

Shan Gao

Curriculum Vitae

Research Center for Philosophy of Science
and Technology, Shanxi University
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Born on May 1, 1971. Nationality: P. R. China

Employment History

Since 2017: Professor, Research Center for Philosophy of Science and Technology
Shanxi University

2014-2017: Associate Professor, Institute for the History of Natural Sciences,
Chinese Academy of Sciences

2013-2014: Assistant Professor, Institute for the History of Natural Sciences,
Chinese Academy of Sciences

Areas of Research

Foundations of Quantum Mechanics, Philosophy of Physics, Philosophy of Mind

Education

2009-2012: PhD in History and Philosophy of Science, University of Sydney.

Supervisors: Huw Price and Dean Rickles

Thesis: Interpreting Quantum Mechanics in Terms of Random Discontinuous Motion of Particles

1992-1995: MSc, Institute of Electronics, Chinese Academy of Sciences.

Dissertation: An Application of Fuzzy Mathematics in Pattern Recognition

1988-1992: BSc in Electronic Engineering, Beihang University

Fellowships and Awards

2024, Visiting Fellow at the Center for Philosophy of Science, University of Pittsburgh

2018, Young Scholar of the Yangtze River Scholars Program, Ministry of Education of the
People's Republic of China

2016 - 2019, Research Project grant from National Social Science Foundation of China, Grant No:
16BZX021 (200K RMB), "Studies on the measurement problem".

2015 - 2017, Research Project grant from Chinese Academy of Sciences (150K RMB),
"Implications of the meaning of the wave function for solving the measurement problem".

2014 - 2016, Research Project grant from Ministry of Education of the People's Republic of China
(30K RMB), "Meaning of the wave function".

2014 - 2015, Top Priorities Program of the Institute for the History of Natural Sciences, Chinese Academy of Sciences under Grant No. Y45001209G (60K RMB). “History of collapse theories”.

2010, Lucy Firth Scholarship in Philosophy

2009, Lucy Firth Scholarship in Philosophy

2009-2012, University of Sydney International Scholarship

2009-2012, Postgraduate Scholarship in Quantum Foundations

Papers

1. Shan Gao, Global Branching and Everettian Probability: A Critique of Sebens and Carroll’s Proposal. *Foundations of Physics* 55, 78 (2025).
2. Shan Gao, Comment on “Aharonov-Bohm Phase Is Locally Generated Like All Other Quantum Phases”. *Physical Review Letters* 135, 098901 (2025).
3. Shan Gao, Comment on “Energy-level shift of quantum systems via the scalar electric Aharonov-Bohm effect”. *Physical Review A* 111, 066203 (2025).
4. Shan Gao, A No-Go Theorem for Psi-Ontic Models? No, Surely Not! *Foundations of Physics* 55, 32 (2025).
5. Shan Gao, On the Reality of the Quantum State Once Again: A No-Go Theorem for Psi-Ontic Models?. *Foundations of Physics* 54, 52 (2024).
6. Shan Gao, Does Locality Imply Reality of the Wave Function? Hardy’s Theorem Revisited. *Foundations of Physics* 54, 44 (2024).
7. Shan Gao, Why the Global Phase is Not Real. *Foundations of Physics* 54, 19 (2024).
8. Shan Gao, Is the Universe in a Mixed State? *Foundations of Physics* 54, 7 (2024).
9. Shan Gao, Can the Ontology of Bohmian Mechanics Consists Only in Particles? The PBR Theorem Says No. *Foundations of Physics* 53, 91 (2023).
10. Shan Gao, Is Superluminal Signaling Possible in Collapse Theories of Quantum Mechanics? *Foundations of Physics* 53, 87 (2023).
11. Shan Gao, Can Pragmatist Quantum Realism Explain Protective Measurements? *Foundations of Physics* 53, 11 (2022).
12. Shan Gao, Protective Measurements and the Reality of the Wave Function. *The British Journal for the Philosophy of Science*, 73(3), 777-794 (2022).
13. Shan Gao, Understanding Time Reversal in Quantum Mechanics: A New Derivation. *Foundations of Physics* 52, 114 (2022).
14. Shan Gao, On Bell’s Everett (?) Theory. *Foundations of Physics* 52, 89 (2022).
15. Shan Gao, Is Retrocausal Quantum Mechanics Consistent with Special Relativity? *Foundations of Physics* 52, 24 (2022).
16. Shan Gao, A No-Go Result for QBism. *Foundations of Physics* 51, 103 (2021).
17. Shan Gao, Does Quantum Cognition Imply Quantum Minds? *Journal of Consciousness*

