge of worlds, comprised of sets of values and beliefs, and these are subject to measurement of realisation, acquisition, and completion.

Here I want to pause for a caveat about scientific measurement and the cultural conditions it creates. As Isabelle Stengers and other thinkers such as Bruno Latour caution,[19] novelty plays a significant part in the controlled paradigms and hierarchies of disciplinary knowledge. Because quantum theory is enabled by a formal method in the manner of scientific modelling, it is thus also a "mobilizing model;" enabling a disciplinary field, but also giving rise to novel modes of the theory.[20] As Stengers points out, while many scientific concepts remain of a speculative nature until such a time that they made become practised, then the experimental becomes a production of theory; one that is "recognized by the claims of its representatives."[21] Further, we should consider Sylvia Wynter's considered critique

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15   Barad specifically engages the work of physicist Niels Bohr and discusses it through the lens of feminist science and humanities philosophy, including Judith Butler, Donna Haraway, Sandra Harding, Evelyn Keller, and Helen Longino in Karen Barad, *Meeting the universe halfway: Quantum physics and the entanglement of matter and meaning* (Durham, NC: Duke University Press, 2007), 44.

16   See also the discussion on decentring the universal man in Rosi Braidotti, *Posthuman knowledge* (Cambridge: Polity Press, 2019).

17   The various strands of new materialist theory and activists are charted in Felicity Colman, and Iris Van der Tuin, eds., *Methods and Genealogies of New Materialisms* (Edinburgh: Edinburgh University Press, 2024).

18   Katherine. N. Hayles, *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics*, (Chicago: The University of Chicago Press, 1999), 11.

19   Bruno Latour, "Why has critique run out of steam? From matters of fact to matters of concern," *Critical Inquiry* 30, no. 2, 2004: 225–248.

20   Isabelle Stengers, *The Invention of Modern Science*, trans. Daniel W. Smith (Minneapolis & London: University of Minnesota Press, 2000), 114–19.

21   Stengers, *The Invention of Modern Science*, 106–08.

of European scholasticism, where she argues how systems of Western knowledge are based upon colonialist repressive and extractive economies whose goal is the maintenance and continuity of the hierarchical stability of the "contemporary Western world-system."[22]

Outside of the pure domains of science, the conception and language of theoretical quantum theory and quantum mechanics have been taken up by non-scientific domains and disciplines; generating a disciplinary field of quantum philosophy.[23] Across the arts and humanities, the non-Boolean logic and language of quantum concerning the description of the constitution of the material world has enabled a rich interdisciplinary field to address the topics of political agency and social justice and the acceleration of the climate emergency because of continued extractive colonial economic operations.[24] Reflecting and exploring the nature of this philosophy, the call for the creation of a quantum literacy that could be active and adequate to its communities was begun within a group of scholars investigating feminist new materialism. From the activist interest in the political nature of matter, the group came to the conclusion that the metaphysics they were investigating could only be adequately expressed through quantum phenomena[25] and then, as I argue, each evaluated through specific modal frameworks.[26] As Stengers bluntly states: "the quantum theory of measure is addressed in principle to humanity in its entirety."[27] The term "quantum literacy" is also put to use in relation to the requirement for educational literacy to incorporate the findings of quantum mechanics and its implications for

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22   Sylvia Wynter, "Unsettling the coloniality of being/power/truth/freedom: Towards the human, after man, its overrepresentation—An argument," *CR: The new centennial review* 3, no. 3 (2003): 257–337, 270. https://www.jstor.org/stable/41949874

23   The span of which is outside of the focus of this article, however, would include the diverse commentaries of Whitehead, such as Timothy E. Eastman and Hank Keeton, eds., *Physics and Whitehead: Quantum, Process, and Experience* (State University of New York Press, 2012).

24   Some of the work that addresses global political and cultural concerns and draws upon the materialist aspects of quantum to do philosophy, for example, cf. Stacy Alaimo, *Bodily Natures: Science, Environment, and the Material Self* (Indiana University Press, 2010); Brigette Bargetz, "Longing for agency: New materialisms' wrestling with despair," *European Journal of Women's Studies* 26, no.2 (2019): 181–94; Jane Bennett, *Vibrant Matter: A Political Ecology of Things* (Durham, NC and London: Duke University Press, 2010).

25   See discussions on quantum in Vera Bühlmann, Felicity Colman, and Iris Van Der Tuin, "Introduction to new materialist genealogies: New materialisms, novel mentalities, quantum literacy," *Minnesota Review* 88, no. 1 (2017): 47–58; see also the expanded version of this essay, and an account of the reasons behind use of the term "literacy" in Vera Bühlmann, Felicity Colman, and Iris van der Tuin, "New Materialisms: Quantum Ideation across Dissonance," in Felicity Colman and Iris Van Der Tuin, eds., *Methods and Genealogies of New Materialisms,* (Edinburgh: Edinburgh University Press, 2024), ch.01; and on modal systems, see Felicity Colman, "Feminising politics: notes on material and temporal feminist modal logics in action," *Matter: Journal of New Materialist Research* 1, (2020): 1–22.

26   Colman, "Modality," 982–985.

27   Stengers, *The invention of modern science*, 114.

knowledge construction.[28]

Critics of the interdisciplinary use of quantum display what Stengers describes as the "strange" "anxiety of the scientific world,"[29] in some cases becoming downright hostile with a paper published in 2021 discussing a "case" and issuing "a general warning against the other attempts to use quantum mechanics in social theorizing."[30] This blatant ontologising of what constitutes a normative "scientific" community and its objects appears as outmoded in the twenty-first century but is redolent of the censorship and objectification tactics of institutions.[31] However, in 2023, a modal framework must incorporate vast shifts in technological, scientific, and cultural knowledge since the kinds of modals that Kant and Hegel discussed.[32] Dominating current global politics is how the conditions of power emerge from the ways in which physical materials and concepts of the physical forms of things are given shape and actioned by modal frameworks; variously described as democracy, social justice issues, and the dynamics of climate change as leading social principals,[33] and an insistence on siloed thinking is not going to provide the answers for future political models.

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28   Nita Laurentiu, Laura Mazzoli Smith, Nicholas Chancellor, and Helen Cramman, "The challenge and opportunities of quantum literacy for future education and transdisciplinary problem-solving," *Research in Science & Technological Education*, (2021): 1–17; and see Colman, F., Bühlmann, V., O'Donnell, A. and van der Tuin, I., "Ethics of Coding: A Report on the Algorithmic Condition," [EoC]. H2020-EU.2.1.1, Brussels: European Commission. 732407, [https://cordis.europa.eu/project/rcn/207025_en.html pp.1–54](https://cordis.europa.eu/project/rcn/207025_en.html), (2018): 8; 40–41. The report finds that a new form of literacy is required to be able to speak to and be expressive of various domains being generated by the algorithmic condition, which the report describes as the need for "quantum literacy."

29   Stengers, *The invention of modern science*, 4.

30   Jan Faye and Rasmus Jaksland, "Barad, Bohr, and quantum mechanics," *Synthese* 199, no. 3–4 (2021): 8231–8255.

31   Critiques of the arts, humanities, and social sciences engaging with "pure science" by purist scientists who wish to preserve their mimetic orders are numerous. Arkady Plotnitsky discusses the 20th century-long debates on quantum, and the science wars, in Arkady Plotnitsky, *The Knowable and in the Unknowable: Modern Science, Nonclassical Thought, and the "Two Cultures"* (Ann Arbor: University of Michigan Press, 2002).

32   Revisions of both philosophers' respective work on modality are ongoing, but these works have no "body" except for the universal normative one; no one is engaging with the feminist ramifications of modal thinking. Cf. Nathum Brown discusses Hegel's theory of modality as a measurement schema in Nathum Brown, *Hegel on Possibility, Dialectics, Contradiction, and Modality* (London: Bloomsbury Academic, 2020). Kant's modal theory has received attention in Nicholas F. Stang, *Kant's Modal Metaphysics* (Oxford University Press, 2016); and in Uygar Abaci, *Kant's Revolutionary Theory of Modality* (Oxford: Oxford University Press, 2019).

33   Refer to the discussion in Maria Kaika, Angelos Varvarousis, Federico Demaria, and Hug March, "Urbanizing Degrowth: Five Steps towards a Radical Spatial Degrowth Agenda for Planning in the Face of Climate Emergency," *Urban Studies* 60, no. 7 (2023): 1191–1211.

2. Modelling Quantum Feminicity

Quantum physics describes its activities of the measurement of matter, with terms such as complementarity, entanglement, superposition, uncertainty, and diffraction—and this language has been co-opted by feminist texts investigating the politics of matter (for example, in new materialism and or posthumanism).[34] The fields share a quantum literacy, signalling the modal overlaps of quantum physics and feminist theory: both contribute to the destabilisation of the classical androcentric world over a shared historical period, and over similar concerns about the construction of "reality."

As findings from the James Webb telescope confirm,[35] the universe that Earth finds itself in is not singular, and the models used to articulate it in quantum physics and in feminist practices are plural and dynamic. Causal narratives are not adequate in their account of the ways in which the world is experienced within the duration of a life of a living entity. Feminist-informed work uses a range of modalities which respond to and critique the androcentrism of teleological time narratives, offering different world (social, cultural, political) systems, and in doing so, they point out the acquired nature of time as an imposed structure, and seek to render androcentric frameworks transparent. This involves— and requires—an examination of the material systems (including representational activities), as well as the processual possibilities of every modal framework in operation.

If we compare the current approaches in the philosophy of physics with current practices in the philosophy of feminism and then evaluate the modal tributaries that are available, or dormant, then the trans-disciplinary modal convergences become clearer. The diachronic period during which both critical feminism and quantum theory developed concurrently is not inconsequential. Significant technological developments concerning activities of militarism and communications, with the datafication of society, had profound changes for all social-political realms.

First, technological platforms of the twentieth and early twenty-first century enabled a faster progression for feminist philosophy, with identifiable core methodological approaches within the discipline where

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34   Cf. Jane Bennett, *Vibrant Matter: A Political Ecology of Things* (Durham, NC and London: Duke University Press, 2010); Karen Barad, *Meeting the Universe;* Diana Coole and Samantha Frost. eds., *New materialisms: Ontology, Agency, and Politics* (Durham: Duke University Press, 2010); Vicki Kirby, *Quantum Anthropologies: Life at Large* (Durham: Duke University Press, 2013); Stacey Moran, "Quantum Decoherence," *Philosophy Today* 63, no.4 "New Concepts for New Materialism" (Fall 2019): 1051–1068, 10.5840/philtoday20191220295
35   Jason Kalirai, "Scientific discovery with the James Webb space telescope," *Contemporary Physics* 59, no. 3 (2018): 251–290.

there is engagement with modalities of: 1) political feminisms (movements such as ecofeminism, suffrage, black, women's liberation, postnational; afrofuturist feminisms); 2) lived feminisms: science and practice (using methodologies such as affect theory, intersectionality, new materialism, social sciences); and 3) the genealogical analyses of events in feminism (not historical—but intergenerational, revisionist accounts of feminist praxes; "waves"; liberal, radical, digital, post-structural, posthuman).[36]

Second, across the same era, a philosophy of physics can be categorised by its methodological approaches to phenomena and materials, using modalities of: 1) the metaphysics of physics (movements such as rationalist, naturalist); 2) the technical "proofing" of the topics of physics (methods such as axiomatisation; differential equations); and 3) the historical analyses of events in physics (topical debates such as general relativity and quantum mechanics).[37]

From a problem-solving perspective, quantum investigations have been characterised as a theoretical dream and a practical nightmare.[38] Current descriptions of quantum physics are thus also akin to that of cosmology theories of multiple universes, or the multiverse, and the philosophy of modal realism, which holds that there are a multitude of possible worlds that exist simultaneously, each with its own set of laws and properties, and the actual world is just one of these possibilities.[39] Feminist forms of modal realism is a philosophical theory that takes the idea of possibility and necessity as fundamental to reality. It holds that possible worlds—that is, other ways the world could have been—are just as

36   For a discussion of the feminist movements as waves, see Iris Van der Tuin, *Generational feminism: New materialist introduction to a generative approach* (Lexington Books, 2014).

37   Exploring the philosophy of physics and its relationship to possible feminist philosophies of science, Maralee Harrell does not engage with modal frameworks or implications but uses a similar set of three categories to summarise current research into the philosophy of physics in Maralee Harrell, "On the possibility of feminist philosophy of physics," in *Meta-Philosophical Reflection on Feminist Philosophies of Science*, ed. Amoretti, Maria Cristina, and Nicla Vassallo, 15-34. (Boston Studies in the Philosophy and History of Science 317, 2016), 17. Alistair Wilson describes the details of the current debates in the metaphysics of quantum theoretical debates in Alastair Wilson, *The Nature of Contingency: Quantum Physics as Modal Realism* (Oxford: Oxford University Press, 2020). Current historical debates concerning the history of physics are summarised in Carlo Rovelli, *Reality is Not What it Seems: The Journey to Quantum Gravity* (Great Britain: Penguin, 2018).

38   Serge Haroche and Jean-Michel Raimond, "Quantum Computing: Dream or Nghtmare?" *Physics Today* 49, no. 8 (1996): 51–52, https://doi.org/10.1063/1.881512

39   Beyond the scope of this article, there are comparisons to be made with Indian cosmology, and medieval Islamic structural realist models, for example, the philosophical position of Fakhr al-Din al-Razi on physics see Adi Setia, "Fakhr al-Din al-Razi on physics and the nature of the physical world: a preliminary survey," *Islam & Science* 2, no. 2 (2004): 161–181. https://link.gale.com/apps/doc/A128606463/AONE?u=anon~53653369&sid=googleScholar&xid=756a53d2.
On modal realism, see David K. Lewis, *On the plurality of worlds*. Oxford: Blackwell, 1986.

real as the actual world.[40] Quantum physics can be seen as echoing the experiments and narratives of feminist modal realism in that it suggests that the physical world is not deterministic, but rather that the outcome of certain events is inherently uncertain and depends on the observer. In this sense, quantum physics and feminist modal realism share the idea that reality is not fixed, but that it is open to different possibilities and that the nature of reality is contingent upon the *participant situation and the technological platform engaged to affirm the mode of reality*. Focussing on the particle as a participant situation that controls the collective ecology of a modal field and considering this collective mode moves us theoretically away from a humanist, embodied narrative of individuated affective feeling; as a human observer's perspective on their constitution toward a posthumanist decentred human narrative, where all components are considered.[41] The particle/ participant must be considered as an entangled part of the technology of the observation platform. By focusing on where the modalities of the respective disciplines of physics and feminism converge, interdisciplinary community creation through intra-action can occur.[42] The teleological narrativisation of androcentric progress is undone by quantum theories—where Newtonian and Einsteinian conceptions of time (as absolute or relative) are proved inaccurate by quantum physics and by feminist theory that rejects the androcentric organisation of time that is based upon the economic productivity of a socially gendered body. As feminism advocates—demands—a disassembling of androcentric systems is required to countermand time in favour of more ethically designed worlds.

The *what-if* of feminist actions commands a mode of possibility, and its manifestations appeal to the social and political institutions that govern and police biologically and culturally determined bodies. The mode of possibility engages the contextual past, the situated present, and the future-in-formation as it asks: what if things were different in terms of the equality of labour, unstable economic systems, the discriminatory attitudes toward the non-androcentric? The what-if is a transformational modality; a space of activity (feminist active points), but also requires reflexive metaphysical drivers for change. Possibility today infers a site where something could happen, could have already happened, but a body's

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40   Cf. discussions of modal realism as worldmaking in Helen Palmer, *Queer Defamiliarisation: Writing, Mattering, Making Strange* (Edinburgh: Edinburgh University Press, 2020): 67–8; 77; 83; Donna Haraway, "Anthropocene, Capitalocene, Plantationocene, Chthulucene: Making Kin.," *Environmental Humanities* 6, no. 1 (2015): 159–65. doi:10.1215/22011919-3615934.

41   Modal realism is still a minority view in philosophy, and the interpretation of quantum physics is still a matter of ongoing debate among physicists. Arkady Plotnitsky has put forward his thesis in Arkady Plotnitsky, *Reality without Realism: Matter, Thought, and Technology in Quantum Physics* (Switzerland: Springer Nature, 2021).

42   For posthumanist definitions, see Rosi Braidotti and Maria Hlavajova, eds., *Posthuman glossary* (London and New York: Bloomsbury, 2018), and for the address of the political implications for community and identity through quantum and feminist connections, see Whitney Stark, "Assembled bodies: Reconfiguring quantum identities," *The Minnesota Review*, no. 88 (2017): 69–82.

entanglement with that other possible body or condition is situated in a time that has not yet arrived; or into which the actuality is not yet positioned. Claire Colebrook has noted that: "Rehearsing feminism's past is [. . .] an awareness that the past may harbour potentials to which we are not yet attuned."[43] The modality of quantum feminicity is one of possibility but is also a form subject to the necessities and contingencies of life on this planet; in this universe, within other galaxies and universes.

My argument for the recognition of the modality of quantum feminicity is that the principles of feminism already provide the modal tools with which to think through the dynamic infrastructure that quantum theoretical physics makes available for the expression of our vernacular and long-term existences. Vector-points emerge in key feminist texts which offer critiques of the gendering of the temporal, but they often stop short of naming the rupture – describing it instead in the critical terms post-structuralist critique relied upon; the liminal space, the void, a beyond, a sublime, etc.[44] Comparing the modal questions used in philosophy of physics with philosophy of feminism can be productive of certain parallel genealogies of the strands of critical methods and modes which are now entangled. In the following section, I focus in on the modality of the temporal and how that is a useful starting point for further developing this critique with quantum feminicity.

3. Life Modals: Analogue to Quantum

One of the constituent narratives producing "life" or "reality" is the localised operationalisation of time. Time is a concept that is ascribed a value in a user system; finding form in the cultural narratives of the social and political worlds that produce and govern the system. Western and Eastern philosophy provide a number of different models for comprehending and assessing knowledge through temporal frameworks of experience, perception, and the observation of movement. The experience of "time passing," the "lifetime" of an entity, or of "a time" is variously described through images and stories of the natural world, planetary and agricultural cycles, events, and epochal time frames. The perception of time is granted value through measurement tools and their narrativization: sundials,

43   Claire Colebrook, "Stratigraphic time, women's time," *Australian Feminist Studies* 24, no. 59 (March 2009): 11–16; 12. doi.org/10.1080/08164640802645125

44   see Zakiyyah Iman Jackson, "Theorizing in a Void: Sublimity, Matter, and Physics in Black Feminist Poetics," *South Atlantic Quarterly* 117, no. 3 (2018): 617–648; Marisol De la Cadena and Mario Blaser, eds., *A World of Many Worlds* (Durham and London: Duke University Press, 2018).

clocks, analogue, digital, chronons.[45] The cognition of these tools is accorded value through scales of speed of attainment, computational achievement, and fiscal implications.[46] The observation action of time propels movements: we set our alarm clock to wake us from a nightly restorative slumber in order to go and perform another day of labour for a tiny minority-controlled profit market system that is exploitative of all of its resources. Time organisation involves the computation and control of the physical human body and the natural environment by the current market system to which the majority submit. However, perhaps Spinoza's question in his *Theological-Political Treatise*; *Why do people fight for their servitude as if it were their salvation?* is no longer adequate to address the concept of time in a quantum state.

If we flip the androcentric notions of "time" as the temporal organisation of human servitude and experiential driver of life as a service provider for capitalist economies (internally regulated by gender, race, and class hierarchisations) to a quantum philosophical perspective, then an opportunity to change contemporary neoliberal market and governance systems' political agendas is opened, and their associate values and impacts challenged. These systems' goals of financial profit for an entitled minority work through violent and destructive processes that continue to have devastating effects upon communities and the planet.[47] Identification of the systems in play enables intervention to occur, but epochal change is not always rapid. However, the reformation of social justice[48] and the generation of the necessary

45   Chronons are a proposed unit of noncontinuous quantum "time". The conception of a "quantum time" is still under debate by physicists. See, for example, discussions in Yakir Aharonov and David Bohm, "Time in the quantum theory and the uncertainty relation for time and energy" *Physical Review* 122, no. 5 (1961): 1649; and Ruy AH Farias and Erasmo Recami, "Introduction of a Quantum of Time ('chronon'), and its Consequences for Quantum Mechanics," *arXiv preprint quant-ph/9706059*, (1997).

46   Here, I refer the reader to Paul Ricoeur's three volumes on *Time and Narrative (1984–88)*, in which he argues that narratives are what constitute the historical time that is situated between the phenomenological and cosmological time that thinkers such as Husserl or Heidegger frame. Paul Ricoeur, *Time and Narrative, Volume 3*, trans. Kathleen Blamey and David Pellauer (Chicago: University of Chicago, 2014): 11f.

47   I am referring here to all forms of colonialist and capitalist drives and their effects on the planet and communities. See Vandana Shiva and Maria Mies, *Ecofeminism* (London and New York: Zed books, [1993] 2014); and discussion in Matthias Schmelzer, Andrea Vetter, and Aaron Vansintjan, *The Future is Degrowth: A Guide to a World Beyond Capitalism* (London: Verso Books, 2022).