- Studies* 28, 3-4 (2021).
18. Shan Gao, Existence of macroscopic spatial superpositions in collapse theories. *Studies in History and Philosophy of Science* 86, 1-5 (2021).
 19. Shan Gao, A Puzzle for the Field Ontologists. *Foundations of Physics* 50, 1541-1553 (2020).
 20. Shan Gao, The measurement problem revisited. *Synthese* 196, 299-311 (2019).
 21. Shan Gao, Why protective measurement implies the reality of the wave function: Further consolidation. In D. Aerts, M. Chiara, C. de Ronde and D. Krause (eds.), *Probing the Meaning of Quantum Mechanics: Information, Contextuality, Relationalism and Entanglement*, World Scientific. 2019. pp. 89-98.
 22. Shan Gao, Three arguments for the reality of wave-function collapse. In S. Gao (ed.), *Collapse of the Wave Function: Models, Ontology, Origin, and Implications*. Cambridge: Cambridge University Press, 2018.
 23. Shan Gao, Is an Electron a Charge Cloud? A Reexamination of Schrödinger's Charge Density Hypothesis. *Foundations of Science* 23, 145-157 (2018).
 24. Shan Gao, Some thoughts on quantum nonlocality and its apparent incompatibility with relativity. In S. Gao (ed.), *Quantum Nonlocality and Reality: 50 Years of Bell's theorem*. Cambridge: Cambridge University Press, 2016.
 25. Shan Gao, An argument for ψ -ontology in terms of protective measurements. *Studies in History and Philosophy of Modern Physics*, 52, 198-202 (2015).
 26. Shan Gao, How do electrons move in atoms? –From the Bohr model to quantum mechanics. In F. Aaserud and H. Kragh (eds.), *One Hundred Years of the Bohr Atom: Proceedings From a Conference*, Scientia Danica. Series M: Mathematica et physica, vol. 1. Copenhagen: Royal Danish Academy of Sciences and Letters, 2015. pp. 450-464.
 27. Shan Gao, Reality and meaning of the wave function. In S. Gao (ed.), *Protective Measurement and Quantum Reality: Toward a New Understanding of Quantum Mechanics*. Cambridge: Cambridge University Press, 2014.
 28. Shan Gao, On the possibility of nonlinear quantum evolution and superluminal communication, *International Journal of Modern Physics: Conference Series*, 33, 1-6 (2014).
 29. Shan Gao, Three possible implications of spacetime discreteness. In *Space-Time Geometry and Quantum Events*, Ignazio Licata (ed.) New York: Nova Science Publishers. 197-214 (2014).
 30. Shan Gao, On Uffink's criticism of protective measurements, *Studies in History and Philosophy of Modern Physics*, 44, 513-518 (2013).
 31. Shan Gao, Explaining holographic dark energy. *Galaxies* special issue "Particle Physics and Quantum Gravity Implications for Cosmology", Gerald B. Cleaver (eds). 1, 180-191 (2013).
 32. Shan Gao, Does gravity induce wavefunction collapse? An examination of Penrose's conjecture. *Studies in History and Philosophy of Modern Physics*, 44, 148-151 (2013).
 33. Shan Gao, A discrete model of energy-conserved wavefunction collapse, *Proceedings of the*