48   By social justice I refer to the feminist call for the end of activities of militarism that cause political fundamentalism, violence against women and non-majoritarian bodies, and the equitable distribution of resources. See discussions in: Maria Mies, *Patriarchy and Accumulation on a World Scale: Women in the International Division of Labour* (London and Atlantic Heights, NJ.: Zed Books, 1986); Akwugo Emejulu, *Community Development as Micropolitics: Comparing Theories, Policies and Politics in America and Britain* (Bristol: Policy Press, 2015); Tithi Bhattacharya, ed., *Social Reproduction Theory: Remapping Class, Recentering Oppression* (London: Pluto Press, 2017); Nancy Fraser, *Cannibal Capitalism: How our System is Devouring Democracy, Care, and the Planet and What We Can Do About It* (London & New York: Verso Books, 2022).

planetary ethics[49] require change to rapidly occur, making ethics a time-based priority. This ethics is based on achieving a feminist ethos, not a moralistic modal framework for living. In moving from the theological to the digital and quantum technological modes, the critique is moved beyond the singular (individual; pathology) to the collective (communities of bodies, including sentient and non-sentient entities), and the urgent question is: *What are the conditions motivating community and planetary destruction?* How is the modal logic of temporality to be thought if the duration of communities is finite, and the planetary conditions supporting that resource is unstable.

Most societies place a temporal measurement into a material body so that its parameters can be readily identified. This kind of measurement is performing a political physics. Analogue temporal measures have long histories: the sundial, the town crier, the clock, the celestial bodies, the temperature of a body (sentient or non-sentient, air, land, or sea living creatures), and the life of a body or thing. The digital requires a linearity for reckoning events, and sequencing of command chains for operations to progress. Quantum information theory and quantum physics have shifted the quiddity of the values and the measurements that societies use to speak of time. How this change manifests in daily life is a question that constantly emerges in experimental modes that seek other ways of expressing and bringing to form in the worlds they inhabit and recognize as a reality. While the method of computation of the temporal-physicality of the labour market radically changed in the technological shift from analogue to digital calculations, both still assemble and perform measurement modalities that engage medieval and classical knowledge paradigms that are absolute in their counting of labour time—either by diachronous, or synchronous methods.[50] Within this temporal control of bodies by the market, we know that the historically politically marginalised bodies are the ones most exploited, in both analogue and in algorithmic frameworks (service industry construction labour market; algorithms of oppressions).[51]

49   A planetary ethics calls for an end to the destruction of environments and communities through extractive processes, and invasive agricultural methods, and the use instead of sustainable use of the planetary resource. See Shiva and Mies, *Ecofeminism* (2014); Vandana Shiva, *The violence of the Green Revolution: Third World Agriculture, Ecology and Politics* (London and New York: Zed Books, 1991); Vandana Shiva, *Earth Democracy: Justice, Sustainability and Peace* (Berkeley, California: North Atlantic Books, 2005).

50   Cf. Arno Borst, *The Ordering of Time: From the Ancient Computus to the Modern Computer* (Chicago: University of Chicago Press, 1993), 126; I also engage with Foucault's conception of the epistemes of the temporal control of the body in Felicity Colman, "Digital Biopolitics: The Image of Life", in *Resisting Biopolitics: Philosophical, Political and Performative Strategies*, eds., S. Wilmer and A. Žukauskaitė (London & New York: Routledge, 2016):189–201.

51   Cf. Maria Mies has written extensively on the problems associated with asymmetric division of labour by biological difference, in Mies, *Patriarchy and Accumulation on a World Scale: Women in the International Division of Labour* (London and Atlantic Heights, NJ., Zed Books, 1986, 44–47); Nancy Fraser describes the ongoing problems inherent with the division of economic production and social reproduction in Fraser, *Cannibal Capitalism*, 55–58, Safiya Umoja Noble describes the racialisation of algorithmic governance in Safiya Umoja Noble, *Algorithms of Oppression* (New York: New York University Press, 2018, 24-6; 179).

The classical modal political frameworks of cyclical and linear time are generally organised by three approaches aimed to measure and define temporal notions; space (the physics; and territorial control); re/productive modes (governance of the labouring body); and matter (resource control). In other words, existence is predicated by androcentric practices of subjectivation of all things in the world (through practices of colonialism, enslavement, extraction, and exploitation of resources). With quantum theories concerned with measurement, came the awareness that the laws of general relativity allow for a coordination and observation of measurement of the temporal movement of a thing (making concrete the abstract conception of time), however, observations dissolve the notion of a linear movement, and highlight the role that technology plays in any form of measurement. [52]

The physical discontinuity that Heisenberg's uncertainty principal and Bohr's indefiniteness principle show is the discontinuity of and between phenomena.[53] With these features comes the awareness that any event can be either an a priori predicated observation, or an experimental interaction, with any number of contingent outcomes; or a simultaneous superposition of multiple states. With the informational ideation of quantum philosophy, the temporal Aristotelian linear narrativisation of *arche* to *telos* is refigured; released from the classical Euclidean configuration of people and their places; and by implication the science data of theoretical physics (special relativity; quantum mechanics; quantum gravity) disrupt normative social conceptions of the constructs of "reality."[54]

In quantum mechanics, and in the early twenty-first century philosophy of physics, "time" as an object and as a concept has been shown to be not a singular monolithic continuous thing. Rather, in quantum, an entity cannot be described in terms of a "time" rather, objects observed within a field are described as localised, relational, possibly multiple, gravitationally contingent, and the notion of causality—as we understand it in classical physics—is indeterminate at any given moment. Through the conception of quantum, we begin to glean that "time" as a narration of a continuous flowing thing is a false narrative. If light is a particle (photon) and the flow of photons is a wave, then it follows that the measurement of

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52   Giovannetti, Lloyd, and Maccone, "Quantum time," 4.

53   The implications of this are still under debate. See the discussions by Arkady Plotnitsky, "A Toss Without a Coin: Information, Discontinuity, and Mathematics in Quantum Theory." *Entropy* 24, no. 4 (2022): 532; and Maralee Harrell, "On the possibility of feminist philosophy of physics," in *Meta-Philosophical Reflection on Feminist Philosophies of Science*, eds., Maria Cristina Amoretti and Nicla Vassallo (Boston Studies in the Philosophy and History of Science 317, 2016), 28.

54   Cf. Both physicists and philosophers' descriptions of this change, including Carlo Rovelli, *Reality is Not What it Seems: The Journey to Quantum Gravity* (Great Britain: Penguin, 2018); Arkady Plotnitsky, "Nature has no elementary particles and makes no measurements or predictions: Quantum measurement and quantum theory, from Bohr to Bell and from Bell to Bohr," *Entropy* 23, no. 9 (2021): 1197. doi.org/10.3390/e23091197

light is a contextualised frame of something. "Time" in and of this quantum world is actually not the correct expression as quantum mechanics demonstrates. While time is used as a quantification measure (e.g., what is the time of the sunrise; the prayer; the stockmarket), its qualification within different modal worlds is variable, and imprecise; and as a quantitative method, a classical time measure is bound to the political dimensions of that world (as Foucault describes of the epistemic models of human organisation).[55]

How does engaging a quantum modal change the notion of the measurement of duration; and with it the very conception of time? Linear time modalities are intrinsically bound with patriarchal systems that govern the production and control of all resources. Within these systems, what is contextually comprehensible is made normative, with rationales and epistemic evidence provided for the stable governance of that normativity. Further, different modal frameworks are durational experiences which are narrativised through perspectives which may or may not be ethical in their motivation; and within their contextual ecology.[56] In the face of all such reflections, "time" is an inadequate expression to incorporate all such known shifts in comprehension, but a radical shift in the temporal control of resources has significant economic implications, as we have already seen through the transformation of the working week brought by technological and biological social organisational changes.[57]

Why is it important to question if time is the most appropriate expression? For feminist scholars who have engaged with the implications of quantum mechanics and the field of quantum philosophy, the possibilities of an ethical future society are opened by the unmaking of normative epistemic and ontological fields. The implications of this reform contribute to the countermanding modes of quantum feminicity; where a reconceptualization of the previous frameworks enable a freedom from an object based foundational narrative (Barad); or empower an activist or previously framed "revolutionary" sense of the implications of space-time-matter governance (Shiva); and or reconfigure completely the notion of human cognition (Hayles); in all, transmuting or mutating normative notions of "reality" and worlds.

Engaging with the pluralities of worlds (variously named aspects and sites of human-centric life;

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55   Michel Foucault, *The Order of Things: An Archaeology of the Human Sciences*, trans. Alan Sheridan (New York: Vintage, 1973).

56   I am thinking here of the ethical ecology of a non-human animal that kills other animals to consume for survival as opposed to the moralist ecology of a human that kills other humans for political reasons. For a considered discussion of how to approach a posthuman ethics, see Patricia MacCormack, *Posthuman Ethics: Embodiment and Cultural Theory* (London & New York: Routledge, 2016).

57   E.g., see discussion of changes in worker time due to Covid-19 in Naila Kabeer, Shahra Razavi, and Yana van der Meulen Rodgers "Feminist economic perspectives on the COVID-19 pandemic," *Feminist Economics* 27, no. 1–2 (2021): 1–29.

experience, reality, the metaverse), feminist activities always involve invoking and or engaging different temporal modes. Feminist thinkers are quick to point out the reproductive and service labour-time associated with a gendered and racialised "woman-body" as a problematic biological and essentialist politically linear-time framework: Frederici, Grosz, Jackson, Mies, Keeling, Butler, Haraway, Harding, Keller, Longino, Barad—to name but a few—all address this problem in different ways. Why should bodies named as "women" be fixed within the domestic labour-producer agendas mandated by all kinds of institutional governance? Time within current patriarchal capitalist systems is relegated to the economic agendas of the productivity of a politically and culturally biologically determined body; what it literally can and cannot produce in its time-sensitive activities of child production, rearing, and related service, and largely un-paid labour structures. The biopolitics of a body is regulated by the economic time agendas of the market system of its lived existence. With the advent of datafied society, digital processes had the effect of increasing labour work-time frameworks, some shifts occurred; other possibilities came into those frameworks, but still the governing androcentric paradigms remain; adhering to linear service time.[58]

Twentieth century critical philosophy has done much to critique the binary coding of time, which renders absent those bodies not engaged in narrativising and governing the canonic progression of performing (procreating and "progressing" humanity), producing (the labour required for the production of things (Derrida; Irigaray; Kristeva; Federici), and governing (dissemination of the "correct" epistemic modes and their effective implementation and impact). The measurement of something implies there is a value system ascribed to making meaning from the quality, quantity of information and data of all kinds; for example, the inclusion of sentient lived experience, and planetary health measures (all of which have their own modal frameworks for value continuity.[59]) The measurement of something also involves a technological platform, medium, or framework; whether that is mechanical (physical), informatic (analogue, digital, or qubit data), or conceptual (modal) which mediates the participant and the situation. The metaphysical, philosophical implications of entangled qubits offer a countermanding of time as we currently describe it: where an entanglement of things leads to the creation of something novel, or a superposition can create uncertainty, or decoherence, and destruction of the parts or whole. With quantum, the linear temporal narrative is undone.

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58   see Liberty Chee, "Being of Use: Diffraction and an Ethics of Truth-Telling in Post-Cartesian IR," *Global Studies Quarterly* 2, no. 3 (2022): 1–10, https://doi.org/10.1093/isagsq/ksac049; Phoebe V. Moore, "Tracking affective labour for agility in the quantified workplace," *Body & Society* 24, no. 3 (2018): 39–67, https://doi.org/10.1177/1357034X187752; and Judy Wajcman, *Feminism Confronts Technology* (University Park: Pennsylvania State Press, 1991).

59   Modal frameworks are a topic I have addressed in two other papers to which I refer the reader: F.J. Colman, "Modality," *Philosophy Today* 63: no.4 "New Concepts for Materialism", (2019): 983–998; Felicity Colman, "Feminising politics: notes on material and temporal feminist modal logics in action," *Matter: Journal of New Materialist Research* 1, (2020): 1–22.

In considering the countermanding of classical time, how do we best express the varied senses of time in a quantum mode, as a quanta or qubit of an entity in its entangled relationality? While this is a field still under debate, the classical conception of "time" is dissolved by quantum technology for a number of physics probabilities, measured by mathematical problems, the quantum algorithm has been shown to be calculating an unstable, unpredictable, and uncertain state.[60] As a result, the expression of a quantum algorithm of an entity is through the observed actions of qubit, leading to expressions of their movements of entanglement as states of quantum decoherence, and superposition, and a quest to measure these movements.

For all of these reasons, consideration of the quantum realm is resonant with feminist objectives. Following this, we can begin to describe what might constitute a quantum of time (chronon) *renamed more generally as quantum mode*; and begin to articulate this in the terms that the scope of quantum feminicity conceptualises. The following (and final) sections of the article explore three different quantum modal aspects; countermanding (not linear); superposition (not gender); and experimentation (not only experiential).

4. Quantum Feminicity: Countermanding Time

To countermand something is to not only refigure the systems of the temporal order of things, but in the countering, new systems thinking, and new conceptual models are opened. The etymology of countermand indicates the possible modalities the word opens: to counter or go against [L: *contra*] a command [L: *mandare*] is about intervention into an existing; actual political domain.[61] If we tease apart the actions of experiences of countermanding the temporal by disengaging the gender and sex difference emphasis of the feminists' field work, we can instead refocus on the methods and modalities that are being practiced in relation to the situated nature of technological platforms invoked. Engaging the framework of quantum as a technology that has radically countermanded the classical notions of time, through the physical awareness of the movement of sub-atomic particles, effects the understanding of material properties, systems, and modal possibilities. There is a difference to be explored between classical and capitalist time as a mode of production, and quantum modes that offer ways to express worlds and their dynamic movements.

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60   See footnote 5 references.

61   Countermand came to English in the 1400s, via Anglo-Norman, where the prefix *cuntre* ("against") was combined with the Latin verb *mandare* (Eng. verb mander); ("to command").

The broad feminist ambition is to critically examine and change temporal narratives and their cultural and social frameworks. Feminists push back against their (historically sexed and gendered) bodies being placed as temporal objects as the gendered time-bound producers of the patriarchal lineages. No wonder the description of the physical nature of reality is of interest to feminist, and more broadly, posthumanist thinkers. The conceptual schemas posited by numerous feminist texts consistently engage with or address the issues of a constructed reality: the technicalities of a measurement system and a measurement process that determines value of objects and subjects in that system, but further, ranks them according to the durational hierarchies in that system. *A room of one's own* (Woolf 1929), *Ecofeminism* (Mies and Shiva 1993), and *Empire's Endgame: Racism and the British State* (Bhattacharyya et al, 2021) each summon the political matter of the female gendered object in terms of spatial cardinals (Woolf's situation/ requirement for privacy), the calendric (the ecofeminist movement of Verdana Shiva's protest against agricultural extractive techniques and control of reproductive cycles), and the economic politics of their physical material situation (of the colonial timeline that engenders a continual scale of racism that is sustained by global capitalism, digital environments, poorly managed nation states discussed in *Endgame*).

Each of these works express temporal modes of determination, describing a local experience in and of that situation and generating a different perception of a durationally lived event. Some narratives will engage a gendering, class, racializing, or ableist mode to describe a linear or genealogical account of events-in-time, but additionally identify where perceptual awareness changes. These are *vector-points* of quantum feminicity: a mode of production that enables engagement with the materially produced situation in its culturally political situation and in its social political biological predications and flips it, countermanding the meaning of the dissonant matters brought into form.[62]

There are numerous philosophical and cultural contexts where countermanding time refers to the idea that time is not of the androcentric capitalist mode—fixed, linear and progressive—but is instead understood in different contexts and by different social worlds as multi-layered, folded, subject to deontic manipulation or biological modal influence. Another example is Hayles's use of the speculative mode to explore the nature of a technologized subject. Her work repeatedly returns to critique science-fiction worlds that use patriarchal modalities that objectify non-masculinist body-tropes. Hayles acknowledges quantum mechanics as a part of simulation modelling that occurs in the fictive texts she analyses. She does not engage with the language of quantum per se but is clearly drawn to the

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62   I use the term "vector" in the mathematical quantum sense—meaning it is the movement of matter between an action and a resultant condition (x moves diffractively, or in waves; we get sound and or light images). Describing the concept of superposition, François Laruelle says the "quantum model is a vector model," noted in François Laruelle, and Katerina Kolozova, "Non-Standard Marxism: A Quantum Theory Approach: Не-стандарден марксизам: Квантно-теоретски приод," *Identities: Journal for Politics, Gender and Culture* 12, no. 1–2 (2015): 7–21, 9.

temporal states of superposition, and material entanglement. For her, the key points in her speculation on such texts is her interest in cognitive and non-cognitive consciousness as generated by technological possibilities that require a user (or observer) to interact/ activate them, "recognising that multiple causalities simultaneously interact with one another as both means and method."[63]

In the essay "Digital Feminicity," I pointed out that "Experience is a temporal marker of the technological conditions of gender's ability to perform itself."[64] Thinking with quantum modes signals more than an awareness marker: the perception of that performative action and of the movement of an experiment itself. First, second, and third-wave feminist narrative modes describe "experience" using classical temporal properties including affective, deontic, phenomenological, and pedagogic modes.[65] With quantum feminicity a countermanding of classical time occurs where the individuated embodiment of humanism—and its insistence upon "knowledge"—is dispelled, and the notions of understanding, and experience-as-encounter that exceed cognitive and noncognitive consciousness can be activated through possibilities afforded by situations and contingent events that change things. Situations and events may be lived through by individual bodies and these may contribute to the narrativisation of experience; given form through different modalities (such as we see in the popularity of time-travel media forms—tv—film—literature). Some objects and concepts coalesce and can be described through experimental modes (like light quanta); as agential, informational, and imaginative,[66] but some remain in experiential modes (some might say phenomenological or affective), and while they act as vector-points (marking the moment of change), they generally do not countermand the standard temporal narrative.

For example, we could say that media forms such as afrofuturism (where modalities of race and technology conglomerate) act like qubits: entanglements of different bits of information. There is an energy that disassembles the quantifiable temporal framework (music is an easy exemplar here: Alice Coltraine: Janelle Monáe), and it is generative of new forms for a community to coalesce through

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63   Katherine N. Hayles, *My Mother was a Computer* (Chicago: University of Chicago Press, 2010), 217.

64   Felicity Colman, "Digital Feminicity."

65   Claire Colebrook describes the first, second, and third feminist waves in terms of their proposals for a "different future"—and thus offering a different possibility for ethics, in Claire Colebrook, "Stratigraphic Time, Women's Time," *Australian Feminist Studies* 24, no. 59 (March 2009): 11–16; 13. doi.org/10.1080/08164640802645125

66   For a discussion of the different methods for addressing light quanta, see Roy J. Glauber, "One hundred years of light quanta," *Nobel Lecture* 8, *ChemPhysChem i7,* (2006 [2005]): 1618–1639. DOI: 10.1002/cphc.200600329. Some of the different modalities engaged today are mapped in F. J. Colman, "Modality," *Philosophy Today* 63; no.4 "New Concepts for Materialism" (Fall 2019): 983–998, Table 1: Fragment of a Modalities Map. DOI: 10.5840/philtoday2020124307

entangled modes of participation and content. We listen to music, and if it is percussively persuasive, we become immersed in it and new worlds appear, and the music moves in and out of situations and changeable states. That is, at least upon the first or second listening, or in a "live" improvised situation that is dynamic and not static.

But a dilemma arises with the decoherence afforded by the vectors of any form of difference—whether it is presented as novelty, framed as a form of futurism, or described as a theory of change. In some of her stage and recorded performances, the American pop-singer, Beyoncé (b.1981) adopts the visual presentation of her musician's body as a disaffected worker of Fritz Lang's highly sexualised robotic body of the "woman" Maria from the film *Metropolis* (1927). Using the guise of a technologically dislocated body to be expressive of the collective worker/slave/woman experience, Beyoncé presents her performing body as "afrofuturist," but is the transformative process of dis-assemblage in fact rendered static through the repetition of the pop industry capitalist framework? Media forms can be novel in their countermanding of currencies but then re-synthesised for mass market consumptive desires. Beyond the modernist appropriation of the sense of a disaffected political state is what Kodwo Eshun identifies as proleptic to describe what the afrofuturist work is doing. Eshun identifies an unease in the aftrofuturist temporal state, describing it as "a cultural moment when digitopian futures are routinely invoked to hide the present in all of its unhappiness." He continues that the significance of afrofuturism is that it aims to "extend the tradition" of countermemory "by reorienting the intercultural vectors of Black Atlantic temporality towards the proleptic as much as the retrospective."[67] Beyoncé's prolepsis, as Eshun identifies of aftrofuturism, acts in the media realm as a utopic site. Although its processes move through a disruptive mode, its modernist gesture ends up becoming the perfect capitalist mode of production of a product, although of course with the previously minoritized body being the recipient of profit from their labour. The retro-performance of Maria the utopic female-gendered sex-robot is less of an experiment but offers a collective and affirmative visual experience for its target audience,[68] situating it as a mode of digital feminicity where a range of bodies perform through a particular set of digital technological conditions. The quantum mode is, perhaps, found in the experiential movement of the sound, not in the image.

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67   Kodwo Eshun, "Further considerations of Afrofuturism," *CR: The New Centennial Review* 3, no. 2 (2003): 287–302, 289.