- Royal Society A* 469, 20120526 (2013).
34. Shan Gao, A quantum physical argument for panpsychism, *Journal of Consciousness Studies*, 20, 59-70 (2013).
 35. Shan Gao, Is gravity an entropic force? *Entropy* special issue “Black Hole Thermodynamics”, Jacob D. Bekenstein (ed.). 13, 936-948 (2011).
 36. Shan Gao, Meaning of the wave function, *International Journal of Quantum Chemistry*, 111, 4124-4138 (2011).
 37. Shan Gao, The wave function and quantum reality, in *Proceedings of the International Conference on Advances in Quantum Theory*, A. Khrennikov, G. Jaeger, M. Schlosshauer, G. Weihs (eds.), *AIP Conference Proceedings* 1327, 334-338 (2011).
 38. Shan Gao, On Diósi-Penrose criterion of gravity-induced quantum collapse, *International Journal of Theoretical Physics*, 49, 849–853 (2010).
 39. Shan Gao, A quantum theory of consciousness, *Minds and Machines*, 18, 39-52 (2008).
 40. Shan Gao, A model of wavefunction collapse in discrete space-time, *International Journal of Theoretical Physics*, 45, 1965-1979 (2006).
 41. Shan Gao, A conjecture on the origin of dark energy, *Chinese Physics Letters* 22, 783 (2005).
 42. Shan Gao, Quantum collapse, consciousness and superluminal communication, *Foundations of Physics Letters*, 17, 167-182 (2004).

Books

1. Shan Gao, *Meaning of the Wave Function: In Search of the Ontology of Quantum Mechanics*. Cambridge: Cambridge University Press. 2017.
2. Shan Gao, *God Does Play Dice with the Universe*. Beijing: Tsinghua University Press, 2009. (in Chinese)
3. Shan Gao, *Quantum: A Historical and Logical Journey*. Beijing: Tsinghua University Press, 2003. (in Chinese)

Edited Volumes

1. Shan Gao, *Consciousness and Quantum Mechanics*. Oxford: Oxford University Press. 2022.
2. Shan Gao, *Collapse of the Wave Function: Models, Ontology, Origin, and Implications*. Cambridge: Cambridge University Press. 2018.
3. Mary Bell and Shan Gao, *Quantum Nonlocality and Reality: 50 Years of Bell's theorem*. Cambridge: Cambridge University Press. 2016.
4. Shan Gao, *Protective Measurement and Quantum Reality: Toward a New Understanding of Quantum Mechanics*. Cambridge: Cambridge University Press. 2015.

Talks

1. What Does Quantum Mechanics Tell Us about Reality? Lunch Time Talk at the Center for

Philosophy of Science, University of Pittsburgh, March 19, 2024.

2. Interpreting Quantum Mechanics in Terms of Random Discontinuous Motion of Particles. International Workshop on “The Meaning of the Wave Function”. Shanxi University, Taiyuan, China, October 12-14, 2018.
3. A Particle Ontological Interpretation of the Wave Function. EmQM17: Towards Ontology of Quantum Mechanics and the Conscious Agent. David Bohm Centennial Symposium. University of London, UK, 26-28 October 2017.
4. An argument for ψ -ontology in terms of protective measurements. The 18th UK and European Conference on Foundations of Physics, London School of Economics, UK, 16-18 July 2016.
5. How do electrons move in atoms? – From the Bohr model to quantum mechanics. The history of science conference: One hundred years of the Bohr atom, Niels Bohr Archive, Copenhagen, 11-14 June 2013.
5. Protective measurement and the interpretation of the wave function, PIAF (Perimeter Institute - Australia Foundations) Workshop in Foundations, Griffith University, Brisbane, 1-3 December 2010.
6. The discreteness of spacetime and its three possible implications, Foundations of Physics Seminar, Centre for Time (SOPHI), University of Sydney, 10 November 2010.
7. Meaning of the wave function, HPS Research Seminar, Unit for History and Philosophy of Science, University of Sydney, 25 October 2010.
8. Does motion have a cause? Workshop on Decision and Causation, University of Sydney, 30 April 2010.
9. The wave function and quantum reality, Foundations of Physics Seminar, Centre for Time (SOPHI), University of Sydney, 14 October 2009.

Teaching

Philosophy of Quantum Mechanics: Fall 2019 - Fall 2022

Advanced Topics in Philosophy of Science, Fall 2017 - Fall, 2025

Professional Service

Managing Editor, *International Journal of Quantum Foundations*, 2015 to present

Served as a referee for *British Journal for the Philosophy of Science*, *European Journal for Philosophy of Science*, *International Studies in the Philosophy of Science*, *Foundations of Physics*, *Foundations of Science*, *Journal of Consciousness Studies*, *Mind and Matter*, *Sophia*, *Studies in the History of Natural Sciences (in Chinese)*, *Synthese*, *Theoria*, and Cambridge University Press.