68   Nahum Welang argues that Beyoncé's performance of different temporal states of the American black woman's experience is an exorcism that results in a "new reimagined self," in Nahum Welang, "Triple consciousness: The reimagination of Black female identities in contemporary American culture," *Open Cultural Studies* 2, no. 1 (2018): 296–306, 302. Welung's use of a journey narrative engages rituals, and iconography, engaging a deontic modal framework.

5. Quantum Feminicity: Modes of Superposition (**not gender**)

Unlike neoliberal feminists, whose objective is focussed on achieving an individuated economic equality, rather than a collective or community, the left feminist objective is to examine how forms of power and agency are given to bodies of differing abilities, classes, ethnicities and neurodiversities.[69] Feminists of non-neoliberal persuasion—according to their local situation—work to show, intervene, and change all forms of exploitation and oppression that non-majoritarian bodies endure.[70] Feminists argue that the heterogeneity of subjects, communities, kinships, and all sentient beings must be recognised rather than being exploited as an innate, object-for-profit for use by the dominant governance framework: the family, the education system, the state, and global governance systems. According to the World Economic Forum [WEC] (2022) benchmarks for gender parity across four key dimensions (Economic Participation and Opportunity, Educational Attainment, Health and Survival, and Political Empowerment), the current global gender parity gap remains at 68%.[71] Engaging a breadth of feminist modalities, critical feminist theory is not limited to a single ideology or methodology, but encompass a wide range of views and practices that are concerned with challenging and transforming those four broad arenas identified by the WEC; systems of patriarchy, oppression, and inequality based on gender.

Feminists provide models of activism against oppression and exploitation at their local levels that pinpoint the problems that this kind of systematic androcentric bias generates against the bodies under duress, including (but not exhaustively), intersectional racial and sexual discrimination (discussed in Crenshaw, McKittrick, Tate) from absolute fear of difference by an aggressive militarised patriarchal process (Frederici) to accounts of the current women's revolutionary movement in rural India (Ghandy, Shiva), where caste-based violence against women combine with patriarchal systems of oppressions and cycles of poverty continue to be exploited by capitalist labour forms (Fernandes).[72] Their interventions

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69   Cf. the work of Tithi Bhattacharya ed., *Social Reproduction Theory: Remapping Class, Recentering Oppressio*, (London: Pluto Press, 2017).

70   By "non-neoliberal" or "left feminism," I am focussing here on those feminist actions that are not in the service of neo-liberal capitalism, such as Catherine Rottenberg describes in "The rise of neoliberal feminism" *Cultural studies* 28, no. 3 (2014): 418–437. https://doi.org/10.1080/09502386.2013.857361

71   World Economic Forum, "Global Gender Gap Report 2022," (2022). Available at https://www.weforum.org/reports/global-gender-gap-report-2022/

72   Cf. Kimberlé Crenshaw, "Demarginalizing the Intersection of Race and Sex: A Black Feminist Critique of Antidiscrimination Doctrine, Feminist Theory and Antiracist Politics," *University of Chicago Legal Forum*, no . 1, Article 8, (1989): 139–167. http://chicagounbound.uchicago.edu/uclf/vol1989/iss1/8; Katherine McKittrick, ed., *Sylvia Wynter: On being human as praxis* (Durham and London: Duke University Press, 2015): 16–24; Shirley Anne Tate, *From Post-Intersectionality to Black Decolonial Feminism: Black Skin Affections* (New York: Routledge, 2023); Vandana Shiva, *The violence of the green revolution: third world agriculture, ecology and politics* (London and New York: Zed Books, 1991); Vandana Shiva, *Earth democracy: Justice, sustainability and peace* (Berkeley, California: North Atlantic Books, 2005); Anuradha Ghandy, whose teachings to womens'

are points of life (which I describe below as feminist quantum-vectors), demonstrating and demanding change.

Nancy Fraser proposes approaching gender "bifocally," identifying two ways that gender is commonly viewed. First by class distribution and second by status recognition, Fraser advocates for viewing the two approaches viewed "simultaneously."[73] Gendered classes are identified by paid productive labour forms (majority of jobs allocated by historical androcentric systems that determine the economic structures within paid labour: higher pay for "hard," professional career work for the men, lower pay for "soft," service industry work for the women). Fraser argues that only when these two lenses are "superimposed" will we have a "viable feminist politics in the present era."[74]

However, contra Fraser, quantum feminicity argues that feminist demands cannot achieve their objectives by concentrating solely on the problem of gender structures. Feminist activities all conceptualise the illusory, false, limiting, and poorly conceived aspects of temporal linear conformity. With the proliferation of digital communications platforms, there is more access to information about the multiple voices and narratives where the patriarchal colonial world determines its progressive economic minoritarian success. Campaigns are run; interventions are staged. But the unsustainable resource consumption model remains with the social reproduction model of body control (the constant requirement for the various working-class bodies to deliver the service and care industries' needs and engage in information governance, education, and resource control). What quantum thinking enables us to do is to not just articulate but to engage more deeply with the problems that Fraser identifies since quantum enables us to think of this superimposition as actually a superposition.[75] Superposition is a quantum term, describing the ways in which matter can exist in overlapping states with other matter, making its entangled state become something else. We acknowledge that a cause of "something" can never be attributed to a singular cause; there are always multiple states of things. Superposition, as Stacy Moran describes, is a useful complementary quantum concept to think with in relation to the

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groups in Dandakaranya region that covers tribal Bastar in rural India, are collected in Anuradha Ghandy, *Philosophical Trends in the Feminist Movement* (Beijin: Foreign languages Press, 2021); Fernandes, Leela. *Producing workers: The politics of gender, class, and culture in the Calcutta jute mills* (Philadelphia: University of Pennsylvania Press, 1997).

73   Nancy Fraser, *Fortunes of feminism: From state-managed capitalism to neoliberal crisis* (London and New York: Verso, 2013), 162–3.

74   Fraser, *Fortunes of Feminism*, 162.

75   On superposition's relevance for feminist work on how power structures are maintained and organised, see discussions in Pothos, Emmanuel M., and Jerome R. Busemeyer, "Can Quantum Probability Provide a New Direction for Cognitive Modeling?" *Behavioral and Brain Sciences* 36, no. 3 (2013): 255–74. doi:10.1017/S0140525X12001525; Stacey Moran, "Quantum Decoherence," 1052.

agential realist conception of the entanglement of matter, as it asks us to consider entanglement as interference that can be destructive and constructive.[76] How we can begin to articulate the experience of what a body can and could be, imagining the superpositioned states of things in a world, for example, describing the sensations and processes and systems of layers of water, plant, and chemical particles, will lead us to different accounts of life.

6. Quantum Feminicity: Experimental Modes (and Experiential Movement)

The quantum mode refigures the androcentric use of "women"—of being subjects that are matter-object-tools for the service-delivery of the capitalist system. Time-based technology forms show this awareness of possibility, and quite explicitly, demonstrate the time of cultural violence: the tedium of gender specific social and cultural requirements, the laborious time of the day of a housewife or mother, the tedium of time of gendered adolescence, of institutionalised education, domestic labour and neocapitalist work, and the care and service roles for the vulnerable.[77]

Some interpretations of quantum mechanics suggest that time is not a fundamental aspect of reality but is instead emergent from other underlying physical processes. In this sense, countermanding time is disruptive of the normatively perceived flow of time.

Arkady Plotnitsky argues that the concept of a quantum field—as a mode of what he describes as "reality without realism," "makes the terms "observation" and "measurement," as conventionally understood, inapplicable in considering quantum phenomena."[78] Plotnitsky broadly proposes the term "experiment" as preferable to "measurement," and I agree; following that the implications of the term experiment is central for quantum literacy, as it enables to all kinds of creative generative concepts and forms,[79] as well as producing failures, and the possibility of the destruction of things.

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76   Feminists might also reach for the concept of intersectionality here; but that is a specific diagram-matisation of the redress required for racialised, gendered, and hierarchised bodies. Coming from a post-structuralist condition; its fixed historical situation (of specific cases) holds a different meaning that the multiple worlds modal experiment of superposition.

77   Contemporaneous screen media forms such as television and the cinema are particularly adept as mirroring the political positions of bodies.

78   Arkady Plotnitsky, "Nature has no elementary particles and makes no measurements or predictions: Quantum measurement and quantum theory, from Bohr to Bell and from Bell to Bohr," *Entropy* (23, no. 9 (2021): 1197, doi.org/10.3390/e23091197

79   For example, see Laurie Anderson's creative use of the concept of quantum in her essay, "Quantum Listening is Full of Space and Questions," in Pauline Oliveros, *Quantum Listening*. Ignota.org. 2022: 1–6.

With quantum feminicity, the experimental is the mode of activation, of a change of the state of things. Quantum physics describe things as contingent thereby changing what were thought to be unconditional laws of "nature." Similarly, feminist work strives to describe the physical, spatial and temporal nature of the constructed reality that they find their bodies located in and by: just because of the governance of their corporeal visible embodiment of a genealogy of ethnicity, gender, and or social class—through androcentric modals. Feminist theories (of whichever methodological inclination) describe how the production of a gendered body is contingent upon the referential values of the observer of (the body), and protest at the implications this observation holds. While this description might seem resonant with the theory of relativity,[80] actions now described as diffracted, entangled, decoherent (Barad; Plotnitsky) lead us to think quantum modes for framing our contingently fragile, and slippery existence in the worlds we inhabit.

I am not arguing that there has been a "quantum turn" in the same way that theorists have advocated for a "material," "affective" or "intersectional" turn.[81] While quantum concepts are undoubtedly in their early stages, they are nevertheless being used as methodological tools and modal metaphysics.[82] I am interested to surface the idea that thinking with quantum modes is a feminist philosophical action, which I describe here as quantum feminicity to infer the condition of quantum as a potential transformative mode and the condition of feminism. Feminist activism seeks to achieve change through processes of systematic and transparent ethically minded equitable ways of being. I want to consider how engaging quantum is to reach through the "what is reality" question that Latour examined, to the emergence and naming of (an) existence as a mode that examines how existence itself, as a "reality," is

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80   Arkady Plotnitsky demonstrates that: "Relativity was the first physical theory that defeated our ability to form a phenomenal conception of individual physical behaviour, and as such, it was a radical change in the history of physics." In Arkady Plotnitsky, "Nature has no elementary particles and makes no measurements or predictions: Quantum measurement and quantum theory, from Bohr to Bell and from Bell to Bohr," 6.

81   Cf. Maria Carbin and Sara Edenheim, "The intersectional turn in feminist theory: A dream of a common language?" *European Journal of Women's Studies* 20, no. 3 (2013): 233–248; Patricia Ticineto Clough and Jean O'Malley Halley, eds., *The Affective Turn Theorizing the Social* (Durham: Duke University Press, 2007): 1–22; Iris Van der Tuin, "New feminist materialisms," *Women's Studies International Forum* 34, no. 4, (2011): 271–277.

82   Cf. Karen L. O'Brien, "Climate change and social transformations: is it time for a quantum leap?" *Wiley Interdisciplinary Reviews: Climate Change* 7, no. 5 (2016): 618–626; Jay Gambetta, "IBM's Roadmap for Scaling Quantum Technology," IBM Research Blog, (September 13, 2022), https://research.ibm.com/blog/ibm-quantum-roadmap.

constructed, and by what narratives, material artefacts, and technological platforms is it constituted.[83] Quantum feminicity, as such, is a part of the modal realist philosophical movement, engaging with modal metaphysics to engage with the concepts that given our everyday lives form actuality, possibility, and contingency. Meanings of the modalities for life (or paradigmatic realities as situated knowledges) are, however, crafted according to community and individual experiences. Life-duration involves the conditions of events (sometimes called experiences or phenomena), cognition of events (sometimes named as awareness, "intelligence"), and assemblages of information (counterfactual reasoning). These each entail different registers as different bodies trigger different quantum-vectors, but their meaning is generated by their modalities that are bound through their historical governance and limited to the contemporary situation—as Jackson cautions, "do not assume the transparent difference of the human."[84]

Adopting this cautious, contingent approach, feminist philosophy can no longer define "experience" as a counter point to "knowledge". *Or to put this another way, the feminist project of critical epistemological excavation of the conditions of their gendered experience are no longer the defining problem-to-be -solved.* Rather, feminist philosophy that engages the quantum modal framework approaches existence-as-reality is formed by different modes through which a subject and their community are co-constituted.[85] Recognising this co-constitution as an entangled state are quantum-vectors, which can be described by their modal organisation (such as we see with Beyoncé's reclamation of her black woman's body through a deontic modal framework).[86] These are subject to and constituted by not only possibilities

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83   Beyond the economy of this article, but contributing to my thoughts, is the question of modes of existence as it has been addressed in recent philosophy, cf; Étienne Souriau, *The different modes of existence,* trans Erik Beranek and Tim Howles (Minneapolis & London: University of Minnesota Press, 2016). The metaphysical implications of specific modal frameworks discussed by Bruno Latour, *We have never been modern*, trans. Catherine Porter (Cambridge, Massachusetts: Harvard University Press, 1993); Bruno Latour, *Pandora's hope: Essays on the reality of science studies* (Cambridge, Massachusetts: Harvard University Press, 1999); Bruno Latour, *An inquiry into modes of existence: An anthropology of the Moderns*, trans. Catherine Porter (Cambridge, Massachusetts: Harvard University Press, 2013); Graham Harmen's discussion of Latour's contribution to the debates on the metaphysics of reality in Graham Harmen, *Prince of networks: Bruno Latour and metaphysics* (Melbourne: re. press, 2009). See also Gilbert Simondon, *On the mode of existence of technical objects*, trans. Cecile Malaspina and John Rogove (Minneapolis: Univocal Publishing, 2017); and Yuk Hui, *On the Existence of Digital Objects* (University of Minnesota Press, Minneapolis, 2016).

84   Zakiyyah Iman Jackson, "On Race, Species and Becoming Human," *More-Than-Human Encounters*, collaboration of Vriji Universiteit Brussels Crosstalks and Kaaitheatre. (livestreamed March 25, 2021), last accessed 12/12/2022, https://www.youtube.com/watch?v=7YNJn0h4gCo

85   An exemplar of the kind of community practice I have in mind here is described in Dagmar Lorenz-Meyer, "Becoming responsible with solar power? Extending feminist imaginings of community, participation and care," *Australian Feminist Studies* 32, (2017): 427–44.

86   See fn 61.

that are opened through any countermanding temporal actions, but also the factors of contingency and actuality. How do we address then, the situated nature of the production of a communally emergent subjectivity? Can "a body" be accounted for within a quantum feminist register?

There are multiple modes of styles and forms of existence, but by way of heading toward a conclusion for this article, I want to briefly focus further on the formation of a quantum field, through experimentation, perhaps alongside an experiential mode. Instead of deferring to Kant or James's definition of experience to think about "reality,"[87] or Merleau-Ponty or Deleuze to talk about phenomenological human-centred affect, I connect with the work of new materialist scholars who are committed to investigating, as Barad defines, the "material nature of practices and how they come to matter."[88] The "reality" that quantum feminicity is generative of is through the haecceitistical attunement with the material practices of their condition. Feminists create different modes of being by rejecting androcentric structures and demanding not only a change, but as Jackson argues, what is urgently required is the "redress" of the notion of people—in all of their differences.[89] We see these modes of experience called into practices of all kinds—they may be autoethnographic or community in formation (Afrofuturist; Climate Emergency; Social justice work)—with different outcomes.

In Vandana Shiva's work, the pressing issues of climate justice, and just transitions for women's struggle against a violent and inequal cycle of overlapping systems are described in terms that draw upon simultaneous and superimposed temporal layers of a biopoliticised, gendered community body. Shiva's work on the women's liberation movement in rural India describes what Mohanty noted as a part of the feminist politics of experience, where a:

> temporality of struggle, which disrupts and challenges the logic of linearity, development and progress that are the hallmarks of European modernity… [the struggle is] an insistent, simultaneous, nonsynchronous, process characterised by multiple locations, rather than the search for origins and endings.[90]

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87   William James, "A world of pure experience," *The Journal of Philosophy, Psychology and Scientific Methods* 1, no. 20 (1904): 533–543.

88   Barad, *Meeting the Universe*, 45. For a feminist new materialist discussion that argues with a posthumanist phenomenological thesis, see Astrida Neimanis. *Bodies of water: Posthuman feminist phenomenology* (London: Bloomsbury Academic, 2017.

89   Zakiyyah Iman Jackson discusses the issue of redress in relation to racialised subject constructions throughout Zakiyyah Iman Jackson, *Becoming Human* (New York: New York University Press, 2020).

90   Chandra Talpade Mohanty, *Feminism without borders: Decolonizing theory, practicing solidarity* (Durham, N.C., Duke University Press, 2003), 120.

Modernism leads to a mode of production identified by Silva as a mode of experience that can only be changed when community switches to experiment with actions that might actually change things.

On a completely different political register, but nonetheless actively experimenting with the issue of vernacular temporal realities, Kristeva's essay *Le Temps des femmes* (1979) is regularly cited as such a vector-point text, meaning that its publication shifted thinking about a number of pressing political strands: that of the nation-state and its conception in Europe at the end of the 1970s. At the time of its publication, the issue of sexual equality is at the forefront of feminist interventions, as unpaid but economically required reproductive labour is required for the continuation of the monumental histories that economies rely upon, more bodies to service the economy through reproductive modes of labour. Against this background, Kristeva invokes the difficult political positions of the dominant feminist movements and methods of this era, particularly thinking on the notion of a "female subjectivity" in terms of its constitution by temporal narratives that deploy biological tropes to convey a modal gendering of time as it might pertain to the time-span of the biology of that human body with reproductive facilities: "cycles, gestation..."[91] Putting aside her focus on reading the 1970s feminist critique of psychoanalytic modal frameworks that forever condemn the subject to a life defined by psychosis (the phallocentric Freudian social and symbolic predication of "woman" as-deficit-narrative), what is striking in this article is Kristeva's characterisation of how we might think of societies as "sociocultural formations" that can be perceived in terms of the "multiple modalities of time known through the history of civilization."[92] This contrasts a notion of monumental time with a cyclical time, which instead refers to the past as a site of potential difference. Coming at the beginning of a new cycle of inflated global economic activity (1980s) and the start of the neo-capitalist imperative for progress, Kristeva's situation of her discussion on the "reproduction" required by the human species in order to maintain the "tributary of time" equates the patriarchal framework as a repressive technology where women's bodies are treated like nature: to be organised and controlled. This social time is controlled and maintained by "sociosymbolic" contracts to which gendered bodies must submit, a form of measurement which is rendered "objective" by androcentrist frameworks). Colebrook notes that: "Kristeva's "women's time" functions as a potentiality for a break with sequence, series and the progress of a self-developing subject in favour of a creative event that is nevertheless inflected by the past."[93] Kristeva's identification of the gestation time and the political problems of her historical time are couched within the analogue-time social frameworks. Recognising that Kristeva has described

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91   Julia Kristeva, "Women's time," trans. Alice Jardine and Harry Blake, *Signs: Journal of women in culture and society* 7, no. 1 (1981 [1979]): 16. https://doi.org/10.1086/493855
92   Kristeva, "Women's time," 16.
93   Claire Colebrook, "Stratigraphic time, women's time," 15.

a "potentiality for a break" Colebrook identified the active-point of critique as intervention: the potential opened by the feminist articulation—as a point where change can occur. *This potential is the quantum mode; it is the possibility of experimentation, and the name for a countermanded way to speak of experience more specifically in its modal operational form or system.* I would argue that this recognition is what opens community into a quantum mode where the androcentric temporal order (and its normative narratives) is countermanded not as a collective of androcentric time modals, but as empathetic, lived, experimental quantum-vectors that singularly provide access-to other conglomerates, or join-with, thereby generating a communal mode.

Concluding Remarks: The (Contingent) Modal Ends of Time

As we appreciate the notion of calculability in the current capitalist system of work and organisation, then any measurement is also a marker of epistemic categorisations, or as Bergson would have it, a measurement marks out the value system. If x value system = the mode of ethics, then when considering what form of temporal mode is being used in any given situation clues us into the ethos.

Experience can be conceptualised by the concept of time. Within and over time, actions, events occur, modal frameworks change. The impetus for change in societies is propelled by technology, requiring new design solutions. The technological changes in militaristic activities—from the invention of gunpowder, atomic power, information warfare, etc—generate new experiences, new worlds. But people generally detest change. They hold onto the structures they think they know and while they may be quick to adapt to a situational external change, they hold on to their learned behavioural systems. *This is a modal reality of androcentrism that is without the lived, experiential pluralism of the majority of life.* Philosophical and creative modes provide vectors to imagine how things could be otherwise (experimental possibilities = quantum mode), and or express how things are (actuality).

Jackson argues that "imagining a new world then, demands the reimagining of the body."[94] How do we achieve this requirement within the current contingencies of life; how to bring these ideations into forms that are not Frankensteinian. Feminism is nothing if not a critical metaphysics; one which not only examines the posited epistemic points of knowledge frameworks devised by the natural sciences, technology, theology, legal systems—including the familial, educational, national, and economic systems of governance, access, and human rights.

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94   Zakiyyah Iman Jackson, "On Race, Species and Becoming Human."

Thinking forms and experimenting through the lens of the work of feminists in community and joining with their identification of lived action-points cause an intervention into the status quo (through technology, through actions), and can generate a change in the dimensions of worlding conditions. The intervention engages the quantum paradigmatic—in that the feminist work has opened up access to the modes of their calculative production and lead to a deeper understanding of a quantum feminicity. Heeding Stenger's caution, this term is not intended to invoke another theoretical movement, rather it forms part of quantum literacy through a recognition of the work that is being done in instances of quantum feminism, moving actualities of androcentricism to possibilities for a different community of existence through experimentation. This paper has named just a few durational vectors in this transformational mode of production of feminist worlds, where the quiddity of modal systems narrativise their various states and processes (such as countermanding, superposition and experimental practice) through the naming of—the never singular—modalities of feminism. What quantum ideation of the constitution of forms and concepts in worlds provides for us is perception of the ways in which different measurement modalities engender different forms of material knowledge to be produced – and also the possibility of different modes of participation, as new technologies open different platforms for experimentation, data collection, observation and analysis of the dust that we are.

References

Aharonov, Yakir, and David Bohm. "Time in the quantum theory and the uncertainty relation for time and energy." *Physical Review* 122, no. 5 (1961): 1649-1658.

Alaimo, Stacy. *Bodily natures: Science, environment, and the material self*. Indiana University Press, 2010.

Anderson, Laurie. "Quantum Listening is Full of Space and Questions." In *Quantum Listening*, edited by Pauline Oliveros, 1–6. Ignota.org. 2022.

Barad, Karen. *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*. Durham, NC: Duke University Press, 2007.

Bargetz, Brigette. "Longing for agency: New materialisms' wrestling with despair." *European Journal of Women's Studies* 26, no. 2 (2019): 181–94.

Bennett, Jane. *Vibrant Matter: A Political Ecology of Things*. Durham, NC and London: Duke University Press, 2010.

Bhattacharyya, Gargi, Adam Elliott-Cooper, Sita Balani, Kerem Nişancıoğlu, Kojo Koram, Dalia Gebrial, Nadine El-Enany, and Luke De Noronha. *Empire's Endgame: Racism and the British State*. London: Pluto Press, 2021.

Bhattacharya, Tithi ed., *Social Reproduction Theory: Remapping Class, Recentering Oppression*. London: Pluto Press, 2017.

Borst, Arno. *The Ordering of Time: From the Ancient Computus to the Modern Computer*. Chicago: University of Chicago Press, 1993.

Braidotti, Rosi. *Posthuman Knowledge*. Cambridge: Polity Press, 2019.

Braidotti, Rosi, and Maria Hlavajova eds., *Posthuman glossary*. London and New York: Bloomsbury, 2018.

Brown, Nahum. *Hegel on Possibility: Dialectics, Contradiction, and Modality*. London and New York: Bloomsbury Academic, 2020.

Bühlmann, Vera, Felicity Colman, and Iris Van Der Tuin. "Introduction to new materialist genealogies: New materialisms, novel mentalities, quantum literacy." *Minnesota Review* 88, no. 1 (2017): 47–58.

Bühlmann, Vera, Felicity Colman, and Iris van der Tuin, "New Materialisms: Quantum Ideation across Dissonance," In *Methods and Genealogies of New Materialisms*, edited by Felicity Colman and Iris Van der Tuin. Edinburgh: Edinburgh University Press, 2024.

Carbin, Maria, and Sara Edenheim. "The intersectional turn in feminist theory: A dream of a common language?" *European Journal of Women's Studies* 20, no. 3 (2013): 233–248.

Chee, Liberty. "Being of Use: Diffraction and an Ethics of Truth-Telling in Post-Cartesian IR." *Global Studies Quarterly* 2, no. 3 (2022): 1–10, https://doi.org/10.1093/isagsq/ksac049

Clough, Patricia Ticineto, and Jean O'Malley Halley. eds. *The Affective Turn Theorizing the Social*. Durham: Duke University Press, 2007.

Colebrook, Claire. "Stratigraphic time, women's time." *Australian Feminist Studies* 24, no. 59, (March 2009): 11–16, doi.org/10.1080/08164640802645125

Colman, Felicity. "Digital Feminicity: Predication and measurement, materialist informatics and images." *Artnodes: Journal of Art, Science, and Technology* 14, (2014): 7–17. http://dx.doi.org/10.7238/a.v0i14.2408

Colman, Felicity J. "Digital biopolitics: the image of life." In *Resisting Biopolitics: Philosophical, Political, and Performative Strategies*, edited by Stephen E. Wilmer and Audronė Žukauskaitė, 189–201. London: Routledge, 2015.

Colman, F. J. "Modality." *Philosophy Today* 63, no.4 "New Concepts for Materialism" (2019): 983–998. DOI: 10.5840/philtoday2020124307

Colman, Felicity. "Feminising politics: notes on material and temporal feminist modal logics in action." *Matter: Journal of New Materialist Research* 1, (2020): 1–22. https://doi.org/10.1344/jnmr.v1i1.29895

Colman, F., & Van der Tuin, I, eds. *Methods and Genealogies of New Materialisms.* Edinburgh: Edinburgh University Press, 2024.

Coole, Diana and Samantha Frost, eds. *New materialisms: Ontology, agency, and politics.* Durham: Duke University Press, 2010.

Cornford, Francis MacDonald. *Plato's cosmology: The Timaeus of Plato.* Routledge, 2014.

Crenshaw, Kimberlé. "Demarginalizing the Intersection of Race and Sex: A Black Feminist Critique of Antidiscrimination Doctrine, Feminist Theory and Antiracist Politics." *University of Chicago Legal Forum*, (1989): 139–167. http://chicagounbound.uchicago.edu/uclf/vol1989/iss1/8

Crull, Elise M. "Exploring philosophical implications of quantum decoherence." *Philosophy Compass* 8, no. 9 (2013): 875–885

Der Derian, James, and Alexander Wendt, "'Quantizing international relations': The case for quantum approaches to international theory and security practice." *Security Dialogue* 51, no. 5 (2020): 399–413

Der Derian, James, and Alexander Wendt, eds. *Quantum International Relations: A Human Science for World Politics.* Oxford: Oxford University Press, 2022.

De la Cadena, Marisol, and Mario Blaser, eds. *A world of many worlds.* Durham and London: Duke University Press, 2018.

Demo, Anne Teresa. "Hacking agency: Apps, autism, and neurodiversity." *Quarterly Journal of Speech* 103, no. 3 (2017): 277–300.

Emejulu, Akwugo. *Community development as micropolitics: Comparing theories, policies and politics in America and Britain.* Bristol: Policy Press, 2015.

Eshun, Kodwo. "Further considerations of Afrofuturism." *CR: The New Centennial Review* **3**, no. 2 (2003): 287–302.

Faye, Jan, and Rasmus Jaksland. "Barad, Bohr, and quantum mechanics." *Synthese* 199, no. 3–4 (2021): 8231–8255.

Farias, Ruy A.H., and Erasmo Recami. "Introduction of a Quantum of Time ('chronon'), and its Consequences for Quantum Mechanics." *arXiv preprint quant-ph/9706059* (1997).

Federici, Silvia. "The reproduction of labour power in the global economy and the unfinished feminist revolution." In *Workers and labour in a globalised capitalism: contemporary themes and theoretical issues*, edited by Maurizio Atzeni, 85–110. New York: Palgrave McMillan, [2008] 2013.

Fernandes, Leela. *Producing workers: The politics of gender, class, and culture in the Calcutta jute mills.* Philadelphia: University of Pennsylvania Press, 1997.

Foucault, Michel. *The Order of Things: An Archaeology of the Human Sciences.* Translated by Alan Sheridan. New York: Vintage, 1973.

Fox, Michael F.J, Benjamin M. Zwickl, and H. J. Lewandowski. "Preparing for the quantum revolution: What is the role of higher education?" *Physical Review Physics Education Research* 16, no. 2 (2020): 020131

Fraser, Nancy. *Cannibal Capitalism: How our System is Devouring Democracy, Care, and the Planet and What We Can Do About It.* London & New York: Verso Books, 2022.

Gambetta, Jay. "IBM's Roadmap for Scaling Quantum Technology." IBM Research Blog, September 13, 2022. https://research.ibm.com/blog/ibm-quantum-roadmap.

Ghandy, Anuradha. *Philosophical Trends in the Feminist Movement.* Beijing: Foreign languages Press, 2021.

Giovannetti, Vittorio, Seth Lloyd, and Lorenzo Maccone. "Quantum time." *Physical Review* D 92, no. 4 (August 2015): 045033. DOI: 10.1103/PhysRevD.92.045033

Glauber, Roy J. "One hundred years of light quanta." Nobel Lecture 8, 2005. *ChemPhysChem i7,* (2006): 1618–1639. DOI: 10.1002/cphc.200600329

Ghosh, Indranil. "Quantum Game Theory—I: A Comprehensive Study." *Resonance* 26, no. 5 (2021): 671–684.

Haroche, Serge, and Jean-Michel Raimond. "Quantum computing: dream or nightmare?" *Physics Today* 49, no. 8 (1996): 51–52. https://doi.org/10.1063/1.881512

Haraway, Donna. "Situated Knowledges: The Science Question in Feminism as a Site of Discourse on the Privilege of Partial Perspective." *Feminist Studies* 14, no. 3 (1988): 575–99.

Haraway, Donna. "Anthropocene, Capitalocene, Plantationocene, Chthulucene: Making Kin." *Environmental Humanities* 6, no.1 (2015): 159–65, doi:10.1215/22011919-3615934.

Harding, Sandra G. *Whose Science? Whose Knowledge? Thinking from Women's Lives.* Ithaca, N.Y.: Cornell University Press, 1991.

Harmen, Graham. *Prince of networks: Bruno Latour and metaphysics*. Melbourne: re. press, 2009.

Harrell, Maralee. "On the possibility of feminist philosophy of physics." In *Meta-Philosophical Reflection on Feminist Philosophies of Science*, edited by Amoretti, Maria Cristina, and Nicla Vassallo, 15–34. Boston Studies in the Philosophy and History of Science 317, 2016.

Hayles, Katherine. N. *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics*. Chicago: The University of Chicago Press, 1999.

Hayles, Katherine N. *My mother was a computer*. Chicago: University of Chicago Press, 2010.

Hui, Yuk. *On the Existence of Digital Objects*. Minnesota, University of Minnesota Press, 2016.

Jackson, Zakiyyah Iman. "Theorizing in a Void" Sublimity, Matter, and Physics in Black Feminist Poetics." *South Atlantic Quarterly* 117, no. 3 (2018): 617–648.

Jackson, Zakiyyah Iman. *Becoming Human*: *Matter and Meaning in an Antiblack World.* New York: New York University Press, 2020.

Jackson, Zakiyyah Iman. "On Race, Species and Becoming Human." More-Than-Human Encounters series, collaboration of Vriji Universiteit Brussels Crosstalks and Kaaitheatre. Livestreamed March 25, 2021. Last accessed 12/12/2022, https://www.youtube.com/watch?v=7YNJn0h4gCo

James, William. "A world of pure experience." *The Journal of Philosophy, Psychology and Scientific Methods* 1, no. 20 (1904): 533–543.

Kabeer, Naila, Shahra Razavi, and Yana van der Meulen Rodgers. "Feminist economic perspectives on the COVID-19 pandemic." *Feminist Economics* 27, no. 1–2 (2021): 1–29.

Kaika, Maria, Angelos Varvarousis, Federico Demaria, and Hug March. "Urbanizing degrowth: Five Steps Towards a Radical Spatial Degrowth Agenda for Planning in the Face of Climate Emergency." *Urban Studies* 60, no. 7 (2023): 1191–1211.

Keeling, Kara. *Queer Times, Black Futures*. New York: New York University Press, 2019.

Keller, Evelyn Fox. *Reflections on Gender and Science.* New Haven: Yale University Press, 1985.

Käll, Jannice. "The potential for new materialist justice via Nordic feminist perspectives of law." *Nordic Journal on Law and Society* 3, no. 02 (2020): 1–28.

Kalirai, Jason. "Scientific discovery with the James Webb space telescope." *Contemporary Physics* 59, no. 3 (2018): 251–290.

Kolb, David A. "Time and the timeless in Greek thought." *Philosophy East and West* 24, no.2 (1974):137–143.

Konyndik, Kenneth J. *Introductory Modal Logic*. Notre Dame: University of Notre Dame Press, 1986.

Kristeva, Julia. "Women's time." Translated by Alice Jardine, and Harry Blake. *Signs: Journal of women in culture and society* 7, no. 1 (1981 [1979]): 13–35, https://doi.org/10.1086/493855

Laruelle, François, and Katerina Kolozova. "Non-Standard Marxism: A Quantum Theory Approach: Не-стандарден марксизам: Квантно-теоретски приод." *Identities: Journal for Politics, Gender and Culture* 12, no. 1–2 (2015): 7–21.

Latour, Bruno. *We have never been modern*. Translated by Catherine Porter. Cambridge, Massachusetts: Harvard University Press, 1993.

Latour, Bruno. *Pandora's Hope: Essays on the reality of science studies*. Cambridge, Massachusetts: Harvard University Press, 1999.

Latour, Bruno. "Why has critique run out of steam? From matters of fact to matters of concern." *Critical inquiry* 30, no. 2 (2004): 225–248.

Latour, Bruno. *An inquiry into modes of existence: An anthropology of the Moderns*. Translated by Catherine Porter Cambridge. Massachusetts: Harvard University Press, 2013.

Lewis, David K. *On the plurality of worlds*. Oxford: Blackwell, 1986.

Longino, Helen E. *Science as Social Knowledge: Values and Objectivity in Scientific Inquiry*. Princeton, N.J.: Princeton University Press, 1990.

Lorenz-Meyer, Dagmar. "Becoming responsible with solar power? Extending feminist imaginings of community, participation and care." *Australian Feminist Studies* 32, (2017): 427–44.

Maart, Rozena. "Race and pedagogical practices: When race takes center stage in philosophy." *Hypatia* 29, no. 1 (2014): 205–220.

MacCormack, Patricia. *Posthuman ethics: Embodiment and cultural theory*. London & New York: Routledge, 2016.

McKittrick, Katherine, ed. *Sylvia Wynter: On being human as praxis*. Durham and London: Duke University Press, 2015.

Mies, Maria. *Patriarchy and accumulation on a world scale: Women in the international division of labour*. London and Atlantic Heights, NJ.: Zed books, 1986.

Mies, Maria and Shiva, Vandana. *Ecofeminism*. London and New York: Zed books, 2014 [1993].

Mohanty, Chandra Talpade. *Feminism without borders: Decolonizing theory, practicing solidarity*. Durham, N.C., Duke University Press, 2003.

Moore, Phoebe V. "Tracking affective labour for agility in the quantified workplace." *Body & Society* 24, no. 3 (2018): 39–67. https://doi.org/10.1177/1357034X187752

Murphy, Michael PA. "Entangled observers? A quantum perspective on authority in critical security studies." *Critical Studies on Security* 10, no. 3 (2022): 119–131.

Neimanis, Astrida. *Bodies of water: Posthuman feminist phenomenology*. Bloomsbury Academic, 2017.

Noble, Safiya Umoja. *Algorithms of Oppression*. New York: New York University Press, 2018.

O'Brien, Karen L. "Climate change and social transformations: is it time for a quantum leap?." *Wiley Interdisciplinary Reviews: Climate Change* 7, no. 5 (2016): 618–626.

Padavic-Callaghan, Karmela. "Record-Breaking Number of Qubits Entangled in a Quantum Computer." *New Scientist*. July 12, 2023. https://www.newscientist.com/article/2382022-record-breaking-number-of-qubits-entangled-in-a-quantum-computer/.

Palmer, Helen. *Queer Defamiliarisation: Writing, Mattering, Making Strange*. Edinburgh: Edinburgh University Press, 2020.

Phillips, Rasheedah. "Black Quantum Futurism." *Journal of Architectural Education* 77, no. 1 (2023): 9–19.

Plotnitsky, Arkady. *The Knowable and in the Unknowable: Modern Science, Nonclassical Thought, and the "Two Cultures."* Ann Arbor: University of Michigan Press, 2002.

Plotnitsky, Arkady. "Chaosmologies: Quantum Field Theory, Chaos and Thought in Deleuze and Guattari's What is Philosophy?" *Paragraph* 29, no. 2 (2006): 40–56.

Plotnitsky, Arkady. "Nature has no elementary particles and makes no measurements or predictions: Quantum measurement and quantum theory, from Bohr to Bell and from Bell to Bohr." *Entropy* 23, no. 9 (2021): 1197. doi.org/10.3390/e23091197

Plotnitsky, Arkady. *Reality without realism: Matter, thought, and technology in quantum physics.* Switzerland AG: Springer Nature, 2021.

Poser, Hans. "Technology and Modality." In *Applied Virtuality Book Series Printed Physics—Metalithikum I*, edited by Vera Bühlmann and Ludger Hovestadt, 72–112. Vienna: Springer, 2013.

Pothos, Emmanuel M., and Jerome R. Busemeyer. "Can Quantum Probability Provide a New Direction for Cognitive Modeling?" *Behavioral and Brain Sciences* 36, no. 3 (2013): 255–74. doi:10.1017/S0140525X12001525.

Prigogine, Ilya, with Isabelle Stengers. *The End of Certainty: Time, Chaos and the New Laws of Nature*. New York: The Free Press, 1997.

Reydams-Schils, Gretchen J. *Plato's Timaeus as cultural icon*. Notre Dame, IN: University of Notre Dame Press, 2002.

Ricoeur, Paul. *Time and Narrative, Volume 3*. Translated by Kathleen Blamey and David Pellauer. Chicago: University of Chicago, 2014.

Rottenberg, Catherine. "The rise of neoliberal feminism." *Cultural studies* 28, no. 3 (2014): 418–437. doi.org/10.1080/09502386.2013.857361

Rovelli, Carlo. *Reality is not what it seems: The journey to quantum gravity*. Great Britain: Penguin, 2018.

Schmelzer, Matthias, Andrea Vetter, and Aaron Vansintjan. *The future is degrowth: A guide to a world beyond capitalism*. London & New York: Verso Books, 2022.

Schmitz, Sigrid, "The neuro-technological cerebral subject: Persistence of implicit and explicit gender norms in a network of change." *Neuroethics* 5, no.3 (2012): 261–74.

Seskir, Zeki C., and Arsev U. Aydinoglu. "The landscape of academic literature in quantum technologies." *International Journal of Quantum Information* 19, no. 02 (2021): 2150012.

Setia, Adi. "Fakhr al-Din al-Razi on physics and the nature of the physical world: a preliminary survey." *Islam & Science* 2, no. 2 (2004): 161–181. https://link.gale.com/apps/doc/A128606463/AONE?u=anon~53653369&sid=googleScholar&xid=756a53d2.

Shiva, Vandana. *The violence of the green revolution: third world agriculture, ecology and politics.* London and New York: Zed Books, 1991.

Shiva, Vandana. *Earth democracy: Justice, sustainability and peace.* Berkeley, California: North Atlantic Books, 2005.

Simondon, Gilbert. *On the mode of existence of technical objects.* Translated by Cecile Malaspina and John Rogove. Minneapolis: Univocal Publishing, 2017.

Souriau, Étienne. *The different modes of existence.* Translated by Erik Beranek and Tim Howles. Minneapolis & London: University of Minnesota Press, 2016.

Stark, Whitney. "Assembled bodies: Reconfiguring quantum identities." *The Minnesota Review*, no. 88 (2017): 69–82.

Stengers, Isabelle. *The invention of modern science.* Translated by Daniel W. Smith. Minneapolis & London: University of Minnesota Press, 2000.

Tate, Shirley Anne. *From Post-Intersectionality to Black Decolonial Feminism: Black Skin Affections.* New York: Routledge, 2023.

Van der Tuin, Iris. "New feminist materialisms." *Women's Studies International Forum* 34, no. 4 (2011): 271–277.

Van der Tuin, Iris. *Generational feminism: New materialist introduction to a generative approach.* Lexington Books, 2014.

Wajcman, Judy. *Feminism confronts technology.* University Park: Pennsylvania State Press, 1991.

Welang, Nahum. "Triple consciousness: The reimagination of Black female identities in contemporary American culture." *Open Cultural Studies* 2, no. 1 (2018): 296–306.

Whitehead, Eastman, Timothy E., and Hank Keeton. eds. *Physics and Whitehead: Quantum, process, and experience.* Albany, New York: State University of New York Press, 2012.

Wilson, Alastair. *The nature of contingency: Quantum physics as modal realism.* Oxford: Oxford University Press, 2020.

Wyatt, Nicole. "Did Duns Scotus invent possible worlds semantics?" *Australasian Journal of Philosophy* 78, no. 2 (2000): 196–212.

Wynter, Sylvia. "Unsettling the coloniality of being/power/truth/freedom: Towards the human, after man, its overrepresentation—An argument." *CR: The new centennial review* 3, no. 3 (2003): 257–337. https://www.jstor.org/stable/41949874

Young, Thomas. "II. The Bakerian Lecture. On the theory of light and colours." *Philosophical transactions of the Royal Society of London* 92, (1802): 12–48. http://doi.org/10.1098/rstl.1802.0